

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

### H01 BASIC ELECTRIC ELEMENTS

(NOTE omitted)

**H01L SEMICONDUCTOR DEVICES; ELECTRIC SOLID STATE DEVICES NOT OTHERWISE PROVIDED FOR** (use of semiconductor devices for measuring [G01](#); resistors in general [H01C](#); magnets, inductors {in general} , transformers [H01F](#); capacitors in general [H01G](#); electrolytic devices [H01G 9/00](#); batteries, accumulators [H01M](#); waveguides, resonators or lines of the waveguide type [H01P](#); line connectors, current collectors [H01R](#); stimulated emission devices [H01S](#); electromechanical resonators [H03H](#); loudspeakers, microphones, gramophone pick-ups or like acoustic electromechanical transducers [H04R](#); electric light sources in general [H05B](#); printed circuits, hybrid circuits, casings or constructional details of electric apparatus, manufacture of assemblages of electrical components [H05K](#); use of semiconductor devices in circuits having a particular application, see the subclass for the application)

#### NOTES

1. This subclass covers:
  - electric solid state devices which are not covered by any other subclass and details thereof, and includes: semiconductor devices adapted for rectifying, amplifying, oscillating or switching; semiconductor devices sensitive to radiation; electric solid state devices using thermoelectric, superconductive, piezo-electric, electrostrictive, magnetostrictive, galvanomagnetic or bulk negative resistance effects and integrated circuit devices;
  - photoresistors, magnetic field dependent resistors, field effect resistors, capacitors with potential-jump barrier, resistors with potential-jump barrier or surface barrier, incoherent light emitting diodes and thin-film or thick-film circuits;
  - processes and apparatus adapted for the manufacture or treatment of such devices, except where such processes relate to single-step processes for which provision exists elsewhere.
2. In this subclass, the following terms or expressions are used with the meaning indicated:
  - "wafer" means a slice of semiconductor or crystalline substrate material, which can be modified by impurity diffusion (doping), ion implantation or epitaxy, and whose active surface can be processed into arrays of discrete components or integrated circuits;
  - "solid state body" means the body of material within which, or at the surface of which, the physical effects characteristic of the device occur. In thermoelectric devices, it includes all materials in the current path.  
Regions in or on the body of the device (other than the solid state body itself), which exert an influence on the solid state body electrically, are considered to be "electrodes" whether or not an external electrical connection is made thereto. An electrode may include several portions and the term includes metallic regions which exert influence on the solid state body through an insulating region (e.g. capacitive coupling) and inductive coupling arrangements to the body. The dielectric region in a capacitive arrangement is regarded as part of the electrode. In arrangements including several portions, only those portions which exert an influence on the solid state body by virtue of their shape, size, or disposition or the material of which they are formed are considered to be part of the electrode. The other portions are considered to be "arrangements for conducting electric current to or from the solid state body" or "interconnections between solid state components formed in or on a common substrate", i.e. leads;
  - "device" means an electric circuit element; where an electric circuit element is one of a plurality of elements formed in or on a common substrate it is referred to as a "component";
  - "complete device" is a device in its fully assembled state which may or may not require further treatment, e.g. electroforming, before it is ready for use but which does not require the addition of further structural units;
  - "parts" includes all structural units which are included in a complete device;
  - "container" is an enclosure forming part of the complete device and is essentially a solid construction in which the body of the device is placed, or which is formed around the body without forming an intimate layer thereon. An enclosure which consists of one or more layers formed on the body and in intimate contact therewith is referred to as an "encapsulation";
  - "integrated circuit" is a device where all components, e.g. diodes, resistors, are built up on a common substrate and form the device including interconnections between the components;
  - "assembly" of a device is the building up of the device from its component constructional units and includes the provision of fillings in containers.
3. In this subclass, both the process or apparatus for the manufacture or treatment of a device and the device itself are classified, whenever both of these are described sufficiently to be of interest.

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(continued)

4. Attention is drawn to Note (3) after the title of section [C](#), which Note indicates to which version of the periodic table of chemical elements the IPC refers. In this subclass, the Periodic System used is the 8 group system indicated by Roman numerals in the Periodic Table thereunder.

**WARNING**

The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

H01L 21/301	covered by	<a href="#">H01L 21/30</a>
H01L 21/328	covered by	<a href="#">H01L 29/66075</a>
H01L 21/329	covered by	<a href="#">H01L 29/66083</a>
H01L 21/33	covered by	<a href="#">H01L 29/66227</a>
H01L 21/331	covered by	<a href="#">H01L 29/66234</a>
H01L 21/332	covered by	<a href="#">H01L 29/66363</a>
H01L 21/334	covered by	<a href="#">H01L 29/66075</a>
H01L 21/335	covered by	<a href="#">H01L 29/66409</a>
H01L 21/336	covered by	<a href="#">H01L 29/66477</a>
H01L 21/337	covered by	<a href="#">H01L 29/66893</a>
H01L 21/338	covered by	<a href="#">H01L 29/66848</a>
H01L 21/339	covered by	<a href="#">H01L 29/66946</a>
H01L 21/36-H01L 21/368	covered by	
H01L 21/58	covered by	<a href="#">H01L 24/80</a>
H01L 21/60	covered by	<a href="#">H01L 24/80</a>
H01L 21/66	covered by	<a href="#">H01L 22/00</a>
H01L 21/603	covered by	<a href="#">H01L 24/80</a>
H01L 21/607	covered by	<a href="#">H01L 24/80</a>
H01L 21/8242	covered by	<a href="#">H01L 27/10844</a>
H01L 21/8244	covered by	<a href="#">H01L 27/11</a>
H01L 21/8246	covered by	<a href="#">H01L 27/112</a>
H01L 21/98	covered by	<a href="#">H01L 25/50</a>
H01L 29/38	covered by	<a href="#">H01L 29/04-H01L 29/365</a>
H01L 29/96	covered by	<a href="#">H01L 29/68-H01L 29/945</a>
H01L 51/30	covered by	<a href="#">H01L 51/0032</a>
H01L 51/40	covered by	<a href="#">H01L 51/0001</a>
H01L 51/46	covered by	<a href="#">H01L 51/0032</a>
H01L 51/48	covered by	<a href="#">H01L 51/0001</a>
H01L 51/54	covered by	<a href="#">H01L 51/0032</a>

- 21/00 Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof** (testing or measuring during manufacture or treatment, or reliability measurements [H01L 22/00](#); multistep manufacturing processes for passive two-terminal components without a potential-jump or surface barrier for integrated circuits [H01L 28/00](#); ) processes or apparatus peculiar to the manufacture or treatment of devices provided for in groups [H01L 31/00](#) - [H01L 51/00](#) or of parts thereof, see these groups; single-step processes covered by other subclasses, see the relevant subclasses, e.g. [C23C](#), [C30B](#); photomechanical production of textured or patterned surfaces, materials or originals therefor, apparatus specially adapted therefor, in general [G03F](#))
- 21/02 . Manufacture or treatment of semiconductor devices or of parts thereof
- 21/02002 . . {Preparing wafers}

- simple use of grinding or polishing machines [B24B](#)
- thermal smoothening [H01L 21/324](#)

- 21/02005 . . . {Preparing bulk and homogeneous wafers}
- 21/02008 . . . . {Multistep processes}
- 21/0201 . . . . . {Specific process step}
- 21/02013 . . . . . {Grinding, lapping}
- 21/02016 . . . . . {Backside treatment}
- 21/02019 . . . . . {Chemical etching}
- 21/02021 . . . . . {Edge treatment, chamfering}
- 21/02024 . . . . . {Mirror polishing}
- 21/02027 . . . . {Setting crystal orientation}
- 21/0203 . . . . {Making porous regions on the surface}
- 21/02032 . . . . {by reclaiming or re-processing}
- 21/02035 . . . . {Shaping}
- 21/02041 . . {Cleaning}
- 21/02043 . . . {Cleaning before device manufacture, i.e. Begin-Of-Line process}
- 21/02046 . . . . {Dry cleaning only ([H01L 21/02085](#) takes precedence)}
- 21/02049 . . . . . {with gaseous HF}
- 21/02052 . . . . {Wet cleaning only ([H01L 21/02085](#) takes precedence)}
- 21/02054 . . . . {combining dry and wet cleaning steps ([H01L 21/02085](#) takes precedence)}
- 21/02057 . . . {Cleaning during device manufacture}

**NOTES**

1. This group covers processes for manufacturing wafers prior to the fabrication of any device, i.e. between the sawing of ingots (covered by [B28D](#)) and the cleaning of substrates (covered by [H01L 21/02041](#) ).
2. This group does not cover:

- 21/0206 . . . . {during, before or after processing of insulating layers}
- 21/02063 . . . . {the processing being the formation of vias or contact holes}
- 21/02065 . . . . {the processing being a planarization of insulating layers}
- 21/02068 . . . . {during, before or after processing of conductive layers, e.g. polysilicon or amorphous silicon layers}
- 21/02071 . . . . {the processing being a delineation, e.g. RIE, of conductive layers}
- 21/02074 . . . . {the processing being a planarization of conductive layers}
- 21/02076 . . . {Cleaning after the substrates have been singulated}
- 21/02079 . . . {Cleaning for reclaiming}
- 21/02082 . . . {product to be cleaned}
- 21/02085 . . . . {Cleaning of diamond}
- 21/02087 . . . . {Cleaning of wafer edges}
- 21/0209 . . . . {Cleaning of wafer backside}
- 21/02093 . . . . {Cleaning of porous materials}
- 21/02096 . . . {only mechanical cleaning}
- 21/02098 . . . {only involving lasers, e.g. laser ablation}
- 21/02101 . . . {only involving supercritical fluids}
- 21/02104 . . {Forming layers ([deposition in general C23C](#); [crystal growth in general C30B](#))}
- WARNING**
- Groups [H01L 21/02104](#) – [H01L 21/02694](#) are incomplete pending reclassification of documents from groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#).
- Groups [H01L 21/02104](#) – [H01L 21/02694](#), [H01L 21/06](#), [H01L 21/20](#), and [H01L 21/16](#) should be considered in order to perform a complete search.
- 21/02107 . . . {Forming insulating materials on a substrate}
- WARNING**
- Groups [H01L 21/02107](#) – [H01L 21/02326](#) are incomplete pending reclassification of documents from groups [H01L 21/312](#), [H01L 21/314](#), [H01L 21/316](#), and [H01L 21/318](#).
- Groups [H01L 21/02107](#) – [H01L 21/02326](#), [H01L 21/312](#), [H01L 21/314](#), [H01L 21/316](#), and [H01L 21/318](#) should be considered in order to perform a complete search.
- 21/02109 . . . . {characterised by the type of layer, e.g. type of material, porous/non-porous, pre-cursors, mixtures or laminates}
- 21/02112 . . . . {characterised by the material of the layer}
- NOTE**
- Layers comprising sublayers, i.e. multi-layers, are additionally classified in [H01L 21/022](#); porous layers are additionally classified in [H01L 21/02203](#)
- 21/02115 . . . . {the material being carbon, e.g. alpha-C, diamond or hydrogen doped carbon}
- 21/02118 . . . . . {carbon based polymeric organic or inorganic material, e.g. polyimides, poly cyclobutene or PVC ([polymers per se C08G](#), [photoresist per se G03F](#))}
- 21/0212 . . . . . {the material being fluoro carbon compounds, e.g.(CF<sub>x</sub>)<sub>n</sub>, (CH<sub>x</sub>F<sub>y</sub>)<sub>n</sub> or polytetrafluoroethylene}
- 21/02123 . . . . . {the material containing silicon}
- 21/02126 . . . . . {the material containing Si, O, and at least one of H, N, C, F, or other non-metal elements, e.g. SiOC, SiOC:H or SiONC}
- 21/02129 . . . . . {the material being boron or phosphorus doped silicon oxides, e.g. BPSG, BSG or PSG}
- NOTE**
- Halogen, e.g. fluorine, containing BPSG, PSG, BSG, and the like, are additionally classified in [H01L 21/02131](#)
- 21/02131 . . . . . {the material being halogen doped silicon oxides, e.g. FSG}
- 21/02134 . . . . . {the material comprising hydrogen silsesquioxane, e.g. HSQ}
- 21/02137 . . . . . {the material comprising alkyl silsesquioxane, e.g. MSQ}
- 21/0214 . . . . . {the material being a silicon oxynitride, e.g. SiON or SiON:H}
- 21/02142 . . . . . {the material containing silicon and at least one metal element, e.g. metal silicate based insulators or metal silicon oxynitrides}
- 21/02145 . . . . . {the material containing aluminium, e.g. AlSiO<sub>x</sub>}
- 21/02148 . . . . . {the material containing hafnium, e.g. HfSiO<sub>x</sub> or HfSiON}
- 21/0215 . . . . . {the material containing tantalum, e.g. TaSiO<sub>x</sub>}
- 21/02153 . . . . . {the material containing titanium, e.g. TiSiO<sub>x</sub>}
- 21/02156 . . . . . {the material containing at least one rare earth element, e.g. silicate of lanthanides, scandium or yttrium}
- 21/02159 . . . . . {the material containing zirconium, e.g. ZrSiO<sub>x</sub>}
- 21/02161 . . . . . {the material containing more than one metal element}
- 21/02164 . . . . . {the material being a silicon oxide, e.g. SiO<sub>2</sub>}
- NOTE**
- The formation of silicon oxide layers is classified in this group regardless of the precursor or of the process of formation; in case of explicit statements on doping, on rest-groups, or on material components see [H01L 21/02126](#) and subgroups; deposition of silicon oxide from organic precursors without further statements on film

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- 21/02167 . . . . . {the material being a silicon carbide not containing oxygen, e.g. SiC, SiC:H or silicon carbonitrides ([H01L 21/02126](#) and [H01L 21/0214](#) take precedence)}
- 21/0217 . . . . . {the material being a silicon nitride not containing oxygen, e.g. SixNy or SixByNz ([H01L 21/02126](#) and [H01L 21/0214](#) take precedence)}
- 21/02172 . . . . . {the material containing at least one metal element, e.g. metal oxides, metal nitrides, metal oxynitrides or metal carbides (materials containing silicon [H01L 21/02123](#); metal silicates [H01L 21/02142](#))}
- 21/02175 . . . . . {characterised by the metal ([H01L 21/02197](#) takes precedence)}
- 21/02178 . . . . . {the material containing aluminium, e.g. Al<sub>2</sub>O<sub>3</sub>}
- 21/02181 . . . . . {the material containing hafnium, e.g. HfO<sub>2</sub>}
- 21/02183 . . . . . {the material containing tantalum, e.g. Ta<sub>2</sub>O<sub>5</sub>}
- 21/02186 . . . . . {the material containing titanium, e.g. TiO<sub>2</sub>}
- 21/02189 . . . . . {the material containing zirconium, e.g. ZrO<sub>2</sub>}
- 21/02192 . . . . . {the material containing at least one rare earth metal element, e.g. oxides of lanthanides, scandium or yttrium}
- 21/02194 . . . . . {the material containing more than one metal element}
- 21/02197 . . . . . {the material having a perovskite structure, e.g. BaTiO<sub>3</sub>}
- 21/022 . . . . . {the layer being a laminate, i.e. composed of sublayers, e.g. stacks of alternating high-k metal oxides (adhesion layers or buffer layers [H01L 21/02304](#), [H01L 21/02362](#))}
- 21/02203 . . . . . {the layer being porous}
- 21/02205 . . . . . {the layer being characterised by the precursor material for deposition}
- 21/02208 . . . . . {the precursor containing a compound comprising Si}
- 21/02211 . . . . . {the compound being a silane, e.g. disilane, methylsilane or chlorosilane}
- 21/02214 . . . . . {the compound comprising silicon and oxygen}
- NOTE**
- This group does not cover mixtures of a silane and oxygen
- 21/02216 . . . . . {the compound being a molecule comprising at least one silicon-oxygen bond and the compound having hydrogen or an organic group attached to the silicon or oxygen, e.g. a siloxane}

- 21/02219 . . . . . {the compound comprising silicon and nitrogen}
- NOTE**
- This group does not cover mixtures of silane and nitrogen
- 21/02222 . . . . . {the compound being a silazane}
- 21/02225 . . . . . {characterised by the process for the formation of the insulating layer}
- 21/02227 . . . . . {formation by a process other than a deposition process}
- NOTE**
- Subject matter classified in the range of [H01L 21/0223](#) - [H01L 21/02249](#) is additionally classified in [H01L 21/02249](#), [H01L 21/02255](#) and [H01L 21/02252](#), depending on the type of reaction
- 21/0223 . . . . . {formation by oxidation, e.g. oxidation of the substrate}
- 21/02233 . . . . . {of the semiconductor substrate or a semiconductor layer}
- 21/02236 . . . . . {group IV semiconductor}
- 21/02238 . . . . . {silicon in uncombined form, i.e. pure silicon}
- 21/02241 . . . . . {III-V semiconductor}
- 21/02244 . . . . . {of a metallic layer}
- 21/02247 . . . . . {formation by nitridation, e.g. nitridation of the substrate}
- 21/02249 . . . . . {formation by combined oxidation and nitridation performed simultaneously}
- 21/02252 . . . . . {formation by plasma treatment, e.g. plasma oxidation of the substrate (after treatment of an insulating film by plasma [H01L 21/3105](#) and subgroups)}
- 21/02255 . . . . . {formation by thermal treatment ([H01L 21/02252](#) takes precedence; after treatment of an insulating film [H01L 21/3105](#) and subgroups)}
- 21/02258 . . . . . {formation by anodic treatment, e.g. anodic oxidation}
- 21/0226 . . . . . {formation by a deposition process ([per se C23C](#))}
- 21/02263 . . . . . {deposition from the gas or vapour phase}
- NOTE**
- This group and subgroups also cover deposition methods in which the gas or vapour is produced by physical means, e.g. ablation from targets or heating of source material
- 21/02266 . . . . . {deposition by physical ablation of a target, e.g. sputtering, reactive sputtering, physical vapour deposition or pulsed laser deposition}

- 21/02269 . . . . . {deposition by thermal evaporation  
([H01L 21/02293](#) takes precedence)}
- NOTE**  
Subject matter relating to molecular beam epitaxy is classified in this group
- 21/02271 . . . . . {deposition by decomposition or reaction of gaseous or vapour phase compounds, i.e. chemical vapour deposition ([H01L 21/02266](#) takes precedence)}
- 21/02274 . . . . . {in the presence of a plasma [PECVD]}
- 21/02277 . . . . . {the reactions being activated by other means than plasma or thermal, e.g. photo-CVD}
- 21/0228 . . . . . {deposition by cyclic CVD, e.g. ALD, ALE, pulsed CVD}
- NOTE**  
Subject matter relating to cyclic plasma CVD is additionally classified in [H01L 21/02274](#)
- 21/02282 . . . . . {liquid deposition, e.g. spin-coating, sol-gel techniques, spray coating}
- 21/02285 . . . . . {Langmuir-Blodgett techniques}
- 21/02288 . . . . . {printing, e.g. ink-jet printing ([per se B41J](#))}
- 21/0229 . . . . . {liquid atomic layer deposition}
- 21/02293 . . . . . {formation of epitaxial layers by a deposition process ([epitaxial growth per se C30B](#))}
- NOTE**  
Formation of non-epitaxial layers by MBE, ALE, etc. is not covered by this group; for MBE [see H01L 21/02269](#); for ALE [see H01L 21/0228](#)
- 21/02296 . . . . . {characterised by the treatment performed before or after the formation of the layer ([H01L 21/02227](#) and subgroups take precedence)}
- NOTE**  
This group and subgroups only cover processes which are directly linked to the layer formation; routine anneals, i.e. thermal treatment without further features like a special atmosphere, presence of a plasma, thermally induced chemical reactions, change of phase (crystal structure) etc. are not classified here; for cleaning [see H01L 21/02041](#) and subgroups; for etching processes [see H01L 21/311](#) and subgroups; for planarization processes [see H01L 21/31051](#) and subgroups; for processes to repair etch damage [see H01L 21/3105](#) and subgroups
- 21/02299 . . . . . {pre-treatment}
- NOTE**  
This group and subgroups cover treatments to improve adhesion or change the surface termination; for etching [see H01L 21/306](#) and subgroups and [H01L 21/311](#) and subgroups
- 21/02301 . . . . . {in-situ cleaning}
- NOTE**  
Subject matter relating to the cleaning processes for semiconductor devices in general is covered by [H01L 21/02041](#) and subgroups
- 21/02304 . . . . . {formation of intermediate layers, e.g. buffer layers, layers to improve adhesion, lattice match or diffusion barriers}
- 21/02307 . . . . . {treatment by exposure to a liquid}
- 21/0231 . . . . . {treatment by exposure to electromagnetic radiation, e.g. UV light}
- 21/02312 . . . . . {treatment by exposure to a gas or vapour}
- 21/02315 . . . . . {treatment by exposure to a plasma}
- 21/02318 . . . . . {post-treatment}
- NOTE**  
This group only covers processes that are part of the layer formation; treatments which are performed after completion of the insulating layer are covered by [H01L 21/3105](#) and subgroups
- 21/02321 . . . . . {introduction of substances into an already existing insulating layer ([H01L 21/02227](#) and subgroups take precedence)}
- NOTE**  
processes like the introduction of phosphorus into silicon oxide by diffusion, or doping of an already existing insulating layer are covered by this group and subgroups; for the method of introduction, [see H01L 21/02337](#), [H01L 21/02343](#), [H01L 21/02345](#) and subgroups
- 21/02323 . . . . . {introduction of oxygen}
- 21/02326 . . . . . {into a nitride layer, e.g. changing SiN to SiON}
- 21/02329 . . . . . {introduction of nitrogen}
- 21/02332 . . . . . {into an oxide layer, e.g. changing SiO to SiON}
- 21/02334 . . . . . {in-situ cleaning after layer formation, e.g. removing process residues}
- NOTE**  
Subject matter relating to the cleaning processes for semiconductor

H01L

H01L 21/02334

(continued)

devices in general is covered by  
[H01L 21/02041](#) and subgroups

- 21/02337 . . . . . {treatment by exposure to a gas or vapour}
- 21/0234 . . . . . {treatment by exposure to a plasma}
- 21/02343 . . . . . {treatment by exposure to a liquid}
- 21/02345 . . . . . {treatment by exposure to radiation, e.g. visible light}
- 21/02348 . . . . . {treatment by exposure to UV light}
- 21/02351 . . . . . {treatment by exposure to corpuscular radiation, e.g. exposure to electrons, alpha-particles, protons or ions}
- 21/02354 . . . . . {using a coherent radiation, e.g. a laser}
- 21/02356 . . . . . {treatment to change the morphology of the insulating layer, e.g. transformation of an amorphous layer into a crystalline layer}
- 21/02359 . . . . . {treatment to change the surface groups of the insulating layer}
- 21/02362 . . . . . {formation of intermediate layers, e.g. capping layers or diffusion barriers}
- 21/02365 . . . . . {Forming inorganic semiconducting materials on a substrate (for light-sensitive devices [H01L 31/00](#))}

**WARNING**

Group [H01L 21/02365](#) is incomplete pending reclassification of documents from groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#)

Groups [H01L 21/06](#), [H01L 21/16](#), and [H01L 21/20](#) should be considered in order to perform a complete search.

- 21/02367 . . . . . {Substrates}
- 21/0237 . . . . . {Materials}
- 21/02373 . . . . . {Group 14 semiconducting materials}
- 21/02376 . . . . . {Carbon, e.g. diamond-like carbon}
- 21/02378 . . . . . {Silicon carbide}
- 21/02381 . . . . . {Silicon, silicon germanium, germanium}
- 21/02384 . . . . . {including tin}
- 21/02387 . . . . . {Group 13/15 materials}
- 21/02389 . . . . . {Nitrides}
- 21/02392 . . . . . {Phosphides}
- 21/02395 . . . . . {Arsenides}
- 21/02398 . . . . . {Antimonides}
- 21/024 . . . . . {Group 12/16 materials}
- 21/02403 . . . . . {Oxides}
- 21/02406 . . . . . {Sulfides}
- 21/02409 . . . . . {Selenides}
- 21/02411 . . . . . {Tellurides}
- 21/02414 . . . . . {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02417 . . . . . {Chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/0242 . . . . . {Crystalline insulating materials}
- 21/02422 . . . . . {Non-crystalline insulating materials, e.g. glass, polymers}

- 21/02425 . . . . . {Conductive materials, e.g. metallic silicides}
- 21/02428 . . . . . {Structure}
- 21/0243 . . . . . {Surface structure}
- 21/02433 . . . . . {Crystal orientation}
- 21/02436 . . . . . {Intermediate layers between substrates and deposited layers}
- 21/02439 . . . . . {Materials}
- 21/02441 . . . . . {Group 14 semiconducting materials}
- 21/02444 . . . . . {Carbon, e.g. diamond-like carbon}
- 21/02447 . . . . . {Silicon carbide}
- 21/0245 . . . . . {Silicon, silicon germanium, germanium}
- 21/02452 . . . . . {including tin}
- 21/02455 . . . . . {Group 13/15 materials}
- 21/02458 . . . . . {Nitrides}
- 21/02461 . . . . . {Phosphides}
- 21/02463 . . . . . {Arsenides}
- 21/02466 . . . . . {Antimonides}
- 21/02469 . . . . . {Group 12/16 materials}
- 21/02472 . . . . . {Oxides}
- 21/02474 . . . . . {Sulfides}
- 21/02477 . . . . . {Selenides}
- 21/0248 . . . . . {Tellurides}
- 21/02483 . . . . . {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02485 . . . . . {Other chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/02488 . . . . . {Insulating materials}
- 21/02491 . . . . . {Conductive materials}
- 21/02494 . . . . . {Structure}
- 21/02496 . . . . . {Layer structure}
- 21/02499 . . . . . {Monolayers}
- 21/02502 . . . . . {consisting of two layers}
- 21/02505 . . . . . {consisting of more than two layers}
- 21/02507 . . . . . {Alternating layers, e.g. superlattice}
- 21/0251 . . . . . {Graded layers}
- 21/02513 . . . . . {Microstructure}
- 21/02516 . . . . . {Crystal orientation}
- 21/02518 . . . . . {Deposited layers}
- 21/02521 . . . . . {Materials}
- 21/02524 . . . . . {Group 14 semiconducting materials}
- 21/02527 . . . . . {Carbon, e.g. diamond-like carbon}
- 21/02529 . . . . . {Silicon carbide}
- 21/02532 . . . . . {Silicon, silicon germanium, germanium}
- 21/02535 . . . . . {including tin}
- 21/02538 . . . . . {Group 13/15 materials}
- 21/0254 . . . . . {Nitrides}
- 21/02543 . . . . . {Phosphides}
- 21/02546 . . . . . {Arsenides}
- 21/02549 . . . . . {Antimonides}
- 21/02551 . . . . . {Group 12/16 materials}
- 21/02554 . . . . . {Oxides}
- 21/02557 . . . . . {Sulfides}
- 21/0256 . . . . . {Selenides}
- 21/02562 . . . . . {Tellurides}

- 21/02565 . . . . . {Oxide semiconducting materials not being Group 12/16 materials, e.g. ternary compounds}
- 21/02568 . . . . . {Chalcogenide semiconducting materials not being oxides, e.g. ternary compounds}
- 21/0257 . . . . . {Doping during depositing}
- 21/02573 . . . . . {Conductivity type}
- 21/02576 . . . . . {N-type}
- 21/02579 . . . . . {P-type}
- 21/02581 . . . . . {Transition metal or rare earth elements}
- 21/02584 . . . . . {Delta-doping}
- 21/02587 . . . . . {Structure}
- 21/0259 . . . . . {Microstructure}
- 21/02592 . . . . . {amorphous}
- 21/02595 . . . . . {polycrystalline}
- 21/02598 . . . . . {monocrystalline}
- 21/02601 . . . . . {Nanoparticles (fullerenes [H01L 51/0046](#))}
- 21/02603 . . . . . {Nanowires}
- 21/02606 . . . . . {Nanotubes (carbon nanotubes [H01L 51/0048](#))}
- 21/02609 . . . . . {Crystal orientation}
- 21/02612 . . . . . {Formation types}
- 21/02614 . . . . . {Transformation of metal, e.g. oxidation, nitridation}
- 21/02617 . . . . . {Deposition types}
- 21/0262 . . . . . {Reduction or decomposition of gaseous compounds, e.g. CVD}
- 21/02623 . . . . . {Liquid deposition}
- 21/02625 . . . . . {using melted materials}
- 21/02628 . . . . . {using solutions}
- 21/02631 . . . . . {Physical deposition at reduced pressure, e.g. MBE, sputtering, evaporation}
- 21/02634 . . . . . {Homoepitaxy}
- 21/02636 . . . . . {Selective deposition, e.g. simultaneous growth of mono- and non-monocrystalline semiconductor materials}
- 21/02639 . . . . . {Preparation of substrate for selective deposition}
- 21/02642 . . . . . {Mask materials other than SiO<sub>2</sub> or SiN}
- 21/02645 . . . . . {Seed materials}
- 21/02647 . . . . . {Lateral overgrowth}
- 21/0265 . . . . . {Pendeoepitaxy}
- 21/02653 . . . . . {Vapour-liquid-solid growth}
- 21/02656 . . . . . {Special treatments}
- 21/02658 . . . . . {Pretreatments (cleaning in general [H01L 21/02041](#))}
- 21/02661 . . . . . {In-situ cleaning}
- 21/02664 . . . . . {Aftertreatments (planarisation in general [H01L 21/304](#))}
- 21/02667 . . . . . {Crystallisation or recrystallisation of non-monocrystalline semiconductor materials, e.g. regrowth}
- 21/02669 . . . . . {using crystallisation inhibiting elements}
- 21/02672 . . . . . {using crystallisation enhancing elements}
- 21/02675 . . . . . {using laser beams}
- 21/02678 . . . . . {Beam shaping, e.g. using a mask}
- 21/0268 . . . . . {Shape of mask}
- 21/02683 . . . . . {Continuous wave laser beam}
- 21/02686 . . . . . {Pulsed laser beam}
- 21/02689 . . . . . {using particle beams}
- 21/02691 . . . . . {Scanning of a beam}
- 21/02694 . . . . . {Controlling the interface between substrate and epitaxial layer, e.g. by ion implantation followed by annealing}
- 21/02697 . . . . . {Forming conducting materials on a substrate}
- 21/027 . . . . . Making masks on semiconductor bodies for further photolithographic processing not provided for in group [H01L 21/18](#) or [H01L 21/34](#) { (photographic masks or originals [per se G03F 1/00](#); registration or positioning of photographic masks or originals [G03F 9/00](#); photographic cameras [G03B](#); control of position [G05D 3/00](#))}
- 21/0271 . . . . . {comprising organic layers}
- 21/0272 . . . . . {for lift-off processes}
- 21/0273 . . . . . {characterised by the treatment of photoresist layers}
- 21/0274 . . . . . {Photolithographic processes}
- 21/0275 . . . . . {using lasers}
- 21/0276 . . . . . {using an anti-reflective coating (anti-reflective coating for lithography in general [G03F 7/09](#))}
- 21/0277 . . . . . {Electrolithographic processes}
- 21/0278 . . . . . {Röntgenlithographic or X-ray lithographic processes}
- 21/0279 . . . . . {Ionlithographic processes}
- 21/033 . . . . . comprising inorganic layers
- 21/0331 . . . . . {for lift-off processes}
- 21/0332 . . . . . {characterised by their composition, e.g. multilayer masks, materials}
- 21/0334 . . . . . {characterised by their size, orientation, disposition, behaviour, shape, in horizontal or vertical plane}
- 21/0335 . . . . . {characterised by their behaviour during the process, e.g. soluble masks, redeposited masks}
- 21/0337 . . . . . {characterised by the process involved to create the mask, e.g. lift-off masks, sidewalls, or to modify the mask, e.g. pre-treatment, post-treatment}
- 21/0338 . . . . . {Process specially adapted to improve the resolution of the mask}
- 21/04 . . . . . the devices having at least one potential-jump barrier or surface barrier, e.g. PN junction, depletion layer, carrier concentration layer {(multistep processes specially adapted for the manufacture of said devices [H01L 29/66007](#), [H01L 29/401](#); details of semiconductor bodies [H01L 29/02](#))}
- 21/0405 . . . . . {the devices having semiconductor bodies comprising semiconducting carbon, e.g. diamond, diamond-like carbon (multistep processes for the manufacture of said devices [H01L 29/66015](#))}
- NOTE**  
This group covers passivation
- 21/041 . . . . . {Making n- or p-doped regions}
- 21/0415 . . . . . {using ion implantation}

- 21/042 . . . . {Changing their shape, e.g. forming recesses (etching of the semiconductor body [H01L 21/302](#))}
- 21/0425 . . . . {Making electrodes}
- 21/043 . . . . {Ohmic electrodes}
- 21/0435 . . . . {Schottky electrodes}
- 21/044 . . . . {Conductor-insulator-semiconductor electrodes}
- 21/0445 . . . {the devices having semiconductor bodies comprising crystalline silicon carbide (multistep processes for the manufacture of said devices [H01L 29/66053](#))}
- 21/045 . . . . {passivating silicon carbide surfaces}
- 21/0455 . . . . {Making n or p doped regions or layers, e.g. using diffusion}
- 21/046 . . . . {using ion implantation}

**NOTE**

Processes where ion implantation of boron and subsequent annealing does not produce a p-doped region are classified elsewhere, e.g. [H01L 21/0445](#)

- 21/0465 . . . . . {using masks}
- 21/047 . . . . . {characterised by the angle between the ion beam and the crystal planes or the main crystal surface}
- 21/0475 . . . . {Changing the shape of the semiconductor body, e.g. forming recesses, (etching of the semiconductor body [H01L 21/302](#))}
- 21/048 . . . . {Making electrodes}
- 21/0485 . . . . {Ohmic electrodes}
- 21/049 . . . . {Conductor-insulator-semiconductor electrodes, e.g. MIS contacts}
- 21/0495 . . . . {Schottky electrodes}
- 21/06 . . . the devices having semiconductor bodies comprising selenium or tellurium in uncombined form other than as impurities in semiconductor bodies of other materials

**WARNING**

Group [H01L 21/06](#) is impacted by reclassification into groups [H01L 21/02365](#) – [H01L 21/02694](#).  
Groups [H01L 21/06](#) and [H01L 21/02365](#) – [H01L 21/02694](#) should be considered in order to perform a complete search.

- 21/08 . . . . Preparation of the foundation plate
- 21/10 . . . . Preliminary treatment of the selenium or tellurium, its application to the foundation plate, or the subsequent treatment of the combination
- 21/101 . . . . {Application of the selenium or tellurium to the foundation plate}
- 21/103 . . . . Conversion of the selenium or tellurium to the conductive state
- 21/105 . . . . Treatment of the surface of the selenium or tellurium layer after having been made conductive
- 21/108 . . . . Provision of discrete insulating layers, i.e. non-genetic barrier layers

- 21/12 . . . . Application of an electrode to the exposed surface of the selenium or tellurium after the selenium or tellurium has been applied to the foundation plate
- 21/14 . . . . Treatment of the complete device, e.g. by electroforming to form a barrier
- 21/145 . . . . . Ageing
- 21/16 . . . the devices having semiconductor bodies comprising cuprous oxide or cuprous iodide

**WARNING**

Group [H01L 21/16](#) is impacted by reclassification into groups [H01L 21/02365](#) – [H01L 21/02694](#).  
Groups [H01L 21/16](#) and [H01L 21/02365](#) – [H01L 21/02694](#) should be considered in order to perform a complete search.

- 21/161 . . . . {Preparation of the foundation plate, preliminary treatment oxidation of the foundation plate, reduction treatment}
- 21/162 . . . . . {Preliminary treatment of the foundation plate}
- 21/164 . . . . . {Oxidation and subsequent heat treatment of the foundation plate ([H01L 21/165](#) takes precedence)}
- 21/165 . . . . . {Reduction of the copper oxide, treatment of the oxide layer}
- 21/167 . . . . . {Application of a non-genetic conductive layer}
- 21/168 . . . . {Treatment of the complete device, e.g. electroforming, ageing}
- 21/18 . . . the devices having semiconductor bodies comprising elements of Group IV of the Periodic System or A<sub>III</sub>B<sub>V</sub> compounds with or without impurities, e.g. doping materials {([H01L 21/041](#) - [H01L 21/0425](#), [H01L 21/045](#) - [H01L 21/048](#) take precedence)}

**NOTE**

This group covers also processes and apparatus which, by using the appropriate technology, are clearly suitable for manufacture or treatment of devices whose bodies comprise elements of Group IV of the Periodic System or A<sub>III</sub>B<sub>V</sub> compounds, even if the material used is not explicitly specified.

- 21/182 . . . . {Intermixing or interdiffusion or disordering of III-V heterostructures, e.g. IILD}
- 21/185 . . . . {Joining of semiconductor bodies for junction formation}
- 21/187 . . . . . {by direct bonding}
- 21/20 . . . . Deposition of semiconductor materials on a substrate, e.g. epitaxial growth {solid phase epitaxy}

**WARNING**

Group [H01L 21/20](#) is impacted by reclassification into groups [H01L 21/02365](#) – [H01L 21/02694](#).  
Groups [H01L 21/20](#) and [H01L 21/02365](#) – [H01L 21/02694](#) should be considered in order to perform a complete search.



- 21/2003 . . . . . {Characterised by the substrate  
([H01L 21/203](#), [H01L 21/205](#),  
[H01L 21/208](#) take precedence)}
- 21/2007 . . . . . {Bonding of semiconductor wafers  
to insulating substrates or to  
semiconducting substrates using  
an intermediate insulating layer  
([H01L 21/2011](#) takes precedence;  
bonding of semiconductor wafers to  
semiconductor wafers for junction  
formation [H01L 21/187](#))}
- 21/2011 . . . . . {the substrate being of crystalline  
insulating material, e.g. sapphire}
- 21/2015 . . . . . {the substrate being of crystalline  
semiconductor material, e.g. lattice  
adaptation, heteroepitaxy}
- 21/2018 . . . . . {Selective epilaxial growth, e.g.  
simultaneous deposition of mono - and  
non-mono semiconductor materials}
- 21/2022 . . . . . {Epitaxial regrowth of non-  
monocrystalline semiconductor  
materials, e.g. lateral epitaxy by seeded  
solidification, solid-state crystallization,  
solid-state graphoepitaxy, explosive  
crystallization, grain growth in  
polycrystalline materials}
- 21/2026 . . . . . {using a coherent energy beam, e.g.  
laser or electron beam}
- 21/203 . . . . . using physical deposition, e.g. vacuum  
deposition, sputtering
- 21/2033 . . . . . {Epitaxial deposition of elements of  
Group IV of the Periodic System, e.g.  
Si, Ge}
- 21/2036 . . . . . {Epitaxial deposition of A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/205 . . . . . using reduction or decomposition of  
a gaseous compound yielding a solid  
condensate, i.e. chemical deposition
- 21/2053 . . . . . {Epitaxial deposition of elements of  
Group IV of the Periodic System, e.g.  
Si, Ge}
- 21/2056 . . . . . {Epitaxial deposition of A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/208 . . . . . using liquid deposition
- 21/2085 . . . . . {Epitaxial deposition of A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/22 . . . . . Diffusion of impurity materials, e.g.  
doping materials, electrode materials,  
into or out of a semiconductor body,  
or between semiconductor regions;  
{Interactions between two or more  
impurities; Redistribution of impurities}
- 21/2205 . . . . . {from the substrate during epitaxy,  
e.g. autodoping; Preventing or using  
autodoping}
- 21/221 . . . . . {of killers}
- 21/2215 . . . . . {in A<sub>III</sub>B<sub>V</sub> compounds}
- 21/222 . . . . . {Lithium-drift}
- 21/2225 . . . . . {Diffusion sources}
- 21/223 . . . . . using diffusion into or out of a  
solid from or into a gaseous phase  
{([H01L 21/221](#) - [H01L 21/222](#) take  
precedence; diffusion through an applied  
layer [H01L 21/225](#))}
- 21/2233 . . . . . {Diffusion into or out of A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/2236 . . . . . {from or into a plasma phase}
- 21/225 . . . . . using diffusion into or out of a solid from  
or into a solid phase, e.g. a doped oxide  
layer {([H01L 21/221](#) - [H01L 21/222](#) take  
precedence)}
- 21/2251 . . . . . {Diffusion into or out of group IV  
semiconductors}
- 21/2252 . . . . . {using predeposition of impurities  
into the semiconductor surface, e.g.  
from a gaseous phase}
- 21/2253 . . . . . {by ion implantation}
- NOTE**
- In groups  
[H01L 21/2254](#) - [H01L 21/2257](#)  
one should consider the main  
compositional parts of the  
applied layer just before the  
diffusion step
- 21/2254 . . . . . {from or through or into an applied  
layer, e.g. photoresist, nitrides}
- 21/2255 . . . . . {the applied layer comprising  
oxides only, e.g. P<sub>2</sub>O<sub>5</sub>, PSG,  
H<sub>3</sub>BO<sub>3</sub>, doped oxides}
- 21/2256 . . . . . {through the applied layer}
- 21/2257 . . . . . {the applied layer being silicon or  
silicide or SIPOS, e.g. polysilicon,  
porous silicon}
- 21/2258 . . . . . {Diffusion into or out of A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/228 . . . . . using diffusion into or out of a solid from  
or into a liquid phase, e.g. alloy diffusion  
processes {([H01L 21/221](#) - [H01L 21/222](#)  
take precedence)}
- 21/24 . . . . . Alloying of impurity materials, e.g. doping  
materials, electrode materials, with a  
semiconductor body {([H01L 21/182](#) takes  
precedence)}
- 21/242 . . . . . {Alloying of doping materials with A<sub>III</sub>B<sub>V</sub>  
compounds}
- 21/244 . . . . . {Alloying of electrode materials}
- 21/246 . . . . . {with A<sub>III</sub>B<sub>V</sub> compounds}
- 21/248 . . . . . {Apparatus specially adapted for the  
alloying}
- 21/26 . . . . . Bombardment with radiation  
{([H01L 21/3105](#) takes precedence)}
- 21/2605 . . . . . {using natural radiation, e.g. alpha, beta or  
gamma radiation}
- 21/261 . . . . . to produce a nuclear reaction transmuted  
chemical elements
- 21/263 . . . . . with high-energy radiation ([H01L 21/261](#)  
takes precedence)
- 21/2633 . . . . . {for etching, e.g. sputteretching}
- 21/2636 . . . . . {for heating, e.g. electron beam heating}

21/265	. . . . . producing ion implantation (ion beam tubes for localised treatment <a href="#">H01J 37/30</a> )	21/28026	. . . . . {characterised by the conductor ( <a href="#">H01L 21/28176</a> takes precedence)}
	<b>WARNING</b>		<b>NOTE</b>
	Groups <a href="#">H01L 21/26566</a> , <a href="#">H01L 21/2658</a> and <a href="#">H01L 21/26593</a> are incomplete pending reclassification of documents from groups <a href="#">H01L 21/26506</a> and <a href="#">H01L 21/2654</a> .		When the final conductor comprises a superconductor, subject matter is not classified according to the subgroups <a href="#">H01L 21/28035</a> - <a href="#">H01L 21/28097</a> . Instead, it is classified in <a href="#">H01L 21/28026</a>
	Groups <a href="#">H01L 21/26566</a> , <a href="#">H01L 21/2658</a> , <a href="#">H01L 21/26593</a> , <a href="#">H01L 21/26506</a> and <a href="#">H01L 21/2654</a> should be considered in order to perform a complete search.	21/28035	. . . . . {the final conductor layer next to the insulator being silicon, e.g. polysilicon, with or without impurities ( <a href="#">H01L 21/28105</a> takes precedence)}
21/26506	. . . . . {in group IV semiconductors}		<b>NOTE</b>
21/26513	. . . . . {of electrically active species}		A very thin, e.g. silicon, adhesion or seed layer is not considered as the one next to the insulator
21/2652	. . . . . {Through-implantation}	21/28044	. . . . . {the conductor comprising at least another non-silicon conductive layer}
21/26526	. . . . . {Recoil-implantation}	21/28052	. . . . . {the conductor comprising a silicide layer formed by the silicidation reaction of silicon with a metal layer (formed by metal ion implantation <a href="#">H01L 21/28044</a> )}
21/26533	. . . . . {of electrically inactive species in silicon to make buried insulating layers}	21/28061	. . . . . {the conductor comprising a metal or metallic silicide formed by deposition, e.g. sputter deposition, i.e. without a silicidation reaction ( <a href="#">H01L 21/28052</a> takes precedence)}
21/2654	. . . . . {in $A_{III}B_V$ compounds}		<b>NOTE</b>
21/26546	. . . . . {of electrically active species}		To assess the coverage of groups <a href="#">H01L 21/28052</a> and <a href="#">H01L 21/28061</a> , barrier layers, e.g. TaSiN, are not considered
21/26553	. . . . . {Through-implantation}	21/2807	. . . . . {the final conductor layer next to the insulator being Si or Ge or C and their alloys except Si}
21/2656	. . . . . {characterised by the implantation of both electrically active and inactive species in the same semiconductor region to be doped}	21/28079	. . . . . {the final conductor layer next to the insulator being a single metal, e.g. Ta, W, Mo, Al}
21/26566	. . . . . {of a cluster, e.g. using a gas cluster ion beam}	21/28088	. . . . . {the final conductor layer next to the insulator being a composite, e.g. TiN}
2021/26573	. . . . . {in diamond}	21/28097	. . . . . {the final conductor layer next to the insulator being a metallic silicide}
21/2658	. . . . . {of a molecular ion, e.g. decaborane}	21/28105	. . . . . {the final conductor next to the insulator having a lateral composition or doping variation, or being formed laterally by more than one deposition step}
21/26586	. . . . . {characterised by the angle between the ion beam and the crystal planes or the main crystal surface}		
21/26593	. . . . . {at a temperature lower than room temperature}		
21/266	. . . . . using masks {( <a href="#">H01L 21/26586</a> takes precedence)}		
21/268	. . . . . using electromagnetic radiation, e.g. laser radiation		
21/2683	. . . . . {using X-ray lasers}		
21/2686	. . . . . {using incoherent radiation}		
21/28	. . . . . Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in <a href="#">H01L 21/20</a> - <a href="#">H01L 21/268</a> ; {(etching for patterning the electrodes <a href="#">H01L 21/311</a> and <a href="#">H01L 21/3213</a> )}		
21/28008	. . . . . {Making conductor-insulator-semiconductor electrodes}		
21/28017	. . . . . {the insulator being formed after the semiconductor body, the semiconductor being silicon}		
	<b>NOTE</b>		
	This group covers deposition of the insulators, including epitaxial insulators, and the conductors within the same process or chamber		

- 21/28114 . . . . . {characterised by the sectional shape, e.g. T, inverted-T}
- NOTE**
- Documents are also classified in groups [H01L 21/28035](#) - [H01L 21/2810](#); when the composition is also relevant
- 21/28123 . . . . . {Lithography-related aspects, e.g. sub-lithography lengths; Isolation-related aspects, e.g. to solve problems arising at the crossing with the side of the device isolation; Planarisation aspects}
- 21/28132 . . . . . {conducting part of electrode is defined by a sidewall spacer or a similar technique, e.g. oxidation under mask, plating}
- 21/28141 . . . . . {insulating part of the electrode is defined by a sidewall spacer, e.g. dummy spacer, or a similar technique, e.g. oxidation under mask, plating}
- 21/2815 . . . . . {part or whole of the electrode is a sidewall spacer or made by a similar technique, e.g. transformation under mask, plating}
- 21/28158 . . . . . {Making the insulator}
- 21/28167 . . . . . {on single crystalline silicon, e.g. using a liquid, i.e. chemical oxidation}
- 21/28176 . . . . . {with a treatment, e.g. annealing, after the formation of the definitive gate conductor}
- 21/28185 . . . . . {with a treatment, e.g. annealing, after the formation of the gate insulator and before the formation of the definitive gate conductor}
- 21/28194 . . . . . {by deposition, e.g. evaporation, ALD, CVD, sputtering, laser deposition ([H01L 21/28202](#) takes precedence)}
- 21/28202 . . . . . {in a nitrogen-containing ambient, e.g. nitride deposition, growth, oxynitridation, NH<sub>3</sub> nitridation, N<sub>2</sub>O oxidation, thermal nitridation, RTN, plasma nitridation, RPN}
- 21/28211 . . . . . {in a gaseous ambient using an oxygen or a water vapour, e.g. RTO, possibly through a layer ([H01L 21/28194](#) and [H01L 21/28202](#) take precedence)}
- NOTE**
- thin oxidation layers used as a barrier layer or as a buffer layer, e.g. before the formation of a high-k insulator, are classified here only if important per se
- 21/2822 . . . . . {with substrate doping, e.g. N, Ge, C implantation, before formation of the insulator}
- 21/28229 . . . . . {by deposition of a layer, e.g. metal, metal compound or polysilicon, followed by transformation thereof into an insulating layer}
- 21/28238 . . . . . {with sacrificial oxide}
- 21/28247 . . . . . {passivation or protection of the electrode, e.g. using re-oxidation}
- 21/28255 . . . . . {the insulator being formed after the semiconductor body, the semiconductor belonging to Group IV and not being elemental silicon, e.g. Ge, SiGe, SiGeC}
- 21/28264 . . . . . {the insulator being formed after the semiconductor body, the semiconductor being a III-V compound}
- 21/28273 . . . . . {Making conductor-insulator-conductor-insulator-semiconductor electrodes ([H01L 21/28291](#) takes precedence)}
- 21/28282 . . . . . {comprising a charge trapping insulator}
- 21/28291 . . . . . {comprising a layer which is used for its ferroelectric properties}
- 21/283 . . . . . Deposition of conductive or insulating materials for electrodes {conducting electric current}
- 21/285 . . . . . from a gas or vapour, e.g. condensation
- 21/28506 . . . . . {of conductive layers}
- 21/28512 . . . . . {on semiconductor bodies comprising elements of Group IV of the Periodic System}
- 21/28518 . . . . . {the conductive layers comprising silicides ([H01L 21/28537](#) takes precedence)}
- 21/28525 . . . . . {the conductive layers comprising semiconducting material ([H01L 21/28518](#), [H01L 21/28537](#) take precedence)}
- 21/28531 . . . . . {Making of side-wall contacts}
- 21/28537 . . . . . {Deposition of Schottky electrodes}
- 2021/28543 . . . . . {on semiconductor bodies comprising diamond}
- 21/2855 . . . . . {by physical means, e.g. sputtering, evaporation ([H01L 21/28518](#) - [H01L 21/28537](#) and [H01L 21/28568](#) take precedence)}
- 21/28556 . . . . . {by chemical means, e.g. CVD, LPCVD, PECVD, laser CVD ([H01L 21/28518](#) - [H01L 21/28537](#) and [H01L 21/28568](#) take precedence)}
- 21/28562 . . . . . {Selective deposition}
- 21/28568 . . . . . {the conductive layers comprising transition metals ([H01L 21/28518](#) takes precedence)}
- 21/28575 . . . . . {on semiconductor bodies comprising A<sub>III</sub>B<sub>V</sub> compounds}
- 21/28581 . . . . . {Deposition of Schottky electrodes}

- 21/28587 . . . . . {characterised by the sectional shape, e.g. T, inverted T}
- 21/28593 . . . . . {asymmetrical sectional shape}
- 21/288 . . . . . from a liquid, e.g. electrolytic deposition
- 21/2885 . . . . . {using an external electrical current, i.e. electro-deposition}
- 21/30 . . . . . Treatment of semiconductor bodies using processes or apparatus not provided for in groups [H01L 21/20](#) - [H01L 21/26](#) (manufacture of electrodes thereon [H01L 21/28](#))
- 21/3003 . . . . . {Hydrogenation or deuterisation, e.g. using atomic hydrogen from a plasma}
- 21/3006 . . . . . {of A<sub>III</sub>B<sub>V</sub> compounds}
- 21/302 . . . . . to change their surface-physical characteristics or shape, e.g. etching, polishing, cutting
- 21/304 . . . . . Mechanical treatment, e.g. grinding, polishing, cutting ([H01L 21/30625](#) takes precedence)
- 21/3043 . . . . . {Making grooves, e.g. cutting}
- 21/3046 . . . . . {using blasting, e.g. sand-blasting ([H01L 21/2633](#) takes precedence)}
- 21/306 . . . . . Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers [H01L 21/31](#))
- 21/30604 . . . . . {Chemical etching}
- 21/30608 . . . . . {Anisotropic liquid etching ([H01L 21/3063](#) takes precedence)}
- 21/30612 . . . . . {Etching of A<sub>III</sub>B<sub>V</sub> compounds}
- 21/30617 . . . . . {Anisotropic liquid etching}
- 21/30621 . . . . . {Vapour phase etching}
- 21/30625 . . . . . {With simultaneous mechanical treatment, e.g. mechanico-chemical polishing}
- 21/3063 . . . . . Electrolytic etching
- 21/30635 . . . . . {of A<sub>III</sub>B<sub>V</sub> compounds}
- 21/3065 . . . . . Plasma etching; Reactive-ion etching
- 21/30655 . . . . . {comprising alternated and repeated etching and passivation steps, e.g. Bosch process}
- 21/308 . . . . . using masks ([H01L 21/3063](#), [H01L 21/3065](#) take precedence)
- 21/3081 . . . . . {characterised by their composition, e.g. multilayer masks, materials}
- 21/3083 . . . . . {characterised by their size, orientation, disposition, behaviour, shape, in horizontal or vertical plane}
- 21/3085 . . . . . {characterised by their behaviour during the process, e.g. soluble masks, redeposited masks}
- 21/3086 . . . . . {characterised by the process involved to create the mask, e.g. lift-off masks, sidewalls, or to modify the mask, e.g. pre-treatment, post-treatment}
- 21/3088 . . . . . {Process specially adapted to improve the resolution of the mask}
- 21/31 . . . . . to form insulating layers thereon, e.g. for masking or by using photolithographic techniques (layers forming electrodes [H01L 21/28](#); encapsulating layers [H01L 21/56](#)); After treatment of these layers
- 21/3105 . . . . . After-treatment
- 21/31051 . . . . . {Planarisation of the insulating layers ([H01L 21/31058](#) takes precedence)}
- 21/31053 . . . . . {involving a dielectric removal step}
- 21/31055 . . . . . {the removal being a chemical etching step, e.g. dry etching (etching *per se* [H01L 21/311](#))}
- 21/31056 . . . . . {the removal being a selective chemical etching step, e.g. selective dry etching through a mask}
- 21/31058 . . . . . {of organic layers}
- 21/311 . . . . . Etching the insulating layers {by chemical or physical means ([H01L 21/31058](#) takes precedence)}
- 21/31105 . . . . . {Etching inorganic layers}
- 21/31111 . . . . . {by chemical means}
- 21/31116 . . . . . {by dry-etching}
- 21/31122 . . . . . {of layers not containing Si, e.g. PZT, Al<sub>2</sub>O<sub>3</sub>}
- 21/31127 . . . . . {Etching organic layers}
- 21/31133 . . . . . {by chemical means}
- 21/31138 . . . . . {by dry-etching}
- 21/31144 . . . . . {using masks}
- 21/3115 . . . . . Doping the insulating layers
- 21/31155 . . . . . {by ion implantation}
- 21/312 . . . . . Organic layers, e.g. photoresist ([H01L 21/3105](#), [H01L 21/32](#) take precedence; {photoresists *per se* [G03C](#)})
- (Frozen)
- WARNING**
- Groups [H01L 21/312](#) – [H01L 21/3128](#) are no longer used for the classification of documents as of May 1, 2011. The content of these groups is being reclassified into groups [H01L 21/02107](#) – [H01L 21/02326](#).
- Groups [H01L 21/02107](#) – [H01L 21/02326](#) should be considered in order to perform a complete search.
- 21/3121 . . . . . {Layers comprising organo-silicon compounds} (Frozen)
- 21/3122 . . . . . {layers comprising polysiloxane compounds} (Frozen)
- 21/3124 . . . . . {layers comprising hydrogen silsesquioxane} (Frozen)
- 21/3125 . . . . . {layers comprising silazane compounds} (Frozen)
- 21/3127 . . . . . {Layers comprising fluoro (hydro)carbon compounds, e.g. polytetrafluoroethylene} (Frozen)
- 21/3128 . . . . . {by Langmuir-Blodgett techniques} (Frozen)

21/314 (Frozen)	Inorganic layers ( <a href="#">H01L 21/3105</a> , <a href="#">H01L 21/32</a> take precedence)	21/31625 (Frozen)	{Deposition of boron or phosphorus doped silicon oxide, e.g. BSG, PSG, BPSG}
	<b>WARNING</b>	21/31629 (Frozen)	{Deposition of halogen doped silicon oxide, e.g. fluorine doped silicon oxide}
	Groups <a href="#">H01L 21/314</a> – <a href="#">H01L 21/3185</a> are no longer used for the classification of documents as of May 1, 2011. The content of these group is being reclassified into group <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> .	21/31633 (Frozen)	{Deposition of carbon doped silicon oxide, e.g. SiOC}
	Groups <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> should be considered in order to perform a complete search.	21/31637 (Frozen)	{Deposition of Tantalum oxides, e.g. Ta <sub>2</sub> O <sub>5</sub> }
21/3141 (Frozen)	{Deposition using atomic layer deposition techniques [ALD]}	21/31641 (Frozen)	{Deposition of Zirconium oxides, e.g. ZrO <sub>2</sub> }
21/3142 (Frozen)	{of nano-laminates, e.g. alternating layers of Al <sub>2</sub> O <sub>3</sub> -HfO <sub>2</sub> }	21/31645 (Frozen)	{Deposition of Hafnium oxides, e.g. HfO <sub>2</sub> }
21/3143 (Frozen)	{composed of alternated layers or of mixtures of nitrides and oxides or of oxinitrides, e.g. formation of oxinitride by oxidation of nitride layers}	21/3165 (Frozen)	{formed by oxidation ( <a href="#">H01L 21/31691</a> , <a href="#">H01L 21/31695</a> take precedence)}
21/3144 (Frozen)	{on silicon}	21/31654 (Frozen)	{of semiconductor materials, e.g. the body itself}
21/3145 (Frozen)	{formed by deposition from a gas or vapour}	21/31658 (Frozen)	{by thermal oxidation, e.g. of SiGe}
21/3146 (Frozen)	{Carbon layers, e.g. diamond-like layers}	21/31662 (Frozen)	{of silicon in uncombined form}
21/3147 (Frozen)	{Epitaxial deposition of insulating materials}	21/31666 (Frozen)	{of AIII BV compounds}
21/3148 (Frozen)	{Silicon Carbide layers}	21/3167 (Frozen)	{of anodic oxidation}
2021/3149 (Frozen)	{Langmuir-Blodgett techniques}	21/31675 (Frozen)	{of silicon}
21/316 (Frozen)	composed of oxides or glassy oxides or oxide based glass	21/31679 (Frozen)	{of AIII BV compounds}
	<b>WARNING</b>	21/31683 (Frozen)	{of metallic layers, e.g. Al deposited on the body, e.g. formation of multi-layer insulating structures}
	Group <a href="#">H01L 21/316</a> is no longer used for the classification of documents as of May 1, 2011. The content of this group is being reclassified into groups <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> .	21/31687 (Frozen)	{by anodic oxidation}
	Groups <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> should be considered in order to perform a complete search.	21/31691 (Frozen)	{with perovskite structure}
21/31604 (Frozen)	{Deposition from a gas or vapour ( <a href="#">H01L 21/31691</a> , <a href="#">H01L 21/31695</a> take precedence)}	21/31695 (Frozen)	{Deposition of porous oxides or porous glassy oxides or oxide based porous glass}
21/31608 (Frozen)	{Deposition of SiO <sub>2</sub> ( <a href="#">H01L 21/31625</a> , <a href="#">H01L 21/31629</a> and <a href="#">H01L 21/31633</a> take precedence)}	21/318 (Frozen)	composed of nitrides <b>WARNING</b>
21/31612 (Frozen)	{on a silicon body}		Group <a href="#">H01L 21/318</a> is no longer used for the classification of documents as of May 1, 2011. The content of this group is being reclassified into groups <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> .
21/31616 (Frozen)	{Deposition of Al <sub>2</sub> O <sub>3</sub> }		Groups <a href="#">H01L 21/02107</a> – <a href="#">H01L 21/02326</a> should be considered in order to perform a complete search.
21/3162 (Frozen)	{on a silicon body}	21/3185 (Frozen)	{of siliconnitrides}
		21/32	using masks
		21/3205	Deposition of non-insulating-, e.g. conductive- or resistive-, layers on insulating layers; After-treatment of these layers ( <a href="#">manufacture of electrodes H01L 21/28</a> )

- 21/32051 . . . . . {Deposition of metallic or metal-silicide layers}
- 21/32053 . . . . . {of metal-silicide layers}
- 21/32055 . . . . . {Deposition of semiconductive layers, e.g. poly - or amorphous silicon layers}
- 21/32056 . . . . . {Deposition of conductive or semi-conductive organic layers  
([H01L 21/32058](#) takes precedence)}
- 21/32058 . . . . . {Deposition of superconductive layers}
- 21/321 . . . . . After treatment
- 21/32105 . . . . . {Oxidation of silicon-containing layers}
- 21/3211 . . . . . {Nitridation of silicon-containing layers}
- 21/32115 . . . . . {Planarisation}
- 21/3212 . . . . . {by chemical mechanical polishing [CMP]}
- 21/32125 . . . . . {by simultaneously passing an electrical current, i.e. electrochemical mechanical polishing, e.g. ECMP}
- 21/3213 . . . . . Physical or chemical etching of the layers, e.g. to produce a patterned layer from a pre-deposited extensive layer
- 21/32131 . . . . . {by physical means only}
- 21/32132 . . . . . {of silicon-containing layers}
- 21/32133 . . . . . {by chemical means only}
- 21/32134 . . . . . {by liquid etching only}
- 21/32135 . . . . . {by vapour etching only}
- 21/32136 . . . . . {using plasmas}
- 21/32137 . . . . . {of silicon-containing layers}
- 21/32138 . . . . . {pre- or post-treatments, e.g. anti-corrosion processes}
- 21/32139 . . . . . {using masks}
- 21/3215 . . . . . Doping the layers
- 21/32155 . . . . . {Doping polycrystalline - or amorphous silicon layers}
- 21/322 . . . . . to modify their internal properties, e.g. to produce internal imperfections
- 21/3221 . . . . . {of silicon bodies, e.g. for gettering}
- 21/3223 . . . . . {using cavities formed by hydrogen or noble gas ion implantation}
- 21/3225 . . . . . {Thermally inducing defects using oxygen present in the silicon body for intrinsic gettering ([H01L 21/3226](#) takes precedence)}
- NOTE**
- Gettering using both extrinsic and intrinsic gettering techniques is classified in both [H01L 21/3221](#) and [H01L 21/3225](#)
- 21/3226 . . . . . {of silicon on insulator}
- 21/3228 . . . . . {of  $A_{III}B_V$  compounds, e.g. to make them semi-insulating}
- 21/324 . . . . . Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering ([H01L 21/20](#) - [H01L 21/288](#) and [H01L 21/302](#) - [H01L 21/322](#) take precedence)
- 21/3242 . . . . . {for the formation of PN junctions without addition of impurities  
([H01L 21/22](#) takes precedence)}
- 21/3245 . . . . . {of  $A_{III}B_V$  compounds}
- 21/3247 . . . . . {for altering the shape, e.g. smoothing the surface}
- WARNING**
- Group [H01L 21/3247](#) is incomplete pending reclassification of documents from group [H01L 21/324](#).
- Groups [H01L 21/324](#) and [H01L 21/3247](#) should be considered in order to perform a complete search.
- 21/326 . . . . . Application of electric currents or fields, e.g. for electroforming ([H01L 21/20](#) - [H01L 21/288](#) and [H01L 21/302](#) - [H01L 21/324](#) take precedence)
- 21/34 . . . . . the devices having semiconductor bodies not provided for in groups {[H01L 21/0405](#), [H01L 21/0445](#)}, [H01L 21/06](#), [H01L 21/16](#) and [H01L 21/18](#) with or without impurities, e.g. doping materials
- 21/38 . . . . . Diffusion of impurity materials, e.g. doping materials, electrode materials, into or out of a semiconductor body, or between semiconductor regions
- 21/383 . . . . . using diffusion into or out of a solid from or into a gaseous phase
- 21/385 . . . . . using diffusion into or out of a solid from or into a solid phase, e.g. a doped oxide layer
- 21/388 . . . . . using diffusion into or out of a solid from or into a liquid phase, e.g. alloy diffusion processes
- 21/40 . . . . . Alloying of impurity materials, e.g. doping materials, electrode materials, with a semiconductor body
- 21/42 . . . . . Bombardment with radiation
- 21/423 . . . . . with high-energy radiation
- 21/425 . . . . . producing ion implantation (ion beam tubes for localized treatment [H01J 37/30](#))
- 21/426 . . . . . using masks
- 21/428 . . . . . using electromagnetic radiation, e.g. laser radiation
- 21/44 . . . . . Manufacture of electrodes on semiconductor bodies using processes or apparatus not provided for in groups [H01L 21/38](#) - [H01L 21/428](#)
- 21/441 . . . . . Deposition of conductive or insulating materials for electrodes
- 21/443 . . . . . from a gas or vapour, e.g. condensation
- 21/445 . . . . . from a liquid, e.g. electrolytic deposition
- 21/447 . . . . . involving the application of pressure, e.g. thermo-compression bonding

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- 21/449 . . . . . involving the application of mechanical vibrations, e.g. ultrasonic vibrations
  - 21/46 . . . . . Treatment of semiconductor bodies using processes or apparatus not provided for in groups [H01L 21/428](#) (manufacture of electrodes thereon [H01L 21/44](#))
  - 21/461 . . . . . to change their surface-physical characteristics or shape, e.g. etching, polishing, cutting
  - 21/463 . . . . . Mechanical treatment, e.g. grinding, ultrasonic treatment
  - 21/465 . . . . . Chemical or electrical treatment, e.g. electrolytic etching (to form insulating layers [H01L 21/469](#))
  - 21/467 . . . . . using masks
  - 21/469 . . . . . to form insulating layers thereon, e.g. for masking or by using photolithographic techniques (layers forming electrodes [H01L 21/44](#); encapsulating layers [H01L 21/56](#)); After-treatment of these layers
  - 21/47 . . . . . Organic layers, e.g. photoresist ([H01L 21/475](#), [H01L 21/4757](#) take precedence)
  - 21/471 . . . . . Inorganic layers ([H01L 21/475](#), [H01L 21/4757](#) take precedence)
  - 21/473 . . . . . composed of oxides or glassy oxides or oxide based glass
  - 21/475 . . . . . using masks
  - 21/4757 . . . . . After-treatment
  - 21/47573 . . . . . {Etching the layer}
  - 21/47576 . . . . . {Doping the layer}
  - 21/4763 . . . . . Deposition of non-insulating, e.g. conductive -, resistive -, layers on insulating layers; After-treatment of these layers (manufacture of electrodes [H01L 21/28](#), {[H01L 21/44](#)})
  - 21/47635 . . . . . {After-treatment of these layers}
  - 21/477 . . . . . Thermal treatment for modifying the properties of semiconductor bodies, e.g. annealing, sintering ([H01L 21/38](#) - [H01L 21/449](#) and [H01L 21/461](#) - [H01L 21/475](#) take precedence)
  - 21/479 . . . . . Application of electric currents or fields, e.g. for electroforming ([H01L 21/38](#) - [H01L 21/449](#) and [H01L 21/461](#) - [H01L 21/475](#) take precedence)
  - 21/48 . . . . . Manufacture or treatment of parts, e.g. containers, prior to assembly of the devices, using processes not provided for in a single one of the subgroups [H01L 21/06](#) - [H01L 21/326](#) ({apparatus therefor [H01L 21/67005](#); insulative sealing of leads in bases [H01L 21/50](#)}; containers, encapsulations, fillings, mountings per se [H01L 23/00](#); {marking of parts [H01L 23/544](#)})
  - 21/4803 . . . . . {Insulating or insulated parts, e.g. mountings, containers, diamond heatsinks ([H01L 21/4846](#) takes precedence; printed circuit boards [H05K 1/00](#))}
  - 21/4807 . . . . . {Ceramic parts}
  - 21/481 . . . . . {Insulating layers on insulating parts, with or without metallisation}
  - 21/4814 . . . . . {Conductive parts}
  - 21/4817 . . . . . {for containers, e.g. caps ([H01L 21/4871](#) takes precedence)}
  - 21/4821 . . . . . {Flat leads, e.g. lead frames with or without insulating supports}
  - 21/4825 . . . . . {Connection or disconnection of other leads to or from flat leads, e.g. wires, bumps, other flat leads}
  - 21/4828 . . . . . {Etching (etching for cleaning without patterning [H01L 21/4835](#))}
  - 21/4832 . . . . . {Etching a temporary substrate after encapsulation process to form leads}
  - 21/4835 . . . . . {Cleaning, e.g. removing of solder}
  - 21/4839 . . . . . {Assembly of a flat lead with an insulating support, e.g. for TAB}
  - 21/4842 . . . . . {Mechanical treatment, e.g. punching, cutting, deforming, cold welding}
  - 21/4846 . . . . . {Leads on or in insulating or insulated substrates, e.g. metallisation ([H01L 21/4821](#) takes precedence; metallisation of ceramics in general [C04B 41/51](#); printed circuits [H05K 3/00](#))}
  - 21/485 . . . . . {Adaptation of interconnections, e.g. engineering charges, repair techniques}
  - 21/4853 . . . . . {Connection or disconnection of other leads to or from a metallisation, e.g. pins, wires, bumps}
  - 21/4857 . . . . . {Multilayer substrates (multilayer metallisation on monolayer substrate [H01L 21/4846](#))}
  - 21/486 . . . . . {Via connections through the substrate with or without pins}
  - 21/4864 . . . . . {Cleaning, e.g. removing of solder}
  - 21/4867 . . . . . {Applying pastes or inks, e.g. screen printing ([H01L 21/486](#) takes precedence)}
  - 21/4871 . . . . . {Bases, plates or heatsinks}
  - 21/4875 . . . . . {Connection or disconnection of other leads to or from bases or plates}
  - 21/4878 . . . . . {Mechanical treatment, e.g. deforming}
  - 21/4882 . . . . . {Assembly of heatsink parts}
  - 21/4885 . . . . . {Wire-like parts or pins (wire ball formation [B23K 20/00](#); methods related to connecting semiconductor or other solid state bodies [H01L 24/00](#))}
- WARNING**
- The documents of this group and subgroups dealing with methods for connecting semiconductor or other solid state bodies are being continuously reclassified to [H01L 24/43](#)
- NOTE**
- In this group, the expression "treatment" covers also the removal of leads from parts
- 21/4889 . . . . . {Connection or disconnection of other leads to or from wire-like parts, e.g. wires}
  - 21/4892 . . . . . {Cleaning}

21/4896	. . . . .	{Mechanical treatment, e.g. cutting, bending}	2021/60105	. . . . .	{using electromagnetic radiation}
21/50	. . .	Assembly of semiconductor devices using processes or apparatus not provided for in a single one of the subgroups <a href="#">H01L 21/06</a> - <a href="#">H01L 21/326</a> , {e.g. sealing of a cap to a base of a container}	2021/60112	. . . . .	{Coherent radiation, i.e. laser beam}
		<b>NOTE</b> Arrangements for connecting or disconnecting semiconductor or other solid state bodies, or methods related thereto, other than those arrangements or methods covered by the following subgroups, are covered by <a href="#">H01L 24/00</a>	2021/6012	. . . . .	{Incoherent radiation, e.g. polychromatic heating lamp}
21/52	. . . .	Mounting semiconductor bodies in containers	2021/60127	. . . . .	{Induction heating, i.e. eddy currents}
21/54	. . . .	Providing fillings in containers, e.g. gas fillings	2021/60135	. . . . .	{using convection, e.g. reflow oven}
21/56	. . . .	Encapsulations, e.g. encapsulation layers, coatings	2021/60142	. . . . .	{with a graded temperature profile}
21/561	. . . . .	{Batch processing}	2021/6015	. . . . .	{using conduction, e.g. chuck heater, thermocompression}
21/563	. . . . .	{Encapsulation of active face of flip-chip device, e.g. underfilling or underencapsulation of flip-chip, encapsulation preform on chip or mounting substrate}	2021/60157	. . . . .	{with a graded temperature profile}
21/565	. . . . .	{Moulds}	2021/60165	. . . . .	{using an electron beam}
21/566	. . . . .	{Release layers for moulds, e.g. release layers, layers against residue during moulding}	2021/60172	. . . . .	{using static pressure}
21/568	. . . . .	{Temporary substrate used as encapsulation process aid ( <a href="#">H01L 21/4832</a> and <a href="#">H01L 21/566</a> take precedence)}	2021/6018	. . . . .	{Unidirectional static pressure}
2021/60	. . . . .	{Attaching or detaching leads or other conductive members, to be used for carrying current to or from the device in operation}	2021/60187	. . . . .	{Isostatic pressure, e.g. degassing using vacuum or pressurised liquid}
2021/60007	. . . . .	{involving a soldering or an alloying process}	2021/60195	. . . . .	{using dynamic pressure, e.g. ultrasonic or thermosonic bonding}
2021/60015	. . . . .	{using plate connectors, e.g. layer, film}	2021/60202	. . . . .	{using a protective atmosphere, e.g. with forming or shielding gas}
2021/60022	. . . . .	{using bump connectors, e.g. for flip chip mounting}	2021/6021	. . . . .	{using an autocatalytic reaction}
2021/6003	. . . . .	{Apparatus therefor}	2021/60217	. . . . .	{Detaching bump connectors, e.g. after testing}
2021/60037	. . . . .	{Right-up bonding}	2021/60225	. . . . .	{Arrangement of bump connectors prior to mounting}
2021/60045	. . . . .	{Pre-treatment step of the bump connectors prior to bonding}	2021/60232	. . . . .	{wherein the bump connectors are disposed only on the semiconductor chip}
2021/60052	. . . . .	{Oxide removing step, e.g. flux, rosin}	2021/6024	. . . . .	{wherein the bump connectors are disposed only on the mounting substrate}
2021/6006	. . . . .	{with temporary supporting member not part of an apparatus, e.g. removable coating, film or substrate}	2021/60247	. . . . .	{wherein the bump connectors are disposed on both the semiconductor chip and the mounting substrate, e.g. bump to bump}
2021/60067	. . . . .	{Aligning the bump connectors with the mounting substrate}	2021/60255	. . . . .	{wherein the bump connectors are provided as prepeg, e.g. are provided in an insulating plate member}
2021/60075	. . . . .	{involving active alignment, i.e. by apparatus steering, e.g. using alignment marks, sensors}	2021/60262	. . . . .	{Lateral distribution of bump connectors prior to mounting}
2021/60082	. . . . .	{involving passive alignment, e.g. using surface energy, chemical reactions, thermal equilibrium}	2021/6027	. . . . .	{Mounting on semiconductor conductive members}
2021/6009	. . . . .	{involving guiding structures, e.g. structures that are left at least partly in the bonded product, spacers}	2021/60277	. . . . .	{involving the use of conductive adhesives}
2021/60097	. . . . .	{Applying energy, e.g. for the soldering or alloying process}	2021/60285	. . . . .	{involving the use of mechanical auxiliary parts without the use of an alloying or soldering process, e.g. pressure contacts}
			2021/60292	. . . . .	{involving the use of an electron or laser beam}
			2021/603	. . . . .	{involving the application of pressure, e.g. thermo-compression bonding}
			2021/607	. . . . .	{involving the application of mechanical vibrations, e.g. ultrasonic vibrations}
			21/62	. . .	the devices having no potential-jump barriers or surface barriers



- 21/64 . . . . . {Apparatus for making assemblies not otherwise provided for, e.g. package constructions}
- 21/67 . . . . . {Apparatus for sealing, encapsulating, glassing, decapsulating or the like (processes [H01L 23/02](#), [H01L 23/28](#))}
- 21/67121 . . . . . {Apparatus for placing on an insulating substrate, e.g. tape}
- 21/67132 . . . . . {Apparatus for wiring semiconductor or solid state device}
- 21/67138 . . . . . {Apparatus for mounting on conductive members, e.g. leadframes or conductors on insulating substrates}
- 21/67144 . . . . . {Apparatus for applying a liquid, a resin, an ink or the like ([H01L 21/67126](#) takes precedence)}
- 21/6715 . . . . . {Apparatus for manufacturing or treating in a plurality of work-stations}
- 21/67161 . . . . . {characterized by the layout of the process chambers}
- 21/67167 . . . . . {surrounding a central transfer chamber}
- 21/67173 . . . . . {in-line arrangement}
- 21/67178 . . . . . {vertical arrangement}
- 21/67184 . . . . . {characterized by the presence of more than one transfer chamber}
- 21/6719 . . . . . {characterized by the construction of the processing chambers, e.g. modular processing chambers}
- 21/67196 . . . . . {characterized by the construction of the transfer chamber}
- 21/67201 . . . . . {characterized by the construction of the load-lock chamber}
- 21/67207 . . . . . {comprising a chamber adapted to a particular process}
- 21/67213 . . . . . {comprising at least one ion or electron beam chamber (coating by ion implantation [C23C](#); ion or electron beam tubes [H01J 37/00](#))}
- 21/67219 . . . . . {comprising at least one polishing chamber (polishing apparatuses [B24B](#))}
- 21/67225 . . . . . {comprising at least one lithography chamber (lithographic apparatuses [G03F 7/00](#))}
- 21/6723 . . . . . {comprising at least one plating chamber (electroless plating apparatuses [C23C](#), electroplating apparatuses [C25D](#))}
- 21/67236 . . . . . {the substrates being processed being not semiconductor wafers, e.g. leadframes or chips}
- 21/67242 . . . . . {Apparatus for monitoring, sorting or marking (testing or measuring during manufacture [H01L 22/00](#), marks per se [H01L 23/544](#); testing individual semiconductor devices [G01R 31/26](#))}
- 21/67248 . . . . . {Temperature monitoring}
- 21/67253 . . . . . {Process monitoring, e.g. flow or thickness monitoring}
- 21/67259 . . . . . {Position monitoring, e.g. misposition detection or presence detection}
- 21/67265 . . . . . {of substrates stored in a container, a magazine, a carrier, a boat or the like}
- 21/67271 . . . . . {Sorting devices}
- 21/64 . . . . . Manufacture or treatment of solid state devices other than semiconductor devices, or of parts thereof, not peculiar to a single device provided for in groups [H01L 31/00](#) - [H01L 51/00](#)
- 21/67 . . . . . Apparatus specially adapted for handling semiconductor or electric solid state devices during manufacture or treatment thereof; Apparatus specially adapted for handling wafers during manufacture or treatment of semiconductor or electric solid state devices or components {; Apparatus not specifically provided for elsewhere (processes per se [H01L 21/30](#), [H01L 21/46](#), [H01L 23/00](#); simple temporary support means, e.g. using adhesives, electric or magnetic means [H01L 21/68](#), [H01L 21/302](#); apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies and for methods related thereto [H01L 24/74](#);)}
- NOTE**
- In this subgroup the term substrate designates a semiconductor or electric solid state device or component, or a wafer
- 21/67005 . . . . . {Apparatus not specifically provided for elsewhere (processes per se [H01L 21/30](#), [H01L 21/46](#), [H01L 23/00](#); simple temporary support means, e.g. using adhesives, electric or magnetic means [H01L 21/68](#), [H01L 21/302](#))}
- 21/67011 . . . . . {Apparatus for manufacture or treatment (processes [H01L 21/30](#), [H01L 21/46](#); for production or after-treatment of single crystals or homogeneous polycrystalline material [C30B 35/00](#))}
- 21/67017 . . . . . {Apparatus for fluid treatment ([H01L 21/67126](#), [H01L 21/6715](#) take precedence)}
- 21/67023 . . . . . {for general liquid treatment, e.g. etching followed by cleaning}
- 21/67028 . . . . . {for cleaning followed by drying, rinsing, stripping, blasting or the like}
- 21/67034 . . . . . {for drying}
- 21/6704 . . . . . {for wet cleaning or washing}
- 21/67046 . . . . . {using mainly scrubbing means, e.g. brushes}
- 21/67051 . . . . . {using mainly spraying means, e.g. nozzles}
- 21/67057 . . . . . {with the semiconductor substrates being dipped in baths or vessels}
- 21/67063 . . . . . {for etching}
- 21/67069 . . . . . {for drying etching}
- 21/67075 . . . . . {for wet etching}
- 21/6708 . . . . . {using mainly spraying means, e.g. nozzles}
- 21/67086 . . . . . {with the semiconductor substrates being dipped in baths or vessels}
- 21/67092 . . . . . {Apparatus for mechanical treatment (or grinding or cutting, see the relevant groups in subclasses [B24B](#) or [B28D](#))}
- 21/67098 . . . . . {Apparatus for thermal treatment}
- 21/67103 . . . . . {mainly by conduction}
- 21/67109 . . . . . {mainly by convection}
- 21/67115 . . . . . {mainly by radiation}

- 21/67276 . . . . {Production flow monitoring, e.g. for increasing throughput ([program-control systems per se G05B 19/00](#), e.g. total factory control [G05B 19/418](#))}
- 21/67282 . . . . {Marking devices}
- 21/67288 . . . . {Monitoring of warpage, curvature, damage, defects or the like}
- 21/67294 . . . . {using identification means, e.g. labels on substrates or labels on containers}
- 21/673 . . . using specially adapted carriers {or holders; Fixing the workpieces on such carriers or holders ([holders for supporting a complete device in operation H01L 23/32](#))}
- 21/67303 . . . {Vertical boat type carrier whereby the substrates are horizontally supported, e.g. comprising rod-shaped elements}
- 21/67306 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/67309 . . . . {characterized by the substrate support}
- 21/67313 . . . {Horizontal boat type carrier whereby the substrates are vertically supported, e.g. comprising rod-shaped elements}
- 21/67316 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/6732 . . . {Vertical carrier comprising wall type elements whereby the substrates are horizontally supported, e.g. comprising sidewalls}
- 21/67323 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/67326 . . . {Horizontal carrier comprising wall type elements whereby the substrates are vertically supported, e.g. comprising sidewalls}
- 21/6733 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/67333 . . . {Trays for chips ([magazine for components H05K 13/0084](#))}
- 21/67336 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/6734 . . . {specially adapted for supporting large square shaped substrates ([containers and packaging elements for glass sheets B65D 85/48](#), transporting of glass products during their manufacture [C03B 35/00](#))}
- 21/67343 . . . . {characterized by a material, a roughness, a coating or the like}
- 21/67346 . . . {characterized by being specially adapted for supporting a single substrate or by comprising a stack of such individual supports}
- 21/6735 . . . {Closed carriers}
- 21/67353 . . . . {specially adapted for a single substrate}
- 21/67356 . . . . {specially adapted for containing chips, dies or ICs}
- 21/67359 . . . . {specially adapted for containing masks, reticles or pellicles}
- 21/67363 . . . . {specially adapted for containing substrates other than wafers ([H01L 21/67356](#), [H01L 21/67359](#) take precedence)}
- 21/67366 . . . . {characterised by materials, roughness, coatings or the like ([materials relating to an injection moulding process B29C 45/00](#); [chemical composition of materials C08L 51/00](#))}
- 21/67369 . . . . {characterised by shock absorbing elements, e.g. retainers or cushions}
- 21/67373 . . . . {characterised by locking systems}
- 21/67376 . . . . {characterised by sealing arrangements}
- 21/67379 . . . . {characterised by coupling elements, kinematic members, handles or elements to be externally gripped}
- 21/67383 . . . . {characterised by substrate supports}
- 21/67386 . . . . {characterised by the construction of the closed carrier}
- 21/67389 . . . . {characterised by atmosphere control}
- 21/67393 . . . . {characterised by the presence of atmosphere modifying elements inside or attached to the closed carrier}
- 21/67396 . . . . {characterised by the presence of antistatic elements}
- 21/677 . . . for conveying, e.g. between different workstations
- 21/67703 . . . {between different workstations}
- 21/67706 . . . . {Mechanical details, e.g. roller, belt ([H01L 21/67709](#) takes precedence)}
- 21/67709 . . . . {using magnetic elements}
- 21/67712 . . . . {the substrate being handled substantially vertically}
- 21/67715 . . . . {Changing the direction of the conveying path}
- 21/67718 . . . . {Changing orientation of the substrate, e.g. from a horizontal position to a vertical position}
- 21/67721 . . . . {the substrates to be conveyed not being semiconductor wafers or large planar substrates, e.g. chips, lead frames ([H01L 21/6773](#) takes precedence)}
- 21/67724 . . . . {by means of a cart or a vehicule}
- 21/67727 . . . . {using a general scheme of a conveying path within a factory}
- 21/6773 . . . . {Conveying cassettes, containers or carriers}
- 21/67733 . . . . {Overhead conveying}
- 21/67736 . . . . {Loading to or unloading from a conveyor}
- 21/67739 . . . {into and out of processing chamber}
- 21/67742 . . . . {Mechanical parts of transfer devices ([robots in general in B25J](#))}
- 21/67745 . . . . {characterized by movements or sequence of movements of transfer devices}
- 21/67748 . . . . {horizontal transfer of a single workpiece}
- 21/67751 . . . . {vertical transfer of a single workpiece}
- 21/67754 . . . . {horizontal transfer of a batch of workpieces}
- 21/67757 . . . . {vertical transfer of a batch of workpieces}
- 21/6776 . . . . {Continuous loading and unloading into and out of a processing chamber, e.g. transporting belts within processing chambers}
- 21/67763 . . . {the wafers being stored in a carrier, involving loading and unloading ([H01L 21/6779](#) takes precedence)}
- 21/67766 . . . . {Mechanical parts of transfer devices ([robots in general in B25J](#))}
- 21/67769 . . . . {Storage means}
- 21/67772 . . . . {involving removal of lid, door, cover}
- 21/67775 . . . . {Docking arrangements}
- 21/67778 . . . . {involving loading and unloading of wafers}
- 21/67781 . . . . {Batch transfer of wafers}
- 21/67784 . . . {using air tracks}
- 21/67787 . . . . {with angular orientation of the workpieces}

- 21/6779 . . . . {the workpieces being stored in a carrier, involving loading and unloading}
- 21/67793 . . . {with orientating and positioning by means of a vibratory bowl or track}
- 21/67796 . . . {with angular orientation of workpieces ([H01L 21/67787](#) and [H01L 21/67793](#) take precedence)}
- 21/68 . . for positioning, orientation or alignment (for conveying [H01L 21/677](#))
- WARNING**
- This group is in reorganisation. See provisionally also group [H01L 21/6835](#)
- 21/681 . . . {using optical controlling means}
- 21/682 . . . {Mask-wafer alignment (in general [G03F 7/70](#), [G03F 9/70](#))}
- 21/683 . . for supporting or gripping (for conveying [H01L 21/677](#), for positioning, orientation or alignment [H01L 21/68](#))
- 21/6831 . . . {using electrostatic chucks}
- 21/6833 . . . . {Details of electrostatic chucks}
- 21/6835 . . . {using temporarily an auxiliary support}
- NOTE**
- [H01L 21/6835](#), details of the apparatus are to be further indexed using the indexing codes chosen from [H01L 2221/68304](#) and subgroups
- 21/6836 . . . . {Wafer tapes, e.g. grinding or dicing support tapes (adhesive tapes in general [C09J 7/20](#))}
- 21/6838 . . . {with gripping and holding devices using a vacuum; Bernoulli devices}
- 21/687 . . . using mechanical means, e.g. chucks, clamps or pinches {(using electrostatic chucks [H01L 21/6831](#))}
- 21/68707 . . . . {the wafers being placed on a robot blade, or gripped by a gripper for conveyance}
- 21/68714 . . . . {the wafers being placed on a susceptor, stage or support}
- 21/68721 . . . . . {characterised by edge clamping, e.g. clamping ring}
- 21/68728 . . . . . {characterised by a plurality of separate clamping members, e.g. clamping fingers}
- 21/68735 . . . . . {characterised by edge profile or support profile}
- 21/68742 . . . . . {characterised by a lifting arrangement, e.g. lift pins}
- 21/6875 . . . . . {characterised by a plurality of individual support members, e.g. support posts or protrusions}
- 21/68757 . . . . . {characterised by a coating or a hardness or a material}
- 21/68764 . . . . . {characterised by a movable susceptor, stage or support, others than those only rotating on their own vertical axis, e.g. susceptors on a rotating carousel}
- 21/68771 . . . . . {characterised by supporting more than one semiconductor substrate}
- 21/68778 . . . . . {characterised by supporting substrates others than wafers, e.g. chips}
- 21/68785 . . . . . {characterised by the mechanical construction of the susceptor, stage or support}
- 21/68792 . . . . . {characterised by the construction of the shaft}
- 21/70 . . Manufacture or treatment of devices consisting of a plurality of solid state components formed in or on a common substrate or of parts thereof; Manufacture of integrated circuit devices or of parts thereof ({multistep manufacturing processes of assemblies consisting of a plurality of individual semiconductor or other solid state devices [H01L 25/00](#); } manufacture of assemblies consisting of preformed electrical components [H05K 3/00](#), [H05K 13/00](#))
- 21/702 . . . {of thick-or thin-film circuits or parts thereof}
- 21/705 . . . {of thick-film circuits or parts thereof}
- 21/707 . . . {of thin-film circuits or parts thereof}
- 21/71 . . Manufacture of specific parts of devices defined in group [H01L 21/70](#) ({[H01L 21/0405](#), [H01L 21/0445](#)}, [H01L 21/28](#), [H01L 21/44](#), [H01L 21/48](#) take precedence)
- 21/74 . . . Making of {localized} buried regions, e.g. buried collector layers, internal connections {substrate contacts}
- 21/743 . . . . {Making of internal connections, substrate contacts}
- 21/746 . . . . {for AIII-BV integrated circuits}
- 21/76 . . . Making of isolation regions between components
- 21/7602 . . . . . {between components manufactured in an active substrate comprising SiC compounds}
- 21/7605 . . . . . {between components manufactured in an active substrate comprising AIII BV compounds}
- 21/7607 . . . . . {between components manufactured in an active substrate comprising  $A_{II}B_{VI}$  compounds}
- 21/761 . . . . . PN junctions
- 21/762 . . . . . Dielectric regions {, e.g. EPIC dielectric isolation, LOCOS; Trench refilling techniques, SOI technology, use of channel stoppers}
- 21/76202 . . . . . {using a local oxidation of silicon, e.g. LOCOS, SWAMI, SILO ([H01L 21/76235](#) takes precedence; together with vertical isolation, e.g. LOCOS in a SOI substrate, [H01L 21/76264](#))}
- 21/76205 . . . . . {in a region being recessed from the surface, e.g. in a recess, groove, tub or trench region}
- 21/76208 . . . . . . . {using auxiliary pillars in the recessed region, e.g. to form LOCOS over extended areas}
- 21/7621 . . . . . . . {the recessed region having a shape other than rectangular, e.g. rounded or oblique shape ([H01L 21/76208](#) takes precedence)}
- 21/76213 . . . . . . . {introducing electrical inactive or active impurities in the local oxidation region, e.g. to alter LOCOS oxide growth characteristics or for additional isolation purpose}
- 21/76216 . . . . . . . {introducing electrical active impurities in the local oxidation region for the sole purpose of creating channel stoppers}

- 21/76218 . . . . . {introducing both types of electrical active impurities in the local oxidation region for the sole purpose of creating channel stoppers, e.g. for isolation of complementary doped regions}
- 21/76221 . . . . . {with a plurality of successive local oxidation steps}
- 21/76224 . . . . . {using trench refilling with dielectric materials ([trench filling with polycrystalline silicon H01L 21/763](#); together with vertical isolation, e.g. trench refilling in a SOI substrate [H01L 21/76264](#))}
- 21/76227 . . . . . {the dielectric materials being obtained by full chemical transformation of non-dielectric materials, such as polycrystalline silicon, metals}
- 21/76229 . . . . . {Concurrent filling of a plurality of trenches having a different trench shape or dimension, e.g. rectangular and V-shaped trenches, wide and narrow trenches, shallow and deep trenches}
- 21/76232 . . . . . {of trenches having a shape other than rectangular or V-shape, e.g. rounded corners, oblique or rounded trench walls ([H01L 21/76229 takes precedence](#))}
- 21/76235 . . . . . {trench shape altered by a local oxidation of silicon process step, e.g. trench corner rounding by LOCOS}
- 21/76237 . . . . . {introducing impurities in trench side or bottom walls, e.g. for forming channel stoppers or alter isolation behavior}
- 21/7624 . . . . . {using semiconductor on insulator [SOI] technology ([H01L 21/76297 takes precedence](#); manufacture of integrated circuits on insulating substrates [H01L 21/84](#); silicon on sapphire [SOS] technology [H01L 21/86](#))}
- 21/76243 . . . . . {using silicon implanted buried insulating layers, e.g. oxide layers, i.e. SIMOX techniques}
- 21/76245 . . . . . {using full isolation by porous oxide silicon, i.e. FIPOS techniques}
- 21/76248 . . . . . {using lateral overgrowth techniques, i.e. ELO techniques}
- 21/76251 . . . . . {using bonding techniques}
- 21/76254 . . . . . {with separation/delamination along an ion implanted layer, e.g. Smart-cut, Unibond}
- 21/76256 . . . . . {using silicon etch back techniques, e.g. BESOI, ELTRAN}
- 21/76259 . . . . . {with separation/delamination along a porous layer}
- 21/76262 . . . . . {using selective deposition of single crystal silicon, i.e. SEG techniques}
- 21/76264 . . . . . {SOI together with lateral isolation, e.g. using local oxidation of silicon, or dielectric or polycrystalline material refilled trench or air gap isolation regions, e.g. completely isolated semiconductor islands}
- 21/76267 . . . . . {Vertical isolation by silicon implanted buried insulating layers, e.g. oxide layers, i.e. SIMOX techniques}
- 21/7627 . . . . . {Vertical isolation by full isolation by porous oxide silicon, i.e. FIPOS techniques}
- 21/76272 . . . . . {Vertical isolation by lateral overgrowth techniques, i.e. ELO techniques}
- 21/76275 . . . . . {Vertical isolation by bonding techniques}
- 21/76278 . . . . . {Vertical isolation by selective deposition of single crystal silicon, i.e. SEG techniques}
- 21/76281 . . . . . {Lateral isolation by selective oxidation of silicon}
- 21/76283 . . . . . {Lateral isolation by refilling of trenches with dielectric material}
- 21/76286 . . . . . {Lateral isolation by refilling of trenches with polycrystalline material}
- 21/76289 . . . . . {Lateral isolation by air gap}
- 21/76291 . . . . . {Lateral isolation by field effect}
- 21/76294 . . . . . {using selective deposition of single crystal silicon, i.e. SEG techniques}
- 21/76297 . . . . . {Dielectric isolation using EPIC techniques, i.e. epitaxial passivated integrated circuit}
- 21/763 . . . . . Polycrystalline semiconductor regions ([H01L 21/76264 takes precedence](#))
- 21/764 . . . . . Air gaps ([H01L 21/76264 takes precedence](#))
- 21/765 . . . . . by field effect ([H01L 21/76264 takes precedence](#))
- 21/768 . . . . . Applying interconnections to be used for carrying current between separate components within a device {comprising conductors and dielectrics}
- NOTE**
- Groups [H01L 21/768](#) - [H01L 21/76898](#) cover multi-step processes for manufacturing interconnections. Information peculiar to single-step processes should also be classified in the corresponding group, e.g.
- cleaning [H01L 21/02041](#)
  - etching [H01L 21/311](#), [H01L 21/3213](#)
  - masking [H01L 21/027](#), [H01L 21/033](#), [H01L 21/31144](#), [H01L 21/32139](#)
  - planarizing [H01L 21/3105](#), [H01L 21/321](#)
- 21/76801 . . . . . {characterised by the formation and the after-treatment of the dielectrics, e.g. smoothing}
- 21/76802 . . . . . {by forming openings in dielectrics}
- 21/76804 . . . . . {by forming tapered via holes}
- 21/76805 . . . . . {the opening being a via or contact hole penetrating the underlying conductor}
- 21/76807 . . . . . {for dual damascene structures}
- 21/76808 . . . . . {involving intermediate temporary filling with material}
- 21/7681 . . . . . {involving one or more buried masks}
- 21/76811 . . . . . {involving multiple stacked pre-patterned masks}
- 21/76813 . . . . . {involving a partial via etch}

- 21/76814 . . . . . {post-treatment or after-treatment, e.g. cleaning or removal of oxides on underlying conductors}
- 21/76816 . . . . . {Aspects relating to the layout of the pattern or to the size of vias or trenches ([layout of the interconnections per se H01L 23/528](#); [CAD of ICs G06F 17/50](#))}
- 21/76817 . . . . . {using printing or stamping techniques}
- 21/76819 . . . . . {Smoothing of the dielectric ([planarisation of insulating materials per se H01L 21/31051](#))}
- 21/7682 . . . . . {the dielectric comprising air gaps}
- 21/76822 . . . . . {Modification of the material of dielectric layers, e.g. grading, after-treatment to improve the stability of the layers, to increase their density etc.}
- 21/76823 . . . . . {transforming an insulating layer into a conductive layer}
- 21/76825 . . . . . {by exposing the layer to particle radiation, e.g. ion implantation, irradiation with UV light or electrons etc. ([plasma treatment H01L 21/76826](#))}
- 21/76826 . . . . . {by contacting the layer with gases, liquids or plasmas}
- 21/76828 . . . . . {thermal treatment}
- 21/76829 . . . . . {characterised by the formation of thin functional dielectric layers, e.g. dielectric etch-stop, barrier, capping or liner layers}
- 21/76831 . . . . . {in via holes or trenches, e.g. non-conductive sidewall liners}
- 21/76832 . . . . . {Multiple layers}
- 21/76834 . . . . . {formation of thin insulating films on the sidewalls or on top of conductors ([H01L 21/76831 takes precedence](#))}
- 21/76835 . . . . . {Combinations of two or more different dielectric layers having a low dielectric constant ([H01L 21/76832 takes precedence](#))}
- 21/76837 . . . . . {Filling up the space between adjacent conductive structures; Gap-filling properties of dielectrics}
- 21/76838 . . . . . {characterised by the formation and the after-treatment of the conductors ([etching for patterning the conductors H01L 21/3213](#))}
- NOTE**
- When the interconnect is also used as the conductor part of a conductor insulator semiconductor electrode (gate level interconnections), documents are classified in the relevant electrode manufacture groups, e.g. [H01L 21/28026](#)
- 21/7684 . . . . . {Smoothing; Planarisation}
- 21/76841 . . . . . {Barrier, adhesion or liner layers}
- 21/76843 . . . . . {formed in openings in a dielectric}
- 21/76844 . . . . . {Bottomless liners}
- 21/76846 . . . . . {Layer combinations}
- 21/76847 . . . . . {the layer being positioned within the main fill metal}
- 21/76849 . . . . . {the layer being positioned on top of the main fill metal}
- 21/7685 . . . . . {the layer covering a conductive structure ([H01L 21/76849 takes precedence](#))}
- 21/76852 . . . . . {the layer also covering the sidewalls of the conductive structure}
- 21/76853 . . . . . {characterized by particular after-treatment steps}
- 21/76855 . . . . . {After-treatment introducing at least one additional element into the layer}
- 21/76856 . . . . . {by treatment in plasmas or gaseous environments, e.g. nitriding a refractory metal liner}
- 21/76858 . . . . . {by diffusing alloying elements}
- 21/76859 . . . . . {by ion implantation}
- 21/76861 . . . . . {Post-treatment or after-treatment not introducing additional chemical elements into the layer}
- 21/76862 . . . . . {Bombardment with particles, e.g. treatment in noble gas plasmas; UV irradiation}
- 21/76864 . . . . . {Thermal treatment}
- 21/76865 . . . . . {Selective removal of parts of the layer ([H01L 21/76844 takes precedence](#))}
- 21/76867 . . . . . {characterized by methods of formation other than PVD, CVD or deposition from a liquids ([PVD H01L 21/2855](#); [CVD H01L 21/28556](#); [deposition from liquids H01L 21/288](#))}
- 21/76868 . . . . . {Forming or treating discontinuous thin films, e.g. repair, enhancement or reinforcement of discontinuous thin films}
- 21/7687 . . . . . {Thin films associated with contacts of capacitors}
- 21/76871 . . . . . {Layers specifically deposited to enhance or enable the nucleation of further layers, i.e. seed layers}
- 21/76873 . . . . . {for electroplating}
- 21/76874 . . . . . {for electroless plating}
- 21/76876 . . . . . {for deposition from the gas phase, e.g. CVD}
- 21/76877 . . . . . {Filling of holes, grooves or trenches, e.g. vias, with conductive material}
- 21/76879 . . . . . {by selective deposition of conductive material in the vias, e.g. selective C.V.D. on semiconductor material, plating ([plating on semiconductors in general H01L 21/288](#))}
- 21/7688 . . . . . {by deposition over sacrificial masking layer, e.g. lift-off ([lift-off per se H01L 21/0272](#))}
- 21/76882 . . . . . {Reflowing or applying of pressure to better fill the contact hole}
- 21/76883 . . . . . {Post-treatment or after-treatment of the conductive material}
- 21/76885 . . . . . {By forming conductive members before deposition of protective insulating material, e.g. pillars, studs}
- 21/76886 . . . . . {Modifying permanently or temporarily the pattern or the conductivity of conductive members, e.g. formation of alloys, reduction of contact resistances}

- 21/76888 . . . . . {By rendering at least a portion of the conductor non conductive, e.g. oxidation}
  - 21/76889 . . . . . {by forming silicides of refractory metals}
  - 21/76891 . . . . . {by using superconducting materials}
  - 21/76892 . . . . . {modifying the pattern}
  - 21/76894 . . . . . {using a laser, e.g. laser cutting, laser direct writing, laser repair}
  - 21/76895 . . . . . {Local interconnects; Local pads, as exemplified by patent document EP0896365}
  - 21/76897 . . . . . {Formation of self-aligned vias or contact plugs, i.e. involving a lithographically uncritical step (self-aligned silicidation on field effect transistors [H01L 29/665](#))}
  - 21/76898 . . . . . {formed through a semiconductor substrate}
  - 21/77 . . . . . Manufacture or treatment of devices consisting of a plurality of solid state components or integrated circuits formed in, or on, a common substrate (electrically programmable read-only memories or multistep manufacturing processes therefor [H01L 27/115](#))
- NOTE**
- Integration processes for the manufacture of devices of the type classified in [H01L 27/14](#) - [H01L 27/32](#) are not classified in this group and its sub-groups. Instead, as they are peculiar to said devices, they are classified together with the devices Multistep processes for manufacturing memory structures in general using field effect technology are covered by [H01L 27/1052](#); Multistep processes for manufacturing dynamic random access memory structures are covered by [H01L 27/10844](#); Multistep processes for manufacturing static random access memory structures are covered by [H01L 27/11](#); Multistep processes for manufacturing read-only memory structures are covered by [H01L 27/112](#); Multistep processes for manufacturing electrically programmable read-only memory structures are covered by [H01L 27/115](#)
- 2021/775 . . . . . {comprising a plurality of TFTs on a non-semiconducting substrate, e.g. driving circuits for AMLCDs}
  - 21/78 . . . . . with subsequent division of the substrate into plural individual devices (cutting to change the surface-physical characteristics or shape of semiconductor bodies [H01L 21/304](#))
  - 21/7806 . . . . . {involving the separation of the active layers from a substrate}
  - 21/7813 . . . . . {leaving a reusable substrate, e.g. epitaxial lift off}
  - 21/782 . . . . . to produce devices, each consisting of a single circuit element ([H01L 21/82](#) takes precedence)
  - 21/784 . . . . . the substrate being a semiconductor body
  - 21/786 . . . . . the substrate being other than a semiconductor body, e.g. insulating body
  - 21/82 . . . . . to produce devices, e.g. integrated circuits, each consisting of a plurality of components
  - 21/8206 . . . . . {the substrate being a semiconductor, using diamond technology ([H01L 21/8258](#) takes precedence)}
  - 21/8213 . . . . . {the substrate being a semiconductor, using SiC technology ([H01L 21/8258](#) takes precedence)}
  - 21/822 . . . . . the substrate being a semiconductor, using silicon technology ([H01L 21/8258](#) takes precedence)
  - 21/8221 . . . . . {Three dimensional integrated circuits stacked in different levels}
  - 21/8222 . . . . . Bipolar technology
  - 21/8224 . . . . . comprising a combination of vertical and lateral transistors
  - 21/8226 . . . . . comprising merged transistor logic or integrated injection logic
  - 21/8228 . . . . . Complementary devices, e.g. complementary transistors
  - 21/82285 . . . . . {Complementary vertical transistors}
  - 21/8229 . . . . . Memory structures
  - 21/8232 . . . . . Field-effect technology
  - 21/8234 . . . . . MIS technology {, i.e. integration processes of field effect transistors of the conductor-insulator-semiconductor type}
  - 21/823406 . . . . . {Combination of charge coupled devices, i.e. CCD, or BBD}
  - 21/823412 . . . . . {with a particular manufacturing method of the channel structures, e.g. channel implants, halo or pocket implants, or channel materials}
  - 21/823418 . . . . . {with a particular manufacturing method of the source or drain structures, e.g. specific source or drain implants or silicided source or drain structures or raised source or drain structures}
  - 21/823425 . . . . . {manufacturing common source or drain regions between a plurality of conductor-insulator-semiconductor structures}
  - 21/823431 . . . . . {with a particular manufacturing method of transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
  - 21/823437 . . . . . {with a particular manufacturing method of the gate conductors, e.g. particular materials, shapes}
  - 21/823443 . . . . . {silicided or salicided gate conductors}
  - 21/82345 . . . . . {gate conductors with different gate conductor materials or different gate conductor implants, e.g. dual gate structures}
  - 21/823456 . . . . . {gate conductors with different shapes, lengths or dimensions}

- 21/823462 . . . . . {with a particular manufacturing method of the gate insulating layers, e.g. different gate insulating layer thicknesses, particular gate insulator materials or particular gate insulator implants}
- 21/823468 . . . . . {with a particular manufacturing method of the gate sidewall spacers, e.g. double spacers, particular spacer material or shape}
- 21/823475 . . . . . {interconnection or wiring or contact manufacturing related aspects}
- 21/823481 . . . . . {isolation region manufacturing related aspects, e.g. to avoid interaction of isolation region with adjacent structure}
- 21/823487 . . . . . {with a particular manufacturing method of vertical transistor structures, i.e. with channel vertical to the substrate surface (with a current flow parallel to the substrate surface [H01L 21/823431](#))}
- 21/823493 . . . . . {with a particular manufacturing method of the wells or tubs, e.g. twin tubs, high energy well implants, buried implanted layers for lateral isolation [BILLI]}
- 21/8236 . . . . . Combination of enhancement and depletion transistors
- 21/8238 . . . . . Complementary field-effect transistors, e.g. CMOS
- 21/823807 . . . . . {with a particular manufacturing method of the channel structures, e.g. channel implants, halo or pocket implants, or channel materials}
- 21/823814 . . . . . {with a particular manufacturing method of the source or drain structures, e.g. specific source or drain implants or silicided source or drain structures or raised source or drain structures}
- 21/823821 . . . . . {with a particular manufacturing method of transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
- 21/823828 . . . . . {with a particular manufacturing method of the gate conductors, e.g. particular materials, shapes}
- 21/823835 . . . . . {silicided or salicided gate conductors}
- 21/823842 . . . . . {gate conductors with different gate conductor materials or different gate conductor implants, e.g. dual gate structures}
- 21/82385 . . . . . {gate conductors with different shapes, lengths or dimensions}
- 21/823857 . . . . . {with a particular manufacturing method of the gate insulating layers, e.g. different gate insulating layer thicknesses, particular gate insulator materials or particular gate insulator implants}
- 21/823864 . . . . . {with a particular manufacturing method of the gate sidewall spacers, e.g. double spacers, particular spacer material or shape}
- 21/823871 . . . . . {interconnection or wiring or contact manufacturing related aspects}
- 21/823878 . . . . . {isolation region manufacturing related aspects, e.g. to avoid interaction of isolation region with adjacent structure}
- 21/823885 . . . . . {with a particular manufacturing method of vertical transistor structures, i.e. with channel vertical to the substrate surface (with a current flow parallel to the substrate surface [H01L 21/823821](#))}
- 21/823892 . . . . . {with a particular manufacturing method of the wells or tubs, e.g. twin tubs, high energy well implants, buried implanted layers for lateral isolation [BILLI]}
- 21/8239 . . . . . Memory structures
- 21/8248 . . . . . Combination of bipolar and field-effect technology
- 21/8249 . . . . . Bipolar and MOS technology
- 21/8252 . . . . . the substrate being a semiconductor, using III-V technology ([H01L 21/8258](#) takes precedence)
- 21/8254 . . . . . the substrate being a semiconductor, using II-VI technology ([H01L 21/8258](#) takes precedence)
- 21/8256 . . . . . the substrate being a semiconductor, using technologies not covered by one of groups ([H01L 21/8206](#), [H01L 21/8213](#)), [H01L 21/822](#), [H01L 21/8252](#) and [H01L 21/8254](#) ([H01L 21/8258](#) takes precedence)
- 21/8258 . . . . . the substrate being a semiconductor, using a combination of technologies covered by ([H01L 21/8206](#), [H01L 21/8213](#)), [H01L 21/822](#), [H01L 21/8252](#), [H01L 21/8254](#) or [H01L 21/8256](#)
- 21/84 . . . . . the substrate being other than a semiconductor body, e.g. being an insulating body
- 21/845 . . . . . {including field-effect transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
- 21/86 . . . . . the insulating body being sapphire, e.g. silicon on sapphire structure, i.e. SOS
- 22/00** {Testing or measuring during manufacture or treatment; Reliability measurements, i.e. testing of parts without further processing to modify the parts as such; Structural arrangements therefor}

- 22/10 . {Measuring as part of the manufacturing process (burn-in [G01R 31/2855](#))}
- 22/12 . . {for structural parameters, e.g. thickness, line width, refractive index, temperature, warp, bond strength, defects, optical inspection, electrical measurement of structural dimensions, metallurgic measurement of diffusions (electrical measurement of diffusions [H01L 22/14](#))}
- 22/14 . . {for electrical parameters, e.g. resistance, deep-levels, CV, diffusions by electrical means}
- 22/20 . {Sequence of activities consisting of a plurality of measurements, corrections, marking or sorting steps}
- 22/22 . . {Connection or disconnection of sub-entities or redundant parts of a device in response to a measurement (testing and repair of stores after manufacture including at wafer scale [G11C 29/00](#); fuses per se [H01L 23/525](#))}
- 22/24 . . {Optical enhancement of defects or not directly visible states, e.g. selective electrolytic deposition, bubbles in liquids, light emission, colour change (voltage contrast [G01R 31/311](#))}
- 22/26 . . {Acting in response to an ongoing measurement without interruption of processing, e.g. endpoint detection, in-situ thickness measurement (endpoint detection arrangements in CMP apparatus [B24B 37/013](#), in discharge apparatus [H01J 37/32](#))}
- 22/30 . {Structural arrangements specially adapted for testing or measuring during manufacture or treatment, or specially adapted for reliability measurements}
- 22/32 . . {Additional lead-in metallisation on a device or substrate, e.g. additional pads or pad portions, lines in the scribe line, sacrificed conductors (arrangements for conducting electric current to or from the solid state body in operation [H01L 23/48](#))}
- 22/34 . . {Circuits for electrically characterising or monitoring manufacturing processes, e. g. whole test die, wafers filled with test structures, on-board-devices incorporated on each die, process control monitors or pad structures thereof, devices in scribe line (switching, multiplexing, gating devices [G01R 19/25](#); process control with lithography, e.g. dose control, [G03F 7/20](#); structures for alignment control by optical means [G03F 7/70633](#))}
- 23/00** **Details of semiconductor or other solid state devices** ([H01L 25/00](#) takes precedence {; structural arrangements for testing or measuring during manufacture or treatment, or for reliability measurements [H01L 22/00](#); arrangements for connecting or disconnecting semiconductor or solid-state bodies, or methods related thereto [H01L 24/00](#); finger print sensors [G06K 9/00006](#))
- NOTE**
- This group **does not cover**:
- details of semiconductor bodies or of electrodes of devices provided for in group [H01L 29/00](#), which details are covered by that group;
  - details peculiar to devices provided for in a single main group of groups
- [H01L 31/00](#) - [H01L 51/00](#), which details are covered by those groups.
- 23/02 . Containers; Seals ([H01L 23/12](#), [H01L 23/34](#), [H01L 23/48](#), [H01L 23/552](#), {[H01L 23/66](#)} take precedence; {for memories [G11C](#)})
- 23/04 . . characterised by the shape {of the container or parts, e.g. caps, walls}
- 23/041 . . . {the container being a hollow construction having no base used as a mounting for the semiconductor body}
- 23/043 . . . the container being a hollow construction and having a conductive base as a mounting as well as a lead for the semiconductor body
- 23/045 . . . . the other leads having an insulating passage through the base
- 23/047 . . . . the other leads being parallel to the base
- 23/049 . . . . the other leads being perpendicular to the base
- 23/051 . . . . another lead being formed by a cover plate parallel to the base plate, e.g. sandwich type
- 23/053 . . . the container being a hollow construction and having an insulating {or insulated} base as a mounting for the semiconductor body
- 23/055 . . . . the leads having a passage through the base {([H01L 23/057](#) takes precedence)}
- 23/057 . . . . the leads being parallel to the base
- 23/06 . . characterised by the material of the container or its electrical properties
- 23/08 . . . the material being an electrical insulator, e.g. glass
- 23/10 . . characterised by the material or arrangement of seals between parts, e.g. between cap and base of the container or between leads and walls of the container
- 23/12 . Mountings, e.g. non-detachable insulating substrates
- 23/13 . . characterised by the shape
- 23/14 . . characterised by the material or its electrical properties {(printed circuit boards [H05K 1/00](#))}
- 23/142 . . . {Metallic substrates having insulating layers}
- 23/145 . . . {Organic substrates, e.g. plastic}
- 23/147 . . . {Semiconductor insulating substrates (semiconductor conductive substrates [H01L 23/4926](#))}
- 23/15 . . . Ceramic or glass substrates {([H01L 23/142](#), [H01L 23/145](#), [H01L 23/147](#) take precedence)}
- 23/16 . Fillings or auxiliary members in containers {or encapsulations}, e.g. centering rings ([H01L 23/42](#), [H01L 23/552](#) take precedence)
- 23/18 . . Fillings characterised by the material, its physical or chemical properties, or its arrangement within the complete device
- NOTE**
- Group [H01L 23/26](#) takes precedence over groups [H01L 23/20](#) - [H01L 23/24](#)
- 23/20 . . . gaseous at the normal operating temperature of the device
- 23/22 . . . liquid at the normal operating temperature of the device
- 23/24 . . . solid or gel at the normal operating temperature of the device {([H01L 23/3135](#) takes precedence)}



- 23/26 . . . including materials for absorbing or reacting with moisture or other undesired substances {, e.g. getters}
- 23/28 . Encapsulations, e.g. encapsulating layers, coatings, {e.g. for protection} ([H01L 23/552](#) takes precedence; {insulating layers for contacts or interconnections [H01L 23/5329](#)})
- 23/29 . . characterised by the material {, e.g. carbon (interlayer dielectrics [H01L 23/5329](#))}
- 23/291 . . . {Oxides or nitrides or carbides, e.g. ceramics, glass}
- 23/293 . . . {Organic, e.g. plastic}
- 23/295 . . . . {containing a filler ([H01L 23/296](#) takes precedence)}
- 23/296 . . . . {Organo-silicon compounds}
- 23/298 . . . {Semiconductor material, e.g. amorphous silicon}
- 23/31 . . characterised by the arrangement {or shape}
- 23/3107 . . . {the device being completely enclosed}
- 23/3114 . . . . {the device being a chip scale package, e.g. CSP}
- 23/3121 . . . . {a substrate forming part of the encapsulation}
- 23/3128 . . . . . {the substrate having spherical bumps for external connection}
- 23/3135 . . . . {Double encapsulation or coating and encapsulation}
- 23/3142 . . . . {Sealing arrangements between parts, e.g. adhesion promoters}
- 23/315 . . . . {the encapsulation having a cavity}
- 23/3157 . . . {Partial encapsulation or coating (mask layer used as insulation layer [H01L 21/31](#))}
- 23/3164 . . . . {the coating being a foil}
- 23/3171 . . . . {the coating being directly applied to the semiconductor body, e.g. passivation layer ([H01L 23/3178](#) takes precedence)}
- 23/3178 . . . . {Coating or filling in grooves made in the semiconductor body}
- 23/3185 . . . . {the coating covering also the sidewalls of the semiconductor body}
- 23/3192 . . . . {Multilayer coating}
- 23/32 . Holders for supporting the complete device in operation, i.e. detachable fixtures ([H01L 23/40](#) takes precedence; connectors, {e.g. sockets} , in general [H01R](#); for printed circuits [H05K](#))
- 23/34 . Arrangements for cooling, heating, ventilating or temperature compensation {; Temperature sensing arrangements (thermal treatment apparatus [H01L 21/00](#))}
- 23/345 . . {Arrangements for heating (thermal treatment apparatus [H01L 21/00](#))}
- 23/36 . . Selection of materials, or shaping, to facilitate cooling or heating, e.g. heatsinks {([H01L 23/28](#), [H01L 23/40](#), [H01L 23/42](#), [H01L 23/44](#), [H01L 23/46](#) take precedence; heating [H01L 23/345](#))}
- 23/367 . . . Cooling facilitated by shape of device {([H01L 23/38](#), [H01L 23/40](#), [H01L 23/42](#), [H01L 23/44](#), [H01L 23/46](#) take precedence)}
- 23/3672 . . . . {Foil-like cooling fins or heat sinks (being part of lead-frames [H01L 23/49568](#))}
- 23/3675 . . . . {characterised by the shape of the housing}
- 23/3677 . . . . {Wire-like or pin-like cooling fins or heat sinks}
- 23/373 . . . . Cooling facilitated by selection of materials for the device {or materials for thermal expansion adaptation, e.g. carbon}
- 23/3731 . . . . . {Ceramic materials or glass ([H01L 23/3732](#), [H01L 23/3733](#), [H01L 23/3735](#), [H01L 23/3737](#), [H01L 23/3738](#) take precedence)}
- 23/3732 . . . . . {Diamonds}
- 23/3733 . . . . . {having a heterogeneous or anisotropic structure, e.g. powder or fibres in a matrix, wire mesh, porous structures ([H01L 23/3732](#), [H01L 23/3737](#) take precedence)}
- 23/3735 . . . . . {Laminates or multilayers, e.g. direct bond copper ceramic substrates}
- 23/3736 . . . . . {Metallic materials ([H01L 23/3732](#), [H01L 23/3733](#), [H01L 23/3735](#), [H01L 23/3737](#), [H01L 23/3738](#) take precedence)}
- 23/3737 . . . . . {Organic materials with or without a thermoconductive filler}
- 23/3738 . . . . . {Semiconductor materials}
- 23/38 . . Cooling arrangements using the Peltier effect
- 23/40 . . Mountings or securing means for detachable cooling or heating arrangements ({heating [H01L 23/345](#)}; fixed by friction, plugs or springs)
- 23/4006 . . . {with bolts or screws}
- 23/4012 . . . . {for stacked arrangements of a plurality of semiconductor devices (assemblies [per se](#) [H01L 25/00](#))}
- 2023/4018 . . . . {characterised by the type of device to be heated or cooled}
- 2023/4025 . . . . . {Base discrete devices, e.g. presspack, disc-type transistors}
- 2023/4031 . . . . . {Packaged discrete devices, e.g. to-3 housings, diodes}
- 2023/4037 . . . . . {characterised by thermal path or place of attachment of heatsink}
- 2023/4043 . . . . . {heatsink to have chip}
- 2023/405 . . . . . {heatsink to package}
- 2023/4056 . . . . . {heatsink to additional heatsink}
- 2023/4062 . . . . . {heatsink to or through board or cabinet}
- 2023/4068 . . . . . {Heatconductors between device and heatsink, e.g. compliant heat-spreaders, heat-conducting bands}
- 2023/4075 . . . . . {Mechanical elements}
- 2023/4081 . . . . . {Compliant clamping elements not primarily serving heat-conduction}
- 2023/4087 . . . . . {Mounting accessories, interposers, clamping or screwing parts}
- 23/4093 . . . {Snap-on arrangements, e.g. clips}
- 23/42 . . Fillings or auxiliary members in containers {or encapsulations} selected or arranged to facilitate heating or cooling ({heating [H01L 23/345](#)}; characterised by selection of materials for the device [H01L 23/373](#))}
- 23/427 . . . Cooling by change of state, e.g. use of heat pipes ({by liquefied gas [H01L 23/445](#))}
- 23/4275 . . . . {by melting or evaporation of solids}
- 23/433 . . . Auxiliary members {in containers} characterised by their shape, e.g. pistons
- 23/4332 . . . . {Bellows}
- 23/4334 . . . . {Auxiliary members in encapsulations ([H01L 23/49568](#) takes precedence)}
- 23/4336 . . . . {in combination with jet impingement}

- 23/4338 . . . . {Pistons, e.g. spring-loaded members}
- 23/44 . . the complete device being wholly immersed in a fluid other than air {(H01L 23/427 takes precedence)}
- 23/445 . . . {the fluid being a liquefied gas, e.g. in a cryogenic vessel}
- 23/46 . . involving the transfer of heat by flowing fluids (H01L 23/42, H01L 23/44 take precedence)
- 23/467 . . . by flowing gases, e.g. air {(H01L 23/473 takes precedence)}
- 23/473 . . . by flowing liquids {(H01L 23/4332, H01L 23/4338 take precedence)}
- 23/4735 . . . . {Jet impingement (H01L 23/4336 takes precedence)}
- 23/48 . . Arrangements for conducting electric current to or from the solid state body in operation, e.g. leads, terminal arrangements (in general H01R); {Selection of materials therefor}
- NOTE**
- Arrangements for connecting or disconnecting semiconductor or other solid state bodies, or methods related thereto, other than those arrangements or methods covered by the following subgroups, are covered by H01L 24/00
- 23/481 . . {Internal lead connections, e.g. via connections, feedthrough structures}
- 23/482 . . consisting of lead-in layers inseparably applied to the semiconductor body {(electrodes H01L 29/40)}
- 23/4821 . . . {Bridge structure with air gap}
- 23/4822 . . . {Beam leads}
- 23/4824 . . . {Pads with extended contours, e.g. grid structure, branch structure, finger structure}
- 23/4825 . . . {for devices consisting of semiconductor layers on insulating or semi-insulating substrates, e.g. silicon on sapphire devices, i.e. SOS}
- 23/4827 . . . {Materials}
- 23/4828 . . . . {Conductive organic material or pastes, e.g. conductive adhesives, inks}
- 23/485 . . . consisting of layered constructions comprising conductive layers and insulating layers, e.g. planar contacts {(H01L 23/4821, H01L 23/4822, H01L 23/4824, H01L 23/4825 take precedence; materials H01L 23/532, bond pads H01L 24/02, bump connectors H01L 24/10)}
- 23/4855 . . . . {Overhang structure}
- 23/488 . . consisting of soldered {or bonded} constructions {(bump connectors H01L 24/01)}
- 23/49 . . . wire-like {arrangements or pins or rods (using optical fibres H01L 23/48; pins attached to insulating substrates H01L 23/49811)}
- 23/492 . . . Bases or plates {or solder therefor}
- 23/4922 . . . . {having a heterogeneous or anisotropic structure}
- 23/4924 . . . . {characterised by the materials}
- 23/4926 . . . . . {the materials containing semiconductor material}
- 23/4928 . . . . . {the materials containing carbon}
- 23/495 . . . Lead-frames {or other flat leads (H01L 23/498 takes precedence; lead frame interconnections between components H01L 23/52)}
- 23/49503 . . . . {characterised by the die pad}
- 23/49506 . . . . . {an insulative substrate being used as a diepad, e.g. ceramic, plastic (H01L 23/49531 takes precedence)}
- 23/4951 . . . . . {Chip-on-leads or leads-on-chip techniques, i.e. inner lead fingers being used as die pad}
- 23/49513 . . . . . {having bonding material between chip and die pad}
- 23/49517 . . . . . {Additional leads}
- 23/4952 . . . . . {the additional leads being a bump or a wire}
- 23/49524 . . . . . {the additional leads being a tape carrier or flat leads}
- 23/49527 . . . . . {the additional leads being a multilayer}
- 23/49531 . . . . . {the additional leads being a wiring board}
- 23/49534 . . . . . {Multi-layer}
- 23/49537 . . . . . {Plurality of lead frames mounted in one device}
- 23/49541 . . . . . {Geometry of the lead-frame}
- 23/49544 . . . . . {Deformation absorbing parts in the lead frame plane, e.g. meanderline shape (H01L 23/49562 takes precedence)}
- 23/49548 . . . . . {Cross section geometry (H01L 23/49562 takes precedence)}
- 23/49551 . . . . . . {characterised by bent parts}
- 23/49555 . . . . . . . {the bent parts being the outer leads}
- 23/49558 . . . . . {Insulating layers on lead frames, e.g. bridging members}
- 23/49562 . . . . . {for devices being provided for in H01L 29/00}
- 23/49565 . . . . . {Side rails of the lead frame, e.g. with perforations, sprocket holes}
- 23/49568 . . . . . {specifically adapted to facilitate heat dissipation}
- 23/49572 . . . . . {consisting of thin flexible metallic tape with or without a film carrier (H01L 23/49503 - H01L 23/49568 and H01L 23/49575 - H01L 23/49579 take precedence)}
- 23/49575 . . . . . {Assemblies of semiconductor devices on lead frames}
- 23/49579 . . . . . {characterised by the materials of the lead frames or layers thereon}
- 23/49582 . . . . . {Metallic layers on lead frames}
- 23/49586 . . . . . {Insulating layers on lead frames}
- 23/49589 . . . . . {Capacitor integral with or on the leadframe}
- 23/49593 . . . . . {Battery in combination with a leadframe}
- 23/49596 . . . . . {Oscillators in combination with lead-frames}
- 23/498 . . . . Leads, {i.e. metallisations or lead-frames} on insulating substrates, {e.g. chip carriers (shape of the substrate H01L 23/13)}
- 23/49805 . . . . . {the leads being also applied on the sidewalls or the bottom of the substrate, e.g. leadless packages for surface mounting}
- 23/49811 . . . . . {Additional leads joined to the metallisation on the insulating substrate, e.g. pins, bumps, wires, flat leads (H01L 23/49827 takes precedence)}
- 23/49816 . . . . . {Spherical bumps on the substrate for external connection, e.g. ball grid arrays [BGA]}

- 23/49822 . . . . {Multilayer substrates (multilayer metallisation on monolayer substrate [H01L 23/498](#))}
- 23/49827 . . . . {Via connections through the substrates, e.g. pins going through the substrate, coaxial cables ([H01L 23/49822](#), [H01L 23/49833](#), [H01L 23/4985](#), [H01L 23/49861](#) take precedence)}
- 23/49833 . . . . {the chip support structure consisting of a plurality of insulating substrates}
- 23/49838 . . . . {Geometry or layout}
- 23/49844 . . . . {for devices being provided for in [H01L 29/00](#)}
- 23/4985 . . . . {Flexible insulating substrates ([H01L 23/49572](#) and [H01L 23/49855](#) take precedence)}
- 23/49855 . . . . {for flat-cards, e.g. credit cards ([cards per se G06K 19/00](#))}
- 23/49861 . . . . {Lead-frames fixed on or encapsulated in insulating substrates ([H01L 23/4985](#), [H01L 23/49805](#) take precedence)}
- 23/49866 . . . . {characterised by the materials (materials of the substrates [H01L 23/14](#), of the lead-frames [H01L 23/49579](#))}
- 23/49872 . . . . {the conductive materials containing semiconductor material}
- 23/49877 . . . . {Carbon, e.g. fullerenes (superconducting fullerenes [H01L 39/123](#))}
- 23/49883 . . . . {the conductive materials containing organic materials or pastes, e.g. for thick films (for printed circuits [H05K 1/092](#))}
- 23/49888 . . . . {the conductive materials containing superconducting material}
- 23/49894 . . . . {Materials of the insulating layers or coatings}
- 23/50 . . for integrated circuit devices, {e.g. power bus, number of leads} ([H01L 23/482](#) - [H01L 23/498](#) take precedence)
- 23/52 . . Arrangements for conducting electric current within the device in operation from one component to another {, i.e. interconnections, e.g. wires, lead frames (optical interconnections [G02B 6/00](#))}
- 23/522 . . including external interconnections consisting of a multilayer structure of conductive and insulating layers inseparably formed on the semiconductor body
- 23/5221 . . . {Crossover interconnections}
- 23/5222 . . . {Capacitive arrangements or effects of, or between wiring layers (other capacitive arrangements [H01L 23/642](#))}
- 23/5223 . . . {Capacitor integral with wiring layers}
- 23/5225 . . . {Shielding layers formed together with wiring layers}
- 23/5226 . . . {Via connections in a multilevel interconnection structure}
- 23/5227 . . . {Inductive arrangements or effects of, or between, wiring layers (other inductive arrangements [H01L 23/645](#))}
- 23/5228 . . . {Resistive arrangements or effects of, or between, wiring layers (other resistive arrangements [H01L 23/647](#))}
- 23/525 . . . with adaptable interconnections
- 23/5252 . . . . {comprising anti-fuses, i.e. connections having their state changed from non-conductive to conductive}
- 23/5254 . . . . {the change of state resulting from the use of an external beam, e.g. laser beam or ion beam}
- 23/5256 . . . . {comprising fuses, i.e. connections having their state changed from conductive to non-conductive}
- 23/5258 . . . . {the change of state resulting from the use of an external beam, e.g. laser beam or ion beam}
- 23/528 . . . {Geometry or} layout of the interconnection structure {([H01L 27/0207](#) takes precedence; algorithms [G06F 17/50](#))}
- 23/5283 . . . . {Cross-sectional geometry}
- 23/5286 . . . . {Arrangements of power or ground buses}
- 23/532 . . . characterised by the materials
- 23/53204 . . . . {Conductive materials}
- 23/53209 . . . . {based on metals, e.g. alloys, metal silicides ([H01L 23/53285](#) takes precedence)}
- 23/53214 . . . . . {the principal metal being aluminium}
- 23/53219 . . . . . {Aluminium alloys}
- 23/53223 . . . . . {Additional layers associated with aluminium layers, e.g. adhesion, barrier, cladding layers}
- 23/53228 . . . . . {the principal metal being copper}
- 23/53233 . . . . . {Copper alloys}
- 23/53238 . . . . . {Additional layers associated with copper layers, e.g. adhesion, barrier, cladding layers}
- 23/53242 . . . . . {the principal metal being a noble metal, e.g. gold}
- 23/53247 . . . . . {Noble-metal alloys}
- 23/53252 . . . . . {Additional layers associated with noble-metal layers, e.g. adhesion, barrier, cladding layers}
- 23/53257 . . . . . {the principal metal being a refractory metal}
- 23/53261 . . . . . {Refractory-metal alloys}
- 23/53266 . . . . . {Additional layers associated with refractory-metal layers, e.g. adhesion, barrier, cladding layers}
- 23/53271 . . . . . {containing semiconductor material, e.g. polysilicon}
- 23/53276 . . . . . {containing carbon, e.g. fullerenes (superconducting fullerenes [H01L 39/123](#))}
- 23/5328 . . . . . {containing conductive organic materials or pastes, e.g. conductive adhesives, inks}
- 23/53285 . . . . . {containing superconducting materials}
- 23/5329 . . . . {Insulating materials}
- 23/53295 . . . . {Stacked insulating layers}
- 23/535 . . including internal interconnections, e.g. cross-under constructions {(internal lead connections [H01L 23/481](#))}
- 23/538 . . the interconnection structure between a plurality of semiconductor chips being formed on, or in, insulating substrates {([H05K](#) takes precedence; manufacture or treatment [H01L 21/4846](#) ; mountings per se [H01L 23/12](#); {materials [H01L 23/49866](#))}
- 23/5381 . . . {Crossover interconnections, e.g. bridge stepovers}
- 23/5382 . . . {Adaptable interconnections, e.g. for engineering changes}

- 23/5383 . . . {Multilayer substrates ([H01L 23/5385](#) takes precedence; multilayer metallisation on monolayer substrates [H01L 23/538](#))}
- 23/5384 . . . {Conductive vias through the substrate with or without pins, e.g. buried coaxial conductors ([H01L 23/5383](#), [H01L 23/5385](#) take precedence; pins attached to insulating substrates [H01L 23/49811](#))}
- 23/5385 . . . {Assembly of a plurality of insulating substrates}
- 23/5386 . . . {Geometry or layout of the interconnection structure}
- 23/5387 . . . {Flexible insulating substrates ([H01L 23/5388](#) takes precedence)}
- 23/5388 . . . {for flat cards, e.g. credit cards ([cards per se G06K 19/00](#))}
- 23/5389 . . . {the chips being integrally enclosed by the interconnect and support structures}
- 23/544 . Marks applied to semiconductor devices {or parts}, e.g. registration marks, {alignment structures, wafer maps ([test patterns for characterising or monitoring manufacturing processes H01L 22/00](#))}
- NOTE**
- When classifying in group [H01L 23/544](#), details are to be further indexed by using the indexing codes chosen from [H01L 2223/544](#) and subgroups
- 23/552 . Protection against radiation, e.g. light {or electromagnetic waves}
- 23/556 . . against alpha rays
- 23/562 . {Protection against mechanical damage ([H01L 23/02](#), [H01L 23/28](#) take precedence)}
- 23/564 . {Details not otherwise provided for, e.g. protection against moisture ([getters H01L 23/26](#))}
- 23/57 . {Protection from inspection, reverse engineering or tampering}
- 23/573 . . {using passive means}
- 23/576 . . {using active circuits}
- 23/58 . Structural electrical arrangements for semiconductor devices not otherwise provided for {, e.g. in combination with batteries ([H01L 23/49593](#), [H01L 23/49596](#) take precedence)}
- 23/585 . . {comprising conductive layers or plates or strips or rods or rings ([H01L 23/60](#), [H01L 23/62](#), [H01L 23/64](#), [H01L 23/66](#) take precedence)}
- 23/60 . . Protection against electrostatic charges or discharges, e.g. Faraday shields ([in general H05F](#))
- 23/62 . . Protection against overvoltage, e.g. fuses, shunts
- 23/64 . . Impedance arrangements
- 23/642 . . . {Capacitive arrangements ([H01L 23/49589](#), [H01L 23/645](#), [H01L 23/647](#), [H01L 23/66](#) take precedence; capacitive effects between wiring layers on the semiconductor body [H01L 23/5222](#))}
- 23/645 . . . {Inductive arrangements ([H01L 23/647](#), [H01L 23/66](#) take precedence)}
- 23/647 . . . {Resistive arrangements ([H01L 23/66](#), [H01L 23/62](#) take precedence)}
- 23/66 . . . High-frequency adaptations
- NOTE**
- When classifying in group [H01L 23/66](#), details are to be further indexed by using the
- indexing codes chosen from [H01L 2223/66](#) and subgroups
- 24/00 **{Arrangements for connecting or disconnecting semiconductor or solid-state bodies; Methods or apparatus related thereto}**
- NOTES**
1. This group does not cover:
- details of semiconductor bodies or of electrodes of devices provided for in group [H01L 29/00](#), which details are covered by that group;
  - details peculiar to devices provided for in a single main group of groups [H01L 31/00](#) - [H01L 51/00](#), which details are covered by those groups.
  - printed circuits, which are covered by groups [H05K 1/00](#) - [H05K 1/189](#);
  - apparatus or manufacturing processes for printed circuits, which are covered by groups [H05K 3/00](#) - [H05K 3/4685](#);
  - manufacture or treatment of parts, which are covered by group [H01L 21/48](#) and subgroups except [H01L 21/4885](#) - [H01L 21/4896](#);
  - assemblies of semiconductor devices, which are covered by groups [H01L 21/50](#) - [H01L 21/568](#);
  - applying interconnections to be used for carrying current between separate components within a device, which is covered by group [H01L 21/768](#) and subgroups;
  - containers or seals, which are covered by groups [H01L 23/02](#) - [H01L 23/10](#);
  - mountings, which are covered by groups [H01L 23/12](#) - [H01L 23/15](#) and subgroups;
  - arrangements for cooling, heating, ventilating or temperature compensation, which are covered by groups [H01L 23/34](#) - [H01L 23/4735](#);
  - arrangements for conducting electric current, which are covered by groups [H01L 23/48](#) - [H01L 23/50](#), and by groups [H01L 23/52](#) - [H01L 23/5389](#);
  - structural electrical arrangements, which are covered by groups [H01L 24/80](#) - [H01L 23/66](#);
  - assemblies of semiconductor or other solid state devices, which are covered by groups [H01L 25/00](#) - [H01L 25/18](#).
2. In this group the following indexing codes are used : [H01L 24/00](#), [H01L 2224/00](#), [H01L 2924/00](#), and subgroups thereof
- 24/01 . {Means for bonding being attached to, or being formed on, the surface to be connected, e.g. chip-to-package, die-attach, "first-level" interconnects; Manufacturing methods related thereto}

- 24/02 . . {Bonding areas (on insulating substrates, e.g. chip carriers, [H01L 23/49816](#), [H01L 23/49838](#), [H01L 23/5389](#)); Manufacturing methods related thereto}
- WARNING**
- Groups [H01L 24/02](#) – [H01L 24/09](#) are incomplete pending reclassification of documents from groups [H01L 24/02](#) and [H01L 24/10](#).
- Groups [H01L 24/02](#) – [H01L 24/09](#) and [H01L 24/10](#) should be considered in order to perform a complete search.
- 24/03 . . . {Manufacturing methods}
- 24/04 . . . {Structure, shape, material or disposition of the bonding areas prior to the connecting process}
- 24/05 . . . . {of an individual bonding area}
- 24/06 . . . . {of a plurality of bonding areas}
- 24/07 . . . {Structure, shape, material or disposition of the bonding areas after the connecting process}
- 24/08 . . . . {of an individual bonding area}
- 24/09 . . . . {of a plurality of bonding areas}
- 24/10 . . {Bump connectors (bumps on insulating substrates, e.g. chip carriers, [H01L 23/49816](#)); Manufacturing methods related thereto}
- 24/11 . . . {Manufacturing methods (for bumps on insulating substrates [H01L 21/4853](#))}
- 24/12 . . . {Structure, shape, material or disposition of the bump connectors prior to the connecting process}
- 24/13 . . . . {of an individual bump connector}
- 24/14 . . . . {of a plurality of bump connectors}
- 24/15 . . . {Structure, shape, material or disposition of the bump connectors after the connecting process}
- 24/16 . . . . {of an individual bump connector}
- 24/17 . . . . {of a plurality of bump connectors}
- 24/18 . . {High density interconnect [HDI] connectors; Manufacturing methods related thereto (interconnection structure between a plurality of semiconductor chips [H01L 23/5389](#))}
- WARNING**
- Groups [H01L 24/18](#) – [H01L 24/25](#) are incomplete pending reclassification of documents from groups [H01L 24/18](#) and [H01L 24/82](#).
- Groups [H01L 24/18](#) – [H01L 24/25](#) and [H01L 24/82](#) should be considered in order to perform a complete search.
- 24/19 . . . {Manufacturing methods of high density interconnect preforms}
- 24/20 . . . {Structure, shape, material or disposition of high density interconnect preforms}
- 24/23 . . . {Structure, shape, material or disposition of the high density interconnect connectors after the connecting process}
- 24/24 . . . . {of an individual high density interconnect connector}
- 24/25 . . . . {of a plurality of high density interconnect connectors}
- 24/26 . . {Layer connectors, e.g. plate connectors, solder or adhesive layers; Manufacturing methods related thereto}
- 24/27 . . . {Manufacturing methods}
- 24/28 . . . {Structure, shape, material or disposition of the layer connectors prior to the connecting process}
- 24/29 . . . . {of an individual layer connector}
- 24/30 . . . . {of a plurality of layer connectors}
- 24/31 . . . {Structure, shape, material or disposition of the layer connectors after the connecting process}
- 24/32 . . . . {of an individual layer connector}
- 24/33 . . . . {of a plurality of layer connectors}
- 24/34 . . {Strap connectors, e.g. copper straps for grounding power devices; Manufacturing methods related thereto}
- WARNING**
- Groups [H01L 24/34](#) – [H01L 24/41](#) are incomplete pending reclassification of documents from groups [H01L 24/34](#), [H01L 24/01](#), [H01L 24/42](#), and [H01L 24/85](#).
- Groups [H01L 24/34](#) – [H01L 24/41](#) and [H01L 24/01](#), [H01L 24/42](#), [H01L 24/85](#) should be considered in order to perform a complete search.
- 24/35 . . . {Manufacturing methods}
- 24/36 . . . {Structure, shape, material or disposition of the strap connectors prior to the connecting process}
- 24/37 . . . . {of an individual strap connector}
- 24/38 . . . . {of a plurality of strap connectors}
- 24/39 . . . {Structure, shape, material or disposition of the strap connectors after the connecting process}
- 24/40 . . . . {of an individual strap connector}
- 24/41 . . . . {of a plurality of strap connectors}
- 24/42 . . {Wire connectors; Manufacturing methods related thereto}
- 24/43 . . . {Manufacturing methods}
- WARNING**
- Group [H01L 24/43](#) is incomplete pending reclassification of documents from groups [H01L 21/4885](#) and [H01L 24/42](#), [H01L 24/85](#).
- Groups [H01L 24/43](#) and [H01L 21/4885](#), [H01L 24/42](#), [H01L 24/85](#) should be considered in order to perform a complete search.
- 24/44 . . . {Structure, shape, material or disposition of the wire connectors prior to the connecting process}
- WARNING**
- Group [H01L 24/44](#) is incomplete pending reclassification of documents from groups [H01L 24/42](#) and [H01L 24/85](#).
- Groups [H01L 24/44](#) and [H01L 24/42](#), [H01L 24/85](#) should be considered in order to perform a complete search.
- 24/45 . . . . {of an individual wire connector}
- 24/46 . . . . {of a plurality of wire connectors}

- 24/47 . . . {Structure, shape, material or disposition of the wire connectors after the connecting process}
- WARNING**
- Group [H01L 24/47](#) is incomplete pending reclassification of documents from groups [H01L 24/42](#) and [H01L 24/85](#).
- Groups [H01L 24/47](#) and [H01L 24/42](#), [H01L 24/85](#) should be considered in order to perform a complete search.
- 24/48 . . . . {of an individual wire connector}
- 24/49 . . . . {of a plurality of wire connectors}
- 24/50 . . {Tape automated bonding [TAB] connectors, i.e. film carriers; Manufacturing methods related thereto (thin flexible metallic tape with or without a film carrier [H01L 23/49572](#), flexible insulating substrates [H01L 23/4985](#), [H01L 23/5387](#))}
- WARNING**
- Group [H01L 24/50](#) is incomplete pending reclassification of documents from group [H01L 24/86](#).
- Groups [H01L 24/50](#) and [H01L 24/86](#) should be considered in order to perform a complete search.
- 24/63 . . {Connectors not provided for in any of the groups [H01L 24/10](#) - [H01L 24/50](#) and subgroups; Manufacturing methods related thereto}
- 24/64 . . . {Manufacturing methods}
- 24/65 . . . {Structure, shape, material or disposition of the connectors prior to the connecting process}
- 24/66 . . . . {of an individual connector}
- 24/67 . . . . {of a plurality of connectors}
- 24/68 . . . {Structure, shape, material or disposition of the connectors after the connecting process}
- 24/69 . . . . {of an individual connector}
- 24/70 . . . . {of a plurality of connectors}
- 24/71 . {Means for bonding not being attached to, or not being formed on, the surface to be connected (holders for supporting the complete device in operation [H01L 23/32](#))}
- 24/72 . . {Detachable connecting means consisting of mechanical auxiliary parts connecting the device, e.g. pressure contacts using springs or clips}
- 24/73 . {Means for bonding being of different types provided for in two or more of groups [H01L 24/10](#), [H01L 24/18](#), [H01L 24/26](#), [H01L 24/34](#), [H01L 24/42](#), [H01L 24/50](#), [H01L 24/63](#), [H01L 24/71](#)}
- 24/74 . {Apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies}
- 24/741 . . {Apparatus for manufacturing means for bonding, e.g. connectors}
- 24/742 . . . {Apparatus for manufacturing bump connectors}
- 24/743 . . . {Apparatus for manufacturing layer connectors}
- 24/744 . . . {Apparatus for manufacturing strap connectors}
- 24/745 . . . {Apparatus for manufacturing wire connectors}
- 24/75 . . {Apparatus for connecting with bump connectors or layer connectors}
- 24/76 . . {Apparatus for connecting with build-up interconnects}
- 24/77 . . {Apparatus for connecting with strap connectors}
- 24/78 . . {Apparatus for connecting with wire connectors}
- 24/79 . . {Apparatus for Tape Automated Bonding [TAB]}
- 24/799 . . {Apparatus for disconnecting}
- 24/80 . {Methods for connecting semiconductor or other solid state bodies using means for bonding being attached to, or being formed on, the surface to be connected}
- 24/81 . . {using a bump connector}
- 24/82 . . {by forming build-up interconnects at chip-level, e.g. for high density interconnects [HDI] (interconnection structure between a plurality of semiconductor chips [H01L 23/5389](#))}
- 24/83 . . {using a layer connector}
- 24/84 . . {using a strap connector}
- WARNING**
- Group [H01L 24/84](#) is incomplete pending reclassification of documents from group [H01L 24/85](#).
- Group [H01L 24/84](#) and [H01L 24/85](#) should be considered in order to perform a complete search.
- 24/85 . . {using a wire connector (wire bonding in general [B23K 20/004](#))}
- 24/86 . . {using tape automated bonding [TAB]}
- 24/89 . . {using at least one connector not provided for in any of the groups [H01L 24/81](#) - [H01L 24/86](#)}
- 24/90 . {Methods for connecting semiconductor or solid state bodies using means for bonding not being attached to, or not being formed on, the body surface to be connected, e.g. pressure contacts using springs or clips}
- 24/91 . {Methods for connecting semiconductor or solid state bodies including different methods provided for in two or more of groups [H01L 24/80](#) - [H01L 24/90](#)}
- 24/92 . . {Specific sequence of method steps}
- 24/93 . {Batch processes}
- WARNING**
- Group [H01L 24/93](#) is incomplete pending reclassification of documents from groups [H01L 24/80](#) - [H01L 24/90](#).
- Groups [H01L 24/93](#) and [H01L 24/80](#) - [H01L 24/90](#) should be considered in order to perform a complete search.
- 24/94 . . {at wafer-level, i.e. with connecting carried out on a wafer comprising a plurality of undiced individual devices}
- 24/95 . . {at chip-level, i.e. with connecting carried out on a plurality of singulated devices, i.e. on diced chips}
- 24/96 . . . {the devices being encapsulated in a common layer, e.g. neo-wafer or pseudo-wafer, said common layer being separable into individual assemblies after connecting}
- 24/97 . . . {the devices being connected to a common substrate, e.g. interposer, said common substrate being separable into individual assemblies after connecting}

- 25/98 . {Methods for disconnecting semiconductor or solid-state bodies}
- 25/00 Assemblies consisting of a plurality of individual semiconductor or other solid state devices {; Multistep manufacturing processes thereof}** (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); photovoltaic modules or arrays of photovoltaic cells [H01L 31/042](#) {; panels or arrays of photo electrochemical cells [H01G 9/2068](#)})
- 25/03 . all the devices being of a type provided for in the same subgroup of groups [H01L 27/00](#) - [H01L 51/00](#), e.g. assemblies of rectifier diodes
- 25/04 . . the devices not having separate containers
- 25/041 . . . {the devices being of a type provided for in group [H01L 31/00](#)}
- 25/042 . . . . {the devices being arranged next to each other (solar cells [H01L 31/042](#))}
- 25/043 . . . . {Stacked arrangements of devices}
- 25/046 . . . {the devices being of a type provided for in group [H01L 51/00](#)}
- 25/047 . . . . {the devices being of a type provided for in group [H01L 51/42](#), e.g. photovoltaic modules based on organic solar cells}
- 25/048 . . . . {the devices being of a type provided for in group [H01L 51/50](#), e.g. assembly of organic light emitting devices}
- 25/065 . . . the devices being of a type provided for in group [H01L 27/00](#)
- NOTE**  
Group [H01L 25/0652](#) takes precedence over groups [H01L 25/0655](#) and [H01L 25/0657](#)
- 25/0652 . . . . {the devices being arranged next and on each other, i.e. mixed assemblies}
- 25/0655 . . . . {the devices being arranged next to each other}
- 25/0657 . . . . {Stacked arrangements of devices}
- 25/07 . . . the devices being of a type provided for in group [H01L 29/00](#)
- NOTE**  
Group [H01L 25/071](#) takes precedence over groups [H01L 25/072](#) - [H01L 25/074](#)
- 25/071 . . . . {the devices being arranged next and on each other, i.e. mixed assemblies}
- 25/072 . . . . {the devices being arranged next to each other}
- 25/073 . . . . {Apertured devices mounted on one or more rods passed through the apertures}
- 25/074 . . . . {Stacked arrangements of non-apertured devices}
- 25/075 . . . the devices being of a type provided for in group [H01L 33/00](#)
- 25/0753 . . . . {the devices being arranged next to each other}
- 25/0756 . . . . {Stacked arrangements of devices}
- 25/10 . . the devices having separate containers
- 25/105 . . . {the devices being of a type provided for in group [H01L 27/00](#)}
- NOTE**  
When classifying in group [H01L 25/105](#), details of the assemblies are to be further indexed by using the indexing codes chosen from [H01L 2225/1005](#) and subgroups
- 25/11 . . . the devices being of a type provided for in group [H01L 29/00](#)
- NOTE**  
Group [H01L 25/112](#) takes precedence over groups [H01L 25/115](#) and [H01L 25/117](#)
- 25/112 . . . . {Mixed assemblies}
- 25/115 . . . . {the devices being arranged next to each other}
- 25/117 . . . . {Stacked arrangements of devices}
- 25/13 . . . the devices being of a type provided for in group [H01L 33/00](#)
- 25/16 . the devices being of types provided for in two or more different main groups of [H01L 27/00](#) - [H01L 49/00](#) {and [H01L 51/00](#)}, e.g. forming hybrid circuits {(interconnections for hybrid circuits [H01L 23/5389](#))}
- 25/162 . . {the devices being mounted on two or more different substrates}
- 25/165 . . {Containers}
- 25/167 . . {comprising optoelectronic devices, e.g. LED, photodiodes}
- 25/18 . the devices being of types provided for in two or more different subgroups of the same main group of groups [H01L 27/00](#) - [H01L 51/00](#) {(comprising devices provided for in [H01L 27/144](#) and subgroups, see [H01L 27/144](#) and subgroups)}
- 25/50 . {Multistep manufacturing processes of assemblies consisting of devices, each device being of a type provided for in group [H01L 27/00](#) or [H01L 29/00](#) ([H01L 21/50](#) takes precedence)}
- 27/00 Devices consisting of a plurality of semiconductor or other solid-state components formed in or on a common substrate** (details thereof [H01L 23/00](#), [H01L 29/00](#) - [H01L 51/00](#); assemblies consisting of a plurality of individual solid state devices [H01L 25/00](#))
- NOTES**
1. In this group, with the exception of groups [H01L 27/115](#) - [H01L 27/11597](#), the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
  2. When classifying in this group, subject matter relating to electrically programmable read-only memories is classified in group [H01L 27/115](#), irrespective of the last place priority rule.

- 27/01 . . . comprising only passive thin-film or thick-film elements formed on a common insulating substrate {passive two-terminal components without a potential-jump or surface barrier for integrated circuits, details thereof and multistep manufacturing processes therefor [H01L 28/00](#)}
- NOTE**  
In groups [H01L 27/01](#) - [H01L 27/26](#), in the absence of an indication to the contrary, classification is made in the last appropriate place.
- 27/013 . . . {Thick-film circuits}
- 27/016 . . . {Thin-film circuits}
- 27/02 . . . including semiconductor components specially adapted for rectifying, oscillating, amplifying or switching and having at least one potential-jump barrier or surface barrier; including integrated passive circuit elements with at least one potential-jump barrier or surface barrier
- 27/0203 . . . {Particular design considerations for integrated circuits}
- 27/0207 . . . {Geometrical layout of the components, e.g. computer aided design; custom LSI, semi-custom LSI, standard cell technique}
- 27/0211 . . . . . {adapted for requirements of temperature}
- 27/0214 . . . . . {for internal polarisation, e.g. I2L}
- 27/0218 . . . . . {of field effect structures}
- 27/0222 . . . . . {Charge pumping, substrate bias generation structures}
- 27/0225 . . . . . {Charge injection in static induction transistor logic structures [SITL]}
- 27/0229 . . . . . {of bipolar structures}
- 27/0233 . . . . . {Integrated injection logic structures [I2L]}
- 27/0237 . . . . . {using vertical injector structures}
- 27/024 . . . . . {using field effect injector structures}
- 27/0244 . . . . . {I2L structures integrated in combination with analog structures}
- 27/0248 . . . . . {for electrical or thermal protection, e.g. electrostatic discharge [ESD] protection}
- 27/0251 . . . . . {for MOS devices}
- 27/0255 . . . . . {using diodes as protective elements}
- 27/0259 . . . . . {using bipolar transistors as protective elements}
- 27/0262 . . . . . {including a PNP transistor and a NPN transistor, wherein each of said transistors has its base coupled to the collector of the other transistor, e.g. silicon controlled rectifier [SCR] devices}
- 27/0266 . . . . . {using field effect transistors as protective elements}
- 27/027 . . . . . {specially adapted to provide an electrical current path other than the field effect induced current path}
- 27/0274 . . . . . {involving a parasitic bipolar transistor triggered by the electrical biasing of the gate electrode of the field effect transistor, e.g. gate coupled transistors}
- 27/0277 . . . . . {involving a parasitic bipolar transistor triggered by the local electrical biasing of the layer acting as base of said parasitic bipolar transistor}
- 27/0281 . . . . . {field effect transistors in a "Darlington-like" configuration}
- 27/0285 . . . . . {bias arrangements for gate electrode of field effect transistors, e.g. RC networks, voltage partitioning circuits [\(H01L 27/0281 takes precedence\)](#)}
- 27/0288 . . . . . {using passive elements as protective elements, e.g. resistors, capacitors, inductors, spark-gaps}
- 27/0292 . . . . . {using a specific configuration of the conducting means connecting the protective devices, e.g. ESD buses}
- 27/0296 . . . . . {involving a specific disposition of the protective devices}
- 27/04 . . . the substrate being a semiconductor body
- 27/06 . . . including a plurality of individual components in a non-repetitive configuration
- 27/0605 . . . . . {integrated circuits made of compound material, e.g. A<sub>III</sub>B<sub>V</sub>}
- 27/0611 . . . . . {integrated circuits having a two-dimensional layout of components without a common active region}
- 27/0617 . . . . . {comprising components of the field-effect type [\(H01L 27/0251 takes precedence\)](#)}
- 27/0623 . . . . . {in combination with bipolar transistors}
- 27/0629 . . . . . {in combination with diodes, or resistors, or capacitors}
- 27/0635 . . . . . {in combination with bipolar transistors and diodes, or resistors, or capacitors}
- 27/0641 . . . . . {without components of the field effect type}
- 27/0647 . . . . . {Bipolar transistors in combination with diodes, or capacitors, or resistors, e.g. vertical bipolar transistor and bipolar lateral transistor and resistor}
- 27/0652 . . . . . {Vertical bipolar transistor in combination with diodes, or capacitors, or resistors}
- 27/0658 . . . . . {Vertical bipolar transistor in combination with resistors or capacitors}
- 27/0664 . . . . . {Vertical bipolar transistor in combination with diodes}
- 27/067 . . . . . {Lateral bipolar transistor in combination with diodes, or capacitors, or resistors}
- 27/0676 . . . . . {comprising combinations of diodes, or capacitors or resistors}
- 27/0682 . . . . . {comprising combinations of capacitors and resistors}
- 27/0688 . . . . . {Integrated circuits having a three-dimensional layout}
- 27/0694 . . . . . {comprising components formed on opposite sides of a semiconductor substrate}
- 27/07 . . . . . the components having an active region in common



- 27/0705 . . . . . {comprising components of the field effect type}
  - 27/0711 . . . . . {in combination with bipolar transistors and diodes, or capacitors, or resistors}
  - 27/0716 . . . . . {in combination with vertical bipolar transistors and diodes, or capacitors, or resistors}
  - 27/0722 . . . . . {in combination with lateral bipolar transistors and diodes, or capacitors, or resistors}
  - 27/0727 . . . . . {in combination with diodes, or capacitors or resistors}
  - 27/0733 . . . . . {in combination with capacitors only}
  - 27/0738 . . . . . {in combination with resistors only}
  - 27/0744 . . . . . {without components of the field effect type}
  - 27/075 . . . . . {Bipolar transistors in combination with diodes, or capacitors, or resistors, e.g. lateral bipolar transistor, and vertical bipolar transistor and resistor}
  - 27/0755 . . . . . {Vertical bipolar transistor in combination with diodes, or capacitors, or resistors}
  - 27/0761 . . . . . {Vertical bipolar transistor in combination with diodes only}
  - 27/0766 . . . . . {with Schottky diodes only}
  - 27/0772 . . . . . {Vertical bipolar transistor in combination with resistors only}
  - 27/0777 . . . . . {Vertical bipolar transistor in combination with capacitors only}
  - 27/0783 . . . . . {Lateral bipolar transistors in combination with diodes, or capacitors, or resistors}
  - 27/0788 . . . . . {comprising combinations of diodes or capacitors or resistors}
  - 27/0794 . . . . . {Combinations of capacitors and resistors}
  - 27/08 . . . . . including only semiconductor components of a single kind
  - 27/0802 . . . . . {Resistors only}
  - 27/0805 . . . . . {Capacitors only}
  - 27/0808 . . . . . {Varactor diodes}
  - 27/0811 . . . . . {MIS diodes}
  - 27/0814 . . . . . {Diodes only}
  - 27/0817 . . . . . {Thyristors only}
  - 27/082 . . . . . including bipolar components only
  - 27/0821 . . . . . {Combination of lateral and vertical transistors only}
  - 27/0823 . . . . . {including vertical bipolar transistors only}
  - 27/0825 . . . . . {Combination of vertical direct transistors of the same conductivity type having different characteristics,(e.g. Darlington transistors)}
  - 27/0826 . . . . . {Combination of vertical complementary transistors}
  - 27/0828 . . . . . {Combination of direct and inverse vertical transistors}
  - 27/085 . . . . . including field-effect components only
  - 27/088 . . . . . the components being field-effect transistors with insulated gate
  - 27/0883 . . . . . {Combination of depletion and enhancement field effect transistors}
  - 27/0886 . . . . . {including transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
  - 27/092 . . . . . complementary MIS field-effect transistors
  - 27/0921 . . . . . {Means for preventing a bipolar, e.g. thyristor, action between the different transistor regions, e.g. Latchup prevention}
  - 27/0922 . . . . . {Combination of complementary transistors having a different structure, e.g. stacked CMOS, high-voltage and low-voltage CMOS}
  - 27/0924 . . . . . {including transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
  - 27/0925 . . . . . {comprising an N-well only in the substrate}
  - 27/0927 . . . . . {comprising a P-well only in the substrate}
  - 27/0928 . . . . . {comprising both N- and P- wells in the substrate, e.g. twin-tub}
  - 27/095 . . . . . the components being Schottky barrier gate field-effect transistors
  - 27/098 . . . . . the components being PN junction gate field-effect transistors
  - 27/10 . . . . . including a plurality of individual components in a repetitive configuration
  - 27/101 . . . . . {including resistors or capacitors only}
  - 27/102 . . . . . including bipolar components
  - 27/1021 . . . . . {including diodes only}
  - 27/1022 . . . . . {including bipolar transistors}
  - 27/1023 . . . . . {Bipolar dynamic random access memory structures}
  - 27/1024 . . . . . {Arrays of single bipolar transistors only, e.g. read only memory structures}
  - 27/1025 . . . . . {Static bipolar memory cell structures}
  - 27/1026 . . . . . {Bipolar electrically programmable memory structures (using fuses [H01L 23/525](#))}
  - 27/1027 . . . . . {Thyristors}
  - 27/1028 . . . . . {Double base diodes}
  - 27/105 . . . . . including field-effect components
- NOTE**
- In this group and its subgroups classification is made in any appropriate place
- 27/1052 . . . . . {Memory structures and multistep manufacturing processes therefor not provided for in groups [H01L 27/1055](#) - [H01L 27/112](#)}
  - 27/1055 . . . . . {comprising charge coupled devices of the so-called bucket brigade type}
  - 27/1057 . . . . . {comprising charge coupled devices [CCD] or charge injection devices [CID]}

27/108	. . . . . Dynamic random access memory structures	27/10876	. . . . . {the transistor having a trench structure in the substrate ( <a href="#">vertical transistor in combination with a capacitor formed in a substrate trench H01L 27/10864</a> )}
	<b>NOTE</b>		
	In this group and its subgroups classification is made in any appropriate place	27/10879	. . . . . {the transistor being of the FinFET type}
27/10802	. . . . . {comprising floating-body transistors, e.g. floating-body cells}	27/10882	. . . . . {with at least one step of making a data line}
27/10805	. . . . . {with one-transistor one-capacitor memory cells}	27/10885	. . . . . {with at least one step of making a bit line}
27/10808	. . . . . {the storage electrode stacked over transistor}	27/10888	. . . . . {with at least one step of making a bit line contact}
27/10811	. . . . . {with bit line higher than capacitor}	27/10891	. . . . . {with at least one step of making a word line}
27/10814	. . . . . {with capacitor higher than bit line level}	27/10894	. . . . . {with simultaneous manufacture of periphery and memory cells}
27/10817	. . . . . {the storage electrode having multiple wings}	27/10897	. . . . . {Peripheral structures}
27/1082	. . . . . {the capacitor extending under transfer transistor area}	27/11	. . . . . Static random access memory structures
27/10823	. . . . . {the transistor having a trench structure in the substrate}	27/1104	. . . . . {the load element being a MOSFET transistor}
27/10826	. . . . . {the transistor being of the FinFET type}	27/1108	. . . . . {the load element being a thin film transistor}
27/10829	. . . . . {the capacitor being in a substrate trench}	27/1112	. . . . . {the load element being a resistor ( <a href="#">resistors for integrated circuits H01L 28/20, H01L 29/8605</a> )}
27/10832	. . . . . {the capacitor extending under or around transfer transistor area}	27/1116	. . . . . {Peripheral circuit region}
27/10835	. . . . . {having storage electrode extension stacked over transistor}	27/112	. . . . . Read-only memory structures {[ROM] and multistep manufacturing processes therefor}
27/10838	. . . . . {the capacitor and the transistor being in one trench}	27/11206	. . . . . {Programmable ROM [PROM], e.g. memory cells comprising a transistor and a fuse or an antifuse}
27/10841	. . . . . {the transistor being vertical}	27/11213	. . . . . {ROM only}
27/10844	. . . . . {Multistep manufacturing methods}	27/1122	. . . . . {with source and drain on the same level, e.g. lateral transistors}
27/10847	. . . . . {for structures comprising one transistor one-capacitor memory cells}	27/11226	. . . . . {Source or drain contact programmed}
27/1085	. . . . . {with at least one step of making the capacitor or connections thereto}	27/11233	. . . . . {Gate programmed, e.g. different gate material or no gate}
27/10852	. . . . . {the capacitor extending over the access transistor}	27/1124	. . . . . {Gate contact programmed}
27/10855	. . . . . {with at least one step of making a connection between transistor and capacitor, e.g. plug}	27/11246	. . . . . {Gate dielectric programmed, e.g. different thickness}
27/10858	. . . . . {the capacitor extending under the access transistor area}	27/11253	. . . . . {Doping programmed, e.g. mask ROM}
27/10861	. . . . . {the capacitor being in a substrate trench}	27/1126	. . . . . {Entire channel doping programmed}
27/10864	. . . . . {in combination with a vertical transistor}	27/11266	. . . . . {Source or drain doping programmed}
27/10867	. . . . . {with at least one step of making a connection between transistor and capacitor, e.g. buried strap}	27/11273	. . . . . {with source and drain on different levels, e.g. vertical channel}
27/1087	. . . . . {with at least one step of making the trench}	27/1128	. . . . . {with transistors on different levels, e.g. 3D ROM}
27/10873	. . . . . {with at least one step of making the transistor}	27/11286	. . . . . {Peripheral circuit regions}
		27/11293	. . . . . {of memory structures of the ROM-only type}
		27/115	. . . . . Electrically programmable read-only memories; Multistep manufacturing processes therefor
		27/11502	. . . . . with ferroelectric memory capacitors
		27/11504	. . . . . characterised by the top-view layout
		27/11507	. . . . . characterised by the memory core region

27/11509 . . . . .	characterised by the peripheral circuit region	27/11573 . . . . .	characterised by the peripheral circuit region
27/11512 . . . . .	characterised by the boundary region between the core and peripheral circuit regions	27/11575 . . . . .	characterised by the boundary region between the core and peripheral circuit regions
27/11514 . . . . .	characterised by the three-dimensional arrangements, e.g. with cells on different height levels	27/11578 . . . . .	characterised by three-dimensional arrangements, e.g. with cells on different height levels
27/11517 . . . . .	with floating gate	27/1158 . . . . .	with source and drain on different levels, e.g. with sloping channels
27/11519 . . . . .	characterised by the top-view layout	27/11582 . . . . .	the channels comprising vertical portions, e.g. U-shaped channels
27/11521 . . . . .	characterised by the memory core region ( <a href="#">three-dimensional arrangements H01L 27/11551</a> )	27/11585 . . . . .	with the gate electrodes comprising a layer used for its ferroelectric memory properties, e.g. metal-ferroelectric-semiconductor [MFS] or metal-ferroelectric-metal-insulator-semiconductor [MFMIS]
27/11524 . . . . .	with cell select transistors, e.g. NAND	27/11587 . . . . .	characterised by the top-view layout
27/11526 . . . . .	characterised by the peripheral circuit region	27/1159 . . . . .	characterised by the memory core region
27/11529 . . . . .	of memory regions comprising cell select transistors, e.g. NAND	27/11592 . . . . .	characterised by the peripheral circuit region
27/11531 . . . . .	Simultaneous manufacturing of periphery and memory cells	27/11595 . . . . .	characterised by the boundary region between core and peripheral circuit regions
27/11534 . . . . .	including only one type of peripheral transistor	27/11597 . . . . .	characterised by three-dimensional arrangements, e.g. cells on different height levels
27/11536 . . . . .	with a control gate layer also being used as part of the peripheral transistor	27/118 . . . . .	Masterslice integrated circuits
27/11539 . . . . .	with an inter-gate dielectric layer also being used as part of the peripheral transistor	27/11801 . . . . .	{using bipolar technology}
27/11541 . . . . .	with a floating-gate layer also being used as part of the peripheral transistor	27/11803 . . . . .	{using field effect technology}
27/11543 . . . . .	with a tunnel dielectric layer also being used as part of the peripheral transistor	2027/11805 . . . . .	{A3B5 or A3B6 gate arrays}
27/11546 . . . . .	including different types of peripheral transistor	27/11807 . . . . .	{CMOS gate arrays}
27/11548 . . . . .	characterised by the boundary region between the core and peripheral circuit regions	2027/11809 . . . . .	{Microarchitecture}
27/11551 . . . . .	characterised by three-dimensional arrangements, e.g. with cells on different height levels	2027/11811 . . . . .	{Basic cell P to N transistor count}
27/11553 . . . . .	with source and drain on different levels, e.g. with sloping channels	2027/11812 . . . . .	{4-T CMOS basic cell}
27/11556 . . . . .	the channels comprising vertical portions, e.g. U-shaped channels	2027/11814 . . . . .	{5-T CMOS basic cell}
27/11558 . . . . .	the control gate being a doped region, e.g. single-poly memory cells	2027/11816 . . . . .	{6-T CMOS basic cell}
27/1156 . . . . .	the floating gate being an electrode shared by two or more components	2027/11818 . . . . .	{7-T CMOS basic cell}
27/11563 . . . . .	with charge-trapping gate insulators, e.g. MNOS or NROM	2027/1182 . . . . .	{8-T CMOS basic cell}
27/11565 . . . . .	characterised by the top-view layout	2027/11822 . . . . .	{relative P to N transistor sizes}
27/11568 . . . . .	characterised by the memory core region ( <a href="#">three-dimensional arrangements H01L 27/11578</a> )	2027/11824 . . . . .	{for current drive capability}
27/1157 . . . . .	with cell select transistors, e.g. NAND	2027/11825 . . . . .	{for delay time adaptation}
		2027/11827 . . . . .	{for capacitive loading}
		2027/11829 . . . . .	{Isolation techniques}
		2027/11831 . . . . .	{FET isolation}
		2027/11833 . . . . .	{LOCOS}
		2027/11835 . . . . .	{Degree of specialisation for implementing specific functions}
		2027/11837 . . . . .	{Implementation of digital circuits}
		2027/11838 . . . . .	{Implementation of memory functions}
		2027/1184 . . . . .	{Implementation of analog circuits}
		2027/11842 . . . . .	{Resistors and capacitors}
		2027/11844 . . . . .	{Hybrid analog or digital}
		2027/11846 . . . . .	{Embedded IO cells}
		2027/11848 . . . . .	{Transmission gate}

2027/1185	. . . . .	{Porous cells, i.e. pass-through elements}	27/1222	. . . . .	{with a particular composition, shape or crystalline structure of the active layer}
2027/11851	. . . . .	{Technology used, i.e. design rules}	27/1225	. . . . .	{with semiconductor materials not belonging to the group IV of the periodic table, e.g. InGaZnO}
2027/11853	. . . . .	{Sub-micron technology}	27/1229	. . . . .	{with different crystal properties within a device or between different devices}
2027/11855	. . . . .	{Twin-tub technology}	27/1233	. . . . .	{with different thicknesses of the active layer in different devices}
2027/11857	. . . . .	{SOS, SOI technology}	27/1237	. . . . .	{with a different composition, shape, layout or thickness of the gate insulator in different devices}
2027/11859	. . . . .	{Connectivity characteristics, i.e. diffusion and polysilicon geometries}	27/124	. . . . .	{with a particular composition, shape or layout of the wiring layers specially adapted to the circuit arrangement, e.g. scanning lines in LCD pixel circuits ( <a href="#">wiring structures per se H01L 23/52</a> )}
2027/11861	. . . . .	{Substrate and well contacts}	27/1244	. . . . .	{for preventing breakage, peeling or short circuiting}
2027/11862	. . . . .	{Horizontal or vertical grid line density}	27/1248	. . . . .	{with a particular composition or shape of the interlayer dielectric specially adapted to the circuit arrangement}
2027/11864	. . . . .	{Yield or reliability}	27/1251	. . . . .	{comprising TFTs having a different architecture, e.g. top- and bottom gate TFTs}
2027/11866	. . . . .	{Gate electrode terminals or contacts}	27/1255	. . . . .	{integrated with passive devices, e.g. auxiliary capacitors}
2027/11868	. . . . .	{Macro-architecture}	27/1259	. . . . .	{Multistep manufacturing methods}
2027/1187	. . . . .	{Number of core or basic cells in the macro (RAM, ROM)}	27/1262	. . . . .	{with a particular formation, treatment or coating of the substrate}
2027/11872	. . . . .	{Distribution function, e.g. Sea of Gates}	27/1266	. . . . .	{the substrate on which the devices are formed not being the final device substrate, e.g. using a temporary substrate}
2027/11874	. . . . .	{Layout specification, i.e. inner core region}	27/127	. . . . .	{with a particular formation, treatment or patterning of the active layer specially adapted to the circuit arrangement}
2027/11875	. . . . .	{Wiring region, routing}	27/1274	. . . . .	{using crystallisation of amorphous semiconductor or recrystallisation of crystalline semiconductor}
2027/11877	. . . . .	{Avoiding clock-skew or clock-delay}	27/1277	. . . . .	{using a crystallisation promoting species, e.g. local introduction of Ni catalyst}
2027/11879	. . . . .	{Data lines (buses)}	27/1281	. . . . .	{by using structural features to control crystal growth, e.g. placement of grain filters}
2027/11881	. . . . .	{Power supply lines}	27/1285	. . . . .	{using control of the annealing or irradiation parameters, e.g. using different scanning direction or intensity for different transistors}
2027/11883	. . . . .	{Levels of metallisation}	27/1288	. . . . .	{employing particular masking sequences or specially adapted masks, e.g. half-tone mask}
2027/11885	. . . . .	{Two levels of metal}	27/1292	. . . . .	{using liquid deposition, e.g. printing}
2027/11887	. . . . .	{Three levels of metal}	27/1296	. . . . .	{adapted to increase the uniformity of device parameters}
2027/11888	. . . . .	{More than 3 levels of metal}	27/13	. . . . .	combined with thin-film or thick-film passive components
2027/1189	. . . . .	{Latch-up prevention}			
2027/11892	. . . . .	{Noise prevention (crosstalk)}			
2027/11894	. . . . .	{Radiation hardened circuits}			
27/11896	. . . . .	{using combined field effect/bipolar technology}			
27/11898	. . . . .	{Input and output buffer/driver structures}			
27/12	. . . . .	the substrate being other than a semiconductor body, e.g. an insulating body			
27/1203	. . . . .	{the substrate comprising an insulating body on a semiconductor body, e.g. SOI ( <a href="#">three-dimensional layout H01L 27/0688</a> )}			
27/1207	. . . . .	{combined with devices in contact with the semiconductor body, i.e. bulk/SOI hybrid circuits}			
27/1211	. . . . .	{combined with field-effect transistors with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}			
27/1214	. . . . .	{comprising a plurality of TFTs formed on a non-semiconducting substrate, e.g. driving circuits for AMLCDs}			
<b><u>WARNING</u></b>					
Group <a href="#">H01L 27/1218</a> – <a href="#">H01L 27/1296</a> are incomplete pending reclassification of documents from group <a href="#">H01L 27/1214</a> .					
Groups <a href="#">H01L 27/1218</a> – <a href="#">H01L 27/1296</a> and <a href="#">H01L 27/1214</a> should be considered in order to perform a complete search.					
27/1218	. . . . .	{with a particular composition or structure of the substrate}			

- 27/14 . . . including semiconductor components sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation and specially adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation ([radiation-sensitive components structurally associated with one or more electric light sources only H01L 31/14](#); [couplings of light guides with optoelectronic elements G02B 6/42](#))
- 27/142 . . . Energy conversion devices ([photovoltaic modules or arrays of single photovoltaic cells comprising bypass diodes integrated or directly associated with the devices H01L 31/0443](#); [photovoltaic modules composed of a plurality of thin film solar cells deposited on the same substrate H01L 31/046](#))
  - 27/1421 . . . {comprising bypass diodes integrated or directly associated with the device, e.g. bypass diode integrated or formed in or on the same substrate as the solar cell}
- 27/144 . . . Devices controlled by radiation
- 27/1443 . . . {with at least one potential jump or surface barrier}
- 27/1446 . . . {in a repetitive configuration}
- 27/146 . . . Imager structures
  - 27/14601 . . . . . {Structural or functional details thereof}
  - 27/14603 . . . . . {Special geometry or disposition of pixel-elements, address-lines or gate-electrodes}
  - 27/14605 . . . . . {Structural or functional details relating to the position of the pixel elements, e.g. smaller pixel elements in the center of the imager compared to pixel elements at the periphery}
  - 27/14607 . . . . . {Geometry of the photosensitive area}
  - 27/14609 . . . . . {Pixel-elements with integrated switching, control, storage or amplification elements ([scanning details of imagers H04N 3/15](#); [circuitry of imagers H04N 5/369](#))}
  - 27/1461 . . . . . {characterised by the photosensitive area}
    - 27/14612 . . . . . {involving a transistor}
    - 27/14614 . . . . . {having a special gate structure}
    - 27/14616 . . . . . {characterised by the channel of the transistor, e.g. channel having a doping gradient}
  - 27/14618 . . . . . {Containers}
  - 27/1462 . . . . . {Coatings}
  - 27/14621 . . . . . {Colour filter arrangements}
  - 27/14623 . . . . . {Optical shielding}
  - 27/14625 . . . . . {Optical elements or arrangements associated with the device}
  - 27/14627 . . . . . {Microlenses}
  - 27/14629 . . . . . {Reflectors}
  - 27/1463 . . . . . {Pixel isolation structures}
  - 27/14632 . . . . . {Wafer-level processed structures}
  - 27/14634 . . . . . {Assemblies, i.e. Hybrid structures}
  - 27/14636 . . . . . {Interconnect structures}
  - 27/14638 . . . . . {Structures specially adapted for transferring the charges across the imager perpendicular to the imaging plane}
  - 27/1464 . . . . . {Back illuminated imager structures}
- 27/14641 . . . . . {Electronic components shared by two or more pixel-elements, e.g. one amplifier shared by two pixel elements}
- 27/14643 . . . . . {Photodiode arrays; MOS imagers}
- 27/14645 . . . . . {Colour imagers}
- 27/14647 . . . . . {Multicolour imagers having a stacked pixel-element structure, e.g. npn, npnpn or MQW elements}
- 27/14649 . . . . . {Infra-red imagers}
- 27/1465 . . . . . {of the hybrid type}
- 27/14652 . . . . . {Multispectral infra-red imagers, having a stacked pixel-element structure, e.g. npn, npnpn or MQW structures}
- 27/14654 . . . . . {Blooming suppression}
- 27/14656 . . . . . {Overflow drain structures}
- 27/14658 . . . . . {X-ray, gamma-ray or corpuscular radiation imagers ([measuring X-, gamma- or corpuscular radiation G01T 1/00](#))}
- 27/14659 . . . . . {Direct radiation imagers structures}
- 27/14661 . . . . . {of the hybrid type}
- 27/14663 . . . . . {Indirect radiation imagers, e.g. using luminescent members}
- 27/14665 . . . . . {Imagers using a photoconductor layer}
- 27/14667 . . . . . {Colour imagers}
- 27/14669 . . . . . {Infra-red imagers}
- 27/1467 . . . . . {of the hybrid type}
- 27/14672 . . . . . {Blooming suppression}
- 27/14674 . . . . . {Overflow drain structures}
- 27/14676 . . . . . {X-ray, gamma-ray or corpuscular radiation imagers ([measuring X-, gamma- or corpuscular radiation G01T 1/00](#))}
- 27/14678 . . . . . {Contact-type imagers}
- 27/14679 . . . . . {Junction field effect transistor [JFET] imagers; static induction transistor [SIT] imagers}
- 27/14681 . . . . . {Bipolar transistor imagers}
- 27/14683 . . . . . {Processes or apparatus peculiar to the manufacture or treatment of these devices or parts thereof ([not peculiar thereto H01L 21/00](#))}
- 27/14685 . . . . . {Process for coatings or optical elements}
- 27/14687 . . . . . {Wafer level processing}
- 27/14689 . . . . . {MOS based technologies}
- 27/1469 . . . . . {Assemblies, i.e. hybrid integration}
- 27/14692 . . . . . {Thin film technologies, e.g. amorphous, poly, micro- or nanocrystalline silicon}
- 27/14694 . . . . . {The active layers comprising only  $A_{III}B_V$  compounds, e.g. GaAs, InP}
- 27/14696 . . . . . {The active layers comprising only  $A_{II}B_{VI}$  compounds, e.g. CdS, ZnS, CdTe}
- 27/14698 . . . . . {Post-treatment for the devices, e.g. annealing, impurity-gettering, short-circuit elimination, recrystallisation}
- 27/148 . . . . . Charge coupled imagers ([individual charge coupled devices H01L 29/765](#))
  - 27/14806 . . . . . {Structural or functional details thereof}
  - 27/14812 . . . . . {Special geometry or disposition of pixel-elements, address lines or gate-electrodes}
  - 27/14818 . . . . . {Optical shielding}
  - 27/14825 . . . . . {Linear CCD imagers}
  - 27/14831 . . . . . {Area CCD imagers}
  - 27/14837 . . . . . {Frame-interline transfer}

- 27/14843 . . . . . {Interline transfer}
- 27/1485 . . . . . {Frame transfer}
- 27/14856 . . . . . {Time-delay and integration}
- 27/14862 . . . . . {CID imagers}
- 27/14868 . . . . . {CCD or CID colour imagers}
- 27/14875 . . . . . {Infra-red CCD or CID imagers}
- 27/14881 . . . . . {of the hybrid type}
- 27/14887 . . . . . {Blooming suppression}
- 27/14893 . . . . . {comprising a photoconductive layer deposited on the CCD structure}
- 27/15 . . . . . including semiconductor components with at least one potential-jump barrier or surface barrier specially adapted for light emission  
{(monolithically integrated components including semiconductor laser components [H01S 5/026](#))}
- 27/153 . . . . . {in a repetitive configuration, e.g. LED bars}
- 27/156 . . . . . {two-dimensional arrays}
- 27/16 . . . . . including thermoelectric components with or without a junction of dissimilar materials; including thermomagnetic components (using the Peltier effect only for cooling of semiconductor or other solid state devices [H01L 23/38](#))
- 27/18 . . . . . including components exhibiting superconductivity
- 27/20 . . . . . including piezo-electric components; including electrostrictive components; including magnetostrictive components
- 27/22 . . . . . including components using galvano-magnetic effects, e.g. Hall effects; using similar magnetic field effects
- 27/222 . . . . . {Magnetic non-volatile memory structures, e.g. MRAM}
- 27/224 . . . . . {comprising two-terminal components, e.g. diodes, MIM elements}
- 27/226 . . . . . {comprising multi-terminal components, e.g. transistors}
- 27/228 . . . . . {of the field-effect transistor type}
- 27/24 . . . . . including solid state components for rectifying, amplifying or switching without a potential-jump barrier or surface barrier, {e.g. resistance switching non-volatile memory structures}
- 27/2409 . . . . . {comprising two-terminal selection components, e.g. diodes}
- 27/2418 . . . . . {of the metal-insulator-metal type}
- 27/2427 . . . . . {of the Ovonic threshold switching type}
- 27/2436 . . . . . {comprising multi-terminal selection components, e.g. transistors}
- 27/2445 . . . . . {of the bipolar type}
- 27/2454 . . . . . {of the vertical channel field-effect transistor type}
- 27/2463 . . . . . {Arrangements comprising multiple bistable or multistable switching components of the same type on a plane parallel to the substrate, e.g. cross-point arrays, details of the horizontal layout}
- 27/2472 . . . . . {the switching components having a common active material layer}
- 27/2481 . . . . . {arranged in a direction perpendicular to the substrate, e.g. 3D cell arrays, details of the vertical layout}
- 27/249 . . . . . {the switching components being connected to a common vertical conductor}
- 27/26 . . . . . including bulk negative resistance effect components
- 27/265 . . . . . {Gunn effect devices}
- 27/28 . . . . . including components using organic materials as the active part, or using a combination of organic materials with other materials as the active part
- 27/281 . . . . . {Integrated circuits having a three-dimensional layout}
- 27/283 . . . . . {comprising components of the field-effect type}
- 27/285 . . . . . {Integrated circuits with a common active layer, e.g. cross point devices}
- 27/286 . . . . . {with an active region comprising an inorganic semiconductor}
- 27/288 . . . . . {Combination of organic light sensitive components with organic light emitting components, e.g. optocoupler}
- 27/30 . . . . . with components specially adapted for sensing infra-red radiation, light, electromagnetic radiation of shorter wavelength, or corpuscular radiation; with components specially adapted for either the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation  
{(combination of organic light sensitive components with organic light emitting components, e.g. optocoupler [H01L 27/288](#))}
- 27/301 . . . . . {Energy conversion devices}
- 27/302 . . . . . {comprising multiple junctions, e.g. tandem cells}
- 27/304 . . . . . {in form of a fiber or a tube, e.g. photovoltaic fibers}
- 27/305 . . . . . {Devices controlled by radiation}
- 27/307 . . . . . {Imager structures}
- 27/308 . . . . . {Devices specially adapted for detecting X-ray radiation (measuring X-radiation [G01T 1/00](#))}
- 27/32 . . . . . with components specially adapted for light emission, e.g. flat-panel displays using organic light-emitting diodes [OLED] {(combination of organic light sensitive components with organic light emitting components, e.g. optocoupler [H01L 27/288](#))}
- 27/3202 . . . . . {OLEDs electrically connected in parallel}
- 27/3204 . . . . . {OLEDs electrically connected in series}
- 27/3206 . . . . . {Multi-colour light emission}
- 27/3209 . . . . . {using stacked OLED}
- 27/3211 . . . . . {using RGB sub-pixels}
- WARNING**
- Groups [H01L 27/3213](#) – [H01L 27/3218](#) are incomplete pending reclassification of documents from group [H01L 27/3211](#).
- Groups [H01L 27/3213](#) – [H01L 27/3218](#) and [H01L 27/3211](#) should be considered in order to perform a complete search.
- 27/3213 . . . . . {using more than three sub-pixels, e.g. RGBW}
- 27/3216 . . . . . {the areas of RGB sub-pixels being different}
- 27/3218 . . . . . {characterised by the geometrical arrangement of the RGB sub-pixels}
- 27/322 . . . . . {using colour filters or colour changing media [CCM]}
- 27/3223 . . . . . {combined with dummy elements, i.e. non-functional features}
- 27/3225 . . . . . {OLED integrated with another component ([H01L 27/3223](#) takes precedence)}

27/3227	. . . . {the other component being a light sensitive element, e.g. inorganic solar cell, inorganic photodiode ( <a href="#">H01L 27/288</a> takes precedence)}	28/00	<b>{Passive two-terminal components without a potential-jump or surface barrier for integrated circuits; Details thereof; Multistep manufacturing processes therefor (testing or measuring during manufacture <a href="#">H01L 22/00</a>; integration methods <a href="#">H01L 21/70</a>; integrated circuits <a href="#">H01L 27/00</a>; two-terminal components with a potential-jump or surface barrier <a href="#">H01L 29/00</a>; resistors in general <a href="#">H01C</a>; inductors in general <a href="#">H01F</a>; capacitors in general <a href="#">H01G</a>)}</b>
27/323	. . . . {the other component being a touch screen}		
27/3232	. . . . {the other component being a light modulating element, e.g. electrochromic element, photochromic element, liquid crystal element}		
27/3234	. . . . {the other component being an imager structure ( <a href="#">H01L 27/146</a> takes precedence)}	28/10	. {Inductors}
27/3237	. . . {Displays not provided for in group <a href="#">H01L 27/3241</a> and subgroups, e.g. segment-type displays}	28/20	. {Resistors}
27/3239	. . . . {Light emitting logos}	28/22	. . {with an active material comprising carbon, e.g. diamond or diamond-like carbon [DLC]}
27/3241	. . . {Matrix-type displays}	28/24	. . {with an active material comprising a refractory, transition or noble metal, metal compound or metal alloy, e.g. silicides, oxides, nitrides}
	<b>WARNING</b>	28/26	. . {with an active material comprising an organic conducting material, e.g. conducting polymers}
	From 1.2.2012 onwards, groups <a href="#">H01L 27/3295</a> and <a href="#">H01L 27/3297</a> are no longer used for classification of new documents. The backfile is being reclassified to <a href="#">H01L 27/3244</a> and <a href="#">H01L 27/3281</a> and subgroups thereof	28/40	. {Capacitors}
		28/55	. . {with a dielectric comprising a perovskite structure material}
27/3244	. . . . {Active matrix displays}	28/56	. . . {the dielectric comprising two or more layers, e.g. comprising buffer layers, seed layers, gradient layers}
27/3246	. . . . . {Banks, i.e. pixel defining layers}	28/57	. . . {comprising a barrier layer to prevent diffusion of hydrogen or oxygen}
27/3248	. . . . . {Connection of the pixel electrode to the TFT}	28/60	. . {Electrodes}
27/3251	. . . . . {Double substrate, i.e. with OLED and TFT on different substrates}	28/65	. . . {comprising a noble metal or a noble metal oxide, e.g. platinum (Pt), ruthenium (Ru), ruthenium dioxide (RuO <sub>2</sub> ), iridium (Ir), iridium dioxide (IrO <sub>2</sub> )}
27/3253	. . . . . {Electrical connection of the two substrates}	28/75	. . . {comprising two or more layers, e.g. comprising a barrier layer and a metal layer}
27/3255	. . . . . {Chiplets}	28/82	. . . {with an enlarged surface, e.g. formed by texturisation}
27/3258	. . . . . {Insulating layers formed between TFT elements and OLED elements}	28/84	. . . . {being a rough surface, e.g. using hemispherical grains}
27/326	. . . . . {special geometry or disposition of pixel-elements}	28/86	. . . . {having horizontal extensions}
27/3262	. . . . . {of TFT}	28/87	. . . . . {made by depositing layers, e.g. by depositing alternating conductive and insulating layers}
27/3265	. . . . . {of capacitor}	28/88	. . . . . {made by patterning layers, e.g. by etching conductive layers}
27/3267	. . . . . {Dual display, i.e. having two independent displays}	28/90	. . . . . {having vertical extensions}
27/3269	. . . . . {Including photosensors to control luminance}	28/91	. . . . . {made by depositing layers, e.g. by depositing alternating conductive and insulating layers}
27/3272	. . . . . {Shielding, e.g. of TFT}	28/92	. . . . . {made by patterning layers, e.g. by etching conductive layers}
27/3274	. . . . . {including organic thin film transistors [OTFT]}		
27/3276	. . . . . {Wiring lines}		
27/3279	. . . . . {comprising structures specially adapted for lowering the resistance}		
27/3281	. . . . . {Passive matrix displays}		
27/3283	. . . . . {Including banks or shadow masks}		
27/3286	. . . . . {Dual display, i.e. having two independent displays}		
27/3288	. . . . . {Wiring lines}		
27/329	. . . . . {comprising structures specially adapted for lowering the resistance}		
27/3293	. . . . . {Tiled displays}		
27/3295	. . . . . {including banks or shadow masks}		
27/3297	. . . . . {Wiring lines, e.g. power supply lines}		

29/00	<p><b>Semiconductor devices adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential-jump barrier or surface barrier, e.g. PN junction depletion layer or carrier concentration layer; Details of semiconductor bodies or of electrodes thereof; {Multistep manufacturing processes therefor} (H01L 31/00 - H01L 47/00, H01L 51/05 take precedence; processes or apparatus adapted for the manufacture or treatment thereof or of parts thereof H01L 21/00; details other than of semiconductor bodies or of electrodes thereof H01L 23/00; devices consisting of a plurality of solid state components formed in or on a common substrate H01L 27/00; {passive two-terminal components without a potential-jump or surface barrier for integrated circuits, details thereof and multistep manufacturing processes therefor H01L 28/00; } resistors in general H01C; capacitors in general H01G, {e.g. ceramic barrier-layer capacitors H01G 4/1272})</b></p> <p><b>NOTE</b></p> <p>In this main group, classification is made both in groups <a href="#">H01L 29/02</a> - <a href="#">H01L 29/51</a> and in groups <a href="#">H01L 29/66</a> - <a href="#">H01L 29/94</a> if both of these sets of groups are relevant.</p>	29/0623	. . . . .	{Buried supplementary region, e.g. buried guard ring ( <a href="#">multi-RESURF H01L 29/0634</a> )}
		29/0626	. . . . .	{with a localised breakdown region, e.g. built-in avalanching region ( <a href="#">in self-protected thyristors H01L 29/7424</a> )}
		29/063	. . . . .	{Reduced surface field [RESURF] pn-junction structures}
		29/0634	. . . . .	{Multiple reduced surface field (multi-RESURF) structures, e.g. double RESURF, charge compensation, cool, superjunction (SJ), 3D-RESURF, composite buffer (CB) structures}
		29/0638	. . . . .	{for preventing surface leakage due to surface inversion layer, e.g. with channel stopper (channel stoppers in combination with isolation region for integrated circuits <a href="#">H01L 21/762</a> )}
		29/0642	. . . . .	{Isolation within the component, i.e. internal isolation}
		29/0646	. . . . .	{PN junctions}
		29/0649	. . . . .	{Dielectric regions, e.g. SiO <sub>2</sub> regions, air gaps}
		29/0653	. . . . .	{adjoining the input or output region of a field-effect device, e.g. the source or drain region}
29/02	. Semiconductor bodies {; Multistep manufacturing processes therefor}	29/0657	. . .	{characterised by the shape of the body}
29/04	. . characterised by their crystalline structure, e.g. polycrystalline, cubic or particular orientation of crystalline planes ( <a href="#">characterised by physical imperfections H01L 29/30</a> )	29/0661	. . . . .	{specially adapted for altering the breakdown voltage by removing semiconductor material at, or in the neighbourhood of, a reverse biased junction, e.g. by bevelling, moat etching, depletion etching}
29/045	. . . {by their particular orientation of crystalline planes}			
29/06	. . characterised by their shape; characterised by the shapes, relative sizes, or dispositions of the semiconductor regions {; characterised by the concentration or distribution of impurities within semiconductor regions}	29/0665	. . . . .	{the shape of the body defining a nanostructure ( <a href="#">nanotechnology per se B82B</a> )}
29/0603	. . . {characterised by particular constructional design considerations, e.g. for preventing surface leakage, for controlling electric field concentration or for internal isolations regions ( <a href="#">isolation regions between components H01L 21/76</a> ; <a href="#">design considerations for integrated circuits H01L 27/00</a> ; <a href="#">geometrical design considerations for devices H01L 29/0657</a> )}	29/0669	. . . . .	{Nanowires or nanotubes ( <a href="#">carbon nanotubes as material of solid-state device active part H01L 51/0048</a> )}
		29/0673	. . . . .	{oriented parallel to a substrate}
		29/0676	. . . . .	{oriented perpendicular or at an angle to a substrate}
		29/068	. . . . .	{comprising a junction}
		29/0684	. . . . .	{characterised by the shape, relative sizes or dispositions of the semiconductor regions or junctions between the regions}
29/0607	. . . . . {for preventing surface leakage or controlling electric field concentration}	29/0688	. . . . .	{characterised by the particular shape of a junction between semiconductor regions}
29/0611	. . . . . {for increasing or controlling the breakdown voltage of reverse biased devices ( <a href="#">H01L 29/0661 takes precedence</a> )}	29/0692	. . . . .	{Surface layout}
		29/0696	. . . . .	{of cellular field-effect devices, e.g. multicellular DMOS transistors or IGBTs}
29/0615	. . . . . {by the doping profile or the shape or the arrangement of the PN junction, or with supplementary regions, e.g. junction termination extension [JTE] ( <a href="#">LDD or drain offset regions H01L 29/7833</a> )}	29/08	. . . . .	with semiconductor regions connected to an electrode carrying current to be rectified, amplified or switched and such electrode being part of a semiconductor device which comprises three or more electrodes
		29/0804	. . . . .	{Emitter regions of bipolar transistors}
29/0619	. . . . . {with a supplementary region doped oppositely to or in rectifying contact with the semiconductor containing or contacting region, e.g. guard rings with PN or Schottky junction}	29/0808	. . . . .	{of lateral transistors}
		29/0813	. . . . .	{Non-interconnected multi-emitter structures}
		29/0817	. . . . .	{of heterojunction bipolar transistors ( <a href="#">H01L 29/7375 takes precedence</a> )}



- 29/0821 . . . . {Collector regions of bipolar transistors}
- 29/0826 . . . . {Pedestal collectors}
- 29/083 . . . . {Anode or cathode regions of thyristors or gated bipolar-mode devices}
- 29/0834 . . . . {Anode regions of thyristors or gated bipolar-mode devices, e.g. supplementary regions surrounding anode regions}
- 29/0839 . . . . {Cathode regions of thyristors}
- 29/0843 . . . . {Source or drain regions of field-effect devices}
- 29/0847 . . . . {of field-effect transistors with insulated gate ([H01L 29/0653](#) takes precedence; with a passive supplementary region between source or drain and substrate related to punch-through, capacity or isolation phenomena [H01L 29/1079](#); with LDD or DDD structure [H01L 29/7833](#); for thin film transistors [H01L 29/78618](#))}
- 29/0852 . . . . {of DMOS transistors}
- WARNING**
- Groups [H01L 29/0852](#) – [H01L 29/0886](#) are incomplete pending reclassification of documents from group [H01L 29/0847](#) and [H01L 29/7801](#).  
Groups [H01L 29/0852](#) – [H01L 29/0886](#) and [H01L 29/0847](#), [H01L 29/7801](#) should be considered in order to perform a complete search.
- 29/0856 . . . . {Source regions}
- 29/086 . . . . {Impurity concentration or distribution}
- 29/0865 . . . . {Disposition}
- 29/0869 . . . . {Shape ([cell layout H01L 29/0696](#))}
- 29/0873 . . . . {Drain regions}
- 29/0878 . . . . {Impurity concentration or distribution}
- 29/0882 . . . . {Disposition}
- 29/0886 . . . . {Shape}
- 29/0891 . . . . {of field-effect transistors with Schottky gate}
- 29/0895 . . . . {Tunnel injectors}
- 29/10 . . . with semiconductor regions connected to an electrode not carrying current to be rectified, amplified or switched and such electrode being part of a semiconductor device which comprises three or more electrodes
- 29/1004 . . . . {Base region of bipolar transistors}
- 29/1008 . . . . {of lateral transistors}
- 29/1012 . . . . {Base regions of thyristors ([H01L 29/083](#) takes precedence)}
- 29/1016 . . . . {Anode base regions of thyristors}
- 29/102 . . . . {Cathode base regions of thyristors}
- 29/1025 . . . . {Channel region of field-effect devices}
- 29/1029 . . . . {of field-effect transistors}
- 29/1033 . . . . {with insulated gate, e.g. characterised by the length, the width, the geometric contour or the doping structure (with channel and gate aligned in the lengthwise direction [H01L 29/42376](#); with buried channel [H01L 29/7838](#))}
- 29/1037 . . . . {and non-planar channel ([resulting from the gate electrode disposition, e.g. within a trench, H01L 29/42356](#))}
- 29/1041 . . . . {with a non-uniform doping structure in the channel region surface}
- 29/1045 . . . . {the doping structure being parallel to the channel length, e.g. DMOS like}
- 29/105 . . . . {with vertical doping variation ([H01L 29/7827](#) takes precedence)}
- 29/1054 . . . . {with a variation of the composition, e.g. channel with strained layer for increasing the mobility}
- 29/1058 . . . . {with PN junction gate}
- 29/1062 . . . . {of charge coupled devices}
- 29/1066 . . . . {Gate region of field-effect devices with PN junction gate}
- 29/107 . . . . {Substrate region of field-effect devices}
- 29/1075 . . . . {of field-effect transistors}
- 29/1079 . . . . {with insulated gate}
- 29/1083 . . . . {with an inactive supplementary region, e.g. for preventing punch-through, improving capacity effect or leakage current}
- 29/1087 . . . . {characterised by the contact structure of the substrate region, e.g. for controlling or preventing bipolar effect}
- 29/1091 . . . . {of charge coupled devices}
- 29/1095 . . . . {Body region, i.e. base region, of DMOS transistors or IGBTs ([cell layout H01L 29/0696](#))}
- 29/12 . . . characterised by the materials of which they are formed
- 29/122 . . . {Single quantum well structures ([single heterojunctions, couples of materials H01L 29/165, H01L 29/205, H01L 29/225, H01L 29/267](#))}
- 29/125 . . . . {Quantum wire structures}
- 29/127 . . . . {Quantum box structures}
- 29/15 . . . Structures with periodic or quasi periodic potential variation, e.g. multiple quantum wells, superlattices ([such structures applied for the control of light G02F 1/017, applied in semiconductor lasers H01S 5/34](#))
- NOTE**
- Group [H01L 29/15](#) takes precedence over groups [H01L 29/16](#) - [H01L 29/26](#).
- 29/151 . . . . {Compositional structures ([H01L 29/157](#) and [H01L 29/158](#) take precedence)}
- 29/152 . . . . {with quantum effects only in vertical direction, i.e. layered structures with quantum effects solely resulting from vertical potential variation}
- 29/154 . . . . {comprising at least one long range structurally disordered material, e.g. one-dimensional vertical amorphous superlattices}
- 29/155 . . . . {Comprising only semiconductor materials ([H01L 29/154](#) takes precedence)}

- 29/157 . . . . {Doping structures, e.g. doping superlattices, nipi superlattices ([delta doping in general H01L 29/365](#))}
- 29/158 . . . . {Structures without potential periodicity in a direction perpendicular to a major surface of the substrate, i.e. vertical direction, e.g. lateral superlattices, lateral surface superlattices [LSS]}
- 29/16 . . . including, apart from doping materials or other impurities, only elements of Group IV of the Periodic System
- 29/1602 . . . . {Diamond}
- 29/1604 . . . . {Amorphous materials}
- 29/1606 . . . . {Graphene}
- 29/1608 . . . . {Silicon carbide}
- 29/161 . . . . including two or more of the elements provided for in group [H01L 29/16](#) {, e.g. alloys ([H01L 29/1604 takes precedence](#))}
- 29/165 . . . . in different semiconductor regions {, e.g. heterojunctions}
- 29/167 . . . . further characterised by the doping material {([H01L 29/1604 takes precedence](#))}
- 29/18 . . . Selenium or tellurium only, apart from doping materials or other impurities
- 29/185 . . . . {Amorphous materials}
- 29/20 . . . including, apart from doping materials or other impurities, only  $A_{III}B_V$  compounds
- 29/2003 . . . . {Nitride compounds}
- 29/2006 . . . . {Amorphous materials}
- 29/201 . . . . including two or more compounds {, e.g. alloys ([H01L 29/2006 takes precedence](#))}
- 29/205 . . . . . in different semiconductor regions {, e.g. heterojunctions}
- 29/207 . . . . further characterised by the doping material {([H01L 29/2006 takes precedence](#))}
- 29/22 . . . including, apart from doping materials or other impurities, only  $A_{III}B_{VI}$  compounds
- 29/2203 . . . . {Cd X compounds being one element of the 6th group of the Periodic System ([H01L 29/2206 takes precedence](#))}
- 29/2206 . . . . {Amorphous materials}
- 29/221 . . . . including two or more compounds {, e.g. alloys ([H01L 29/2206 takes precedence](#))}
- 29/225 . . . . . in different semiconductor regions {, e.g. heterojunctions}
- 29/227 . . . . further characterised by the doping material {([H01L 29/2206 takes precedence](#))}
- 29/24 . . . including, apart from doping materials or other impurities, only semiconductor materials not provided for in groups [H01L 29/16](#), [H01L 29/18](#), [H01L 29/20](#), [H01L 29/22](#) (including organic materials [H01L 51/00](#))
- 29/242 . . . . { $A_{II}B_{VI}$  or  $A_{II}B_{VII}$  compounds, e.g.  $Cu_2O$ , Cu I ([H01L 29/247 takes precedence](#))}
- 29/245 . . . . {Pb compounds, e.g. PbO ([H01L 29/247 takes precedence](#))}
- 29/247 . . . . {Amorphous materials}
- 29/26 . . . including, apart from doping materials or other impurities, elements provided for in two or more of the groups [H01L 29/16](#), [H01L 29/18](#), [H01L 29/20](#), [H01L 29/22](#), [H01L 29/24](#) {, e.g. alloys}
- 29/263 . . . . {Amorphous materials}
- 29/267 . . . . in different semiconductor regions {, e.g. heterojunctions ([H01L 29/263 takes precedence](#))}
- 29/30 . . characterised by physical imperfections; having polished or roughened surface
- 29/32 . . . the imperfections being within the semiconductor body
- 29/34 . . . the imperfections being on the surface
- 29/36 . . characterised by the concentration or distribution of impurities {in the bulk material ([within semiconductor regions H01L 29/06](#))}
- 29/365 . . . {Planar doping, e.g. atomic-plane doping, delta-doping}
- 29/40 . Electrodes {; Multistep manufacturing processes therefor}
- 29/401 . . {Multistep manufacturing processes}
- 29/402 . . {Field plates}
- 29/404 . . . {Multiple field plate structures}
- 29/405 . . . {Resistive arrangements, e.g. resistive or semi-insulating field plates}
- 29/407 . . . {Recessed field plates, e.g. trench field plates, buried field plates}
- 29/408 . . {with an insulating layer with a particular dielectric or electrostatic property, e.g. with static charges or for controlling trapped charges or moving ions, or with a plate acting on the insulator potential or the insulator charges, e.g. for controlling charges effect or potential distribution in the insulating layer, or with a semi-insulating layer contacting directly the semiconductor surface}
- 29/41 . . characterised by their shape, relative sizes or dispositions
- 29/413 . . . {Nanosized electrodes, e.g. nanowire electrodes comprising one or a plurality of nanowires ([transparent electrodes comprising carbon nano-tubes H01L 51/444, nanotechnology per se B82B; nanosized carbon materials, e.g. carbon nanotubes, per se C01B 32/15](#))}
- 29/417 . . . carrying the current to be rectified, amplified or switched
- 29/41708 . . . . {Emitter or collector electrodes for bipolar transistors}
- 29/41716 . . . . {Cathode or anode electrodes for thyristors}
- 29/41725 . . . . {Source or drain electrodes for field effect devices ([with monocrystalline semiconductor on source/drain region H01L 29/0843](#))}
- 29/41733 . . . . . {for thin film transistors with insulated gate}
- 29/41741 . . . . . {for vertical or pseudo-vertical devices}

**NOTE**

A pseudo-vertical device is a device with the drain and source electrodes on the same main surface and where the main current is vertical at least in a part of its path

- 29/4175 . . . . . {for lateral devices where the connection to the source or drain region is done through at least one part of the semiconductor substrate thickness, e.g. with connecting sink or with via-hole}
- NOTE**
- The sink or via-hole leading to the source or drain region is considered to form part of the source or drain electrode
- 29/41758 . . . . . {for lateral devices with structured layout for source or drain region, i.e. the source or drain region having cellular, interdigitated or ring structure or being curved or angular ([H01L 29/41733](#) - [H01L 29/4175](#) take precedence)}
- NOTE**
- Interdigitated structure means that at least one of the source or drain region has two or more fingers
- 29/41766 . . . . . {with at least part of the source or drain electrode having contact below the semiconductor surface, e.g. the source or drain electrode formed at least partially in a groove or with inclusions of conductor inside the semiconductor ([H01L 29/41733](#) - [H01L 29/41758](#) take precedence)}
- 29/41775 . . . . . {characterised by the proximity or the relative position of the source or drain electrode and the gate electrode, e.g. the source or drain electrode separated from the gate electrode by side-walls or spreading around or above the gate electrode}
- 29/41783 . . . . . {Raised source or drain electrodes self aligned with the gate}
- 29/41791 . . . . . {for transistors with a horizontal current flow in a vertical sidewall, e.g. FinFET, MuGFET}
- 29/423 . . . . . not carrying the current to be rectified, amplified or switched
- 29/42304 . . . . . {Base electrodes for bipolar transistors}
- 29/42308 . . . . . {Gate electrodes for thyristors}
- 29/42312 . . . . . {Gate electrodes for field effect devices}
- 29/42316 . . . . . {for field-effect transistors}
- 29/4232 . . . . . {with insulated gate}
- 29/42324 . . . . . {Gate electrodes for transistors with a floating gate}
- 29/42328 . . . . . {with at least one additional gate other than the floating gate and the control gate, e.g. program gate, erase gate or select gate}
- 29/42332 . . . . . {with the floating gate formed by two or more non connected parts, e.g. multi-particles floating gate}
- 29/42336 . . . . . {with one gate at least partly formed in a trench}
- 29/4234 . . . . . {Gate electrodes for transistors with charge trapping gate insulator}
- 29/42344 . . . . . {with at least one additional gate, e.g. program gate, erase gate or select gate}
- 29/42348 . . . . . {with trapping site formed by at least two separated sites, e.g. multi-particles trapping site}
- 29/42352 . . . . . {with the gate at least partly formed in a trench}
- 29/42356 . . . . . {Disposition, e.g. buried gate electrode ([H01L 29/42324](#) and [H01L 29/4234](#) take precedence)}
- 29/4236 . . . . . {within a trench, e.g. trench gate electrode, groove gate electrode}
- 29/42364 . . . . . {characterised by the insulating layer, e.g. thickness or uniformity ([H01L 29/42324](#) and [H01L 29/4234](#) take precedence)}
- 29/42368 . . . . . {the thickness being non-uniform}
- 29/42372 . . . . . {characterised by the conducting layer, e.g. the length, the sectional shape or the lay-out ([H01L 29/42324](#) takes precedence)}
- 29/42376 . . . . . {characterised by the length or the sectional shape}
- 29/4238 . . . . . {characterised by the surface layout}
- 29/42384 . . . . . {for thin film field effect transistors, e.g. characterised by the thickness or the shape of the insulator or the dimensions, the shape or the lay-out of the conductor}
- 2029/42388 . . . . . {characterised by the shape of the insulating material}
- 29/42392 . . . . . {fully surrounding the channel, e.g. gate-all-around}
- 29/42396 . . . . . {for charge coupled devices}
- 29/43 . . . . . characterised by the materials of which they are formed
- 29/432 . . . . . {Heterojunction gate for field effect devices}
- 29/435 . . . . . {Resistive materials for field effect devices, e.g. resistive gate for MOSFET or MESFET}
- 29/437 . . . . . {Superconductor materials}
- 29/45 . . . . . Ohmic electrodes
- 29/452 . . . . . {on AIII-BV compounds}
- 29/454 . . . . . {on thin film AIII-BV compounds}
- 29/456 . . . . . {on silicon}
- 29/458 . . . . . {for thin film silicon, e.g. source or drain electrode}
- 29/47 . . . . . Schottky barrier electrodes ([H01L 29/435](#) takes precedence)}
- 29/475 . . . . . {on AIII-BV compounds}
- 29/49 . . . . . Metal-insulator-semiconductor electrodes, {e.g. gates of MOSFET ([H01L 29/435](#) takes precedence)}
- NOTE**
- This group covers also devices using any other conductor material in place of metal
- 29/4908 . . . . . {for thin film semiconductor, e.g. gate of TFT}

- 29/4916 . . . . {the conductor material next to the insulator being a silicon layer, e.g. polysilicon doped with boron, phosphorus or nitrogen ([H01L 29/4908](#), [H01L 29/4983](#) take precedence)}
- 29/4925 . . . . . {with a multiple layer structure, e.g. several silicon layers with different crystal structure or grain arrangement (with only a vertical doping structure or vertical doping variation [H01L 29/4916](#))}
- 29/4933 . . . . . {with a silicide layer contacting the silicon layer, e.g. Polycide gate (with a barrier layer between the silicide and silicon layers [H01L 29/4941](#))}
- 29/4941 . . . . . {with a barrier layer between the silicon and the metal or metal silicide upper layer, e.g. Silicide/TiN/Polysilicon}
- 29/495 . . . . . {the conductor material next to the insulator being a simple metal, e.g. W, Mo ([H01L 29/4908](#), [H01L 29/4983](#) take precedence)}
- 29/4958 . . . . . {with a multiple layer structure}
- 29/4966 . . . . . {the conductor material next to the insulator being a composite material, e.g. organic material, TiN, MoSi<sub>2</sub> ([H01L 29/4908](#), [H01L 29/4983](#) take precedence)}
- 29/4975 . . . . . {being a silicide layer, e.g. TiSi<sub>2</sub>}
- 29/4983 . . . . . {with a lateral structure, e.g. a Polysilicon gate with a lateral doping variation or with a lateral composition variation or characterised by the sidewalls being composed of conductive, resistive or dielectric material}
- 29/4991 . . . . . {comprising an air gap}
- WARNING**
- Group [H01L 29/4991](#) is incomplete pending reclassification of documents from group [H01L 29/4983](#).
- Groups [H01L 29/4991](#) and [H01L 29/4983](#) should be considered in order to perform a complete search.
- 29/51 . . . . . Insulating materials associated therewith {(for MIS structures on thin film semiconductor [H01L 29/4908](#))}
- 29/511 . . . . . {with a compositional variation, e.g. multilayer structures ([H01L 29/516](#) takes precedence)}
- 29/512 . . . . . {the variation being parallel to the channel plane}
- 29/513 . . . . . {the variation being perpendicular to the channel plane}
- 29/515 . . . . . {with cavities, e.g. containing a gas}
- 29/516 . . . . . {with at least one ferroelectric layer}
- 29/517 . . . . . {the insulating material comprising a metallic compound, e.g. metal oxide, metal silicate ([H01L 29/518](#) takes precedence)}
- 29/518 . . . . . {the insulating material containing nitrogen, e.g. nitride, oxynitride, nitrogen-doped material}
- 29/66 . . . . . Types of semiconductor device {; Multistep manufacturing processes therefor}
- 29/66007 . . . . . {Multistep manufacturing processes}
- 29/66015 . . . . . {of devices having a semiconductor body comprising semiconducting carbon, e.g. diamond, diamond-like carbon, graphene}
- 29/66022 . . . . . {the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
- 29/6603 . . . . . {Diodes}
- 29/66037 . . . . . {the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
- 29/66045 . . . . . {Field-effect transistors}
- 29/66053 . . . . . {of devices having a semiconductor body comprising crystalline silicon carbide}
- 29/6606 . . . . . {the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
- 29/66068 . . . . . {the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
- 29/66075 . . . . . {of devices having semiconductor bodies comprising group 14 or group 13/15 materials (comprising semiconducting carbon [H01L 29/66015](#); comprising crystalline silicon carbide [H01L 29/66053](#))}
- 29/66083 . . . . . {the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
- 29/6609 . . . . . {Diodes}
- 29/66098 . . . . . {Breakdown diodes}
- 29/66106 . . . . . {Zener diodes}
- 29/66113 . . . . . {Avalanche diodes}
- 29/66121 . . . . . {Multilayer diodes, e.g. PNP diodes}
- 29/66128 . . . . . {Planar diodes}
- 29/66136 . . . . . {PN junction diodes}
- 29/66143 . . . . . {Schottky diodes}
- 29/66151 . . . . . {Tunnel diodes (group 13/15 resonant tunneling diodes [H01L 29/66219](#))}
- 29/66159 . . . . . {Transit time diodes, e.g. IMPATT, TRAPATT diodes}
- 29/66166 . . . . . {Resistors with PN junction}
- 29/66174 . . . . . {Capacitors with PN or Schottky junction, e.g. varactors (capacitors with PN junction combined with MOS control [H01L 29/66189](#))}
- 29/66181 . . . . . {Conductor-insulator-semiconductor capacitors, e.g. trench capacitors}
- 29/66189 . . . . . {with PN junction, e.g. hybrid capacitors}
- 29/66196 . . . . . {with an active layer made of a group 13/15 material}

- 29/66204 . . . . . {Diodes}
- 29/66212 . . . . . {Schottky diodes}
- 29/66219 . . . . . {with a heterojunction, e.g. resonant tunneling diodes [RTD]}
- 29/66227 . . . . . {the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
- 29/66234 . . . . . {Bipolar junction transistors [BJT]}
- 29/66242 . . . . . {Heterojunction transistors [HBT] (with an active layer made of a group 13/15 material [H01L 29/66318](#))}
- 29/6625 . . . . . {Lateral transistors ([H01L 29/66242](#) and [H01L 29/66265](#) take precedence)}
- 29/66257 . . . . . {Schottky transistors}
- 29/66265 . . . . . {Thin film bipolar transistors ([H01L 29/66242](#) takes precedence)}
- 29/66272 . . . . . {Silicon vertical transistors ([H01L 29/66242](#), [H01L 29/66257](#) and [H01L 29/66265](#) take precedence)}
- 29/6628 . . . . . {Inverse transistors}
- 29/66287 . . . . . {with a single crystalline emitter, collector or base including extrinsic, link or graft base formed on the silicon substrate, e.g. by epitaxy, recrystallisation, after insulating device isolation ([H01L 29/6628](#) takes precedence)}
- 29/66295 . . . . . {with main current going through the whole silicon substrate, e.g. power bipolar transistor}
- 29/66303 . . . . . {with multi-emitter, e.g. interdigitated, multi-cellular or distributed emitter}
- 29/6631 . . . . . {with an active layer made of a group 13/15 material}
- 29/66318 . . . . . {Heterojunction transistors}
- 29/66325 . . . . . {controlled by field-effect, e.g. insulated gate bipolar transistors [IGBT]}
- 29/66333 . . . . . {Vertical insulated gate bipolar transistors}
- 29/6634 . . . . . {with a recess formed by etching in the source/emitter contact region ([H01L 29/66348](#) takes precedence; etching of semiconductor bodies [H01L 21/302](#))}
- 29/66348 . . . . . {with a recessed gate}
- 29/66356 . . . . . {Gated diodes, e.g. field controlled diodes [FCD], static induction thyristors [SITh], field controlled thyristors [FCTh]}
- 29/66363 . . . . . {Thyristors}
- 29/66371 . . . . . {structurally associated with another device, e.g. built-in diode (making integrated circuits [H01L 21/82](#))}
- 29/66378 . . . . . {the other device being a controlling field-effect device}
- 29/66386 . . . . . {Bidirectional thyristors}
- 29/66393 . . . . . {Lateral or planar thyristors}
- 29/66401 . . . . . {with an active layer made of a group 13/15 material}
- 29/66409 . . . . . {Unipolar field-effect transistors}
- 29/66416 . . . . . {Static induction transistors [SIT] (with an active layer made of a group 13/15 material [H01L 29/66454](#))}
- 29/66424 . . . . . {Permeable base transistors [PBT]}
- 29/66431 . . . . . {with a heterojunction interface channel or gate, e.g. HFET, HIGFET, SISFET, HJFET, HEMT (with an active layer made of a group 13/15 material [H01L 29/66462](#))}
- 29/66439 . . . . . {with a one- or zero-dimensional channel, e.g. quantum wire FET, in-plane gate transistor [IPG], single electron transistor [SET], striped channel transistor, Coulomb blockade transistor (with an active layer made of a group 13/15 material [H01L 29/66469](#))}
- 29/66446 . . . . . {with an active layer made of a group 13/15 material, e.g. group 13/15 velocity modulation transistor [VMT], group 13/15 negative resistance FET [NERFET]}
- 29/66454 . . . . . {Static induction transistors [SIT], e.g. permeable base transistors [PBT]}
- 29/66462 . . . . . {with a heterojunction interface channel or gate, e.g. HFET, HIGFET, SISFET, HJFET, HEMT}
- 29/66469 . . . . . {with one- or zero-dimensional channel, e.g. quantum wire field-effect transistors, in-plane gate transistors [IPG], single electron transistors [SET], Coulomb blockade transistors, striped channel transistors}
- 29/66477 . . . . . {with an insulated gate, i.e. MISFET}
- 29/66484 . . . . . {with multiple gate, at least one gate being an insulated gate ([H01L 29/66742](#) takes precedence)}
- 29/66492 . . . . . {with a pocket or a lightly doped drain selectively formed at the side of the gate}
- 29/665 . . . . . {using self aligned silicidation, i.e. silicide (formation of conductive layers comprising silicides [H01L 21/28518](#))}
- 29/66507 . . . . . {providing different silicide thicknesses on the gate and on source or drain}
- 29/66515 . . . . . {using self aligned selective metal deposition simultaneously on the gate and on source or drain}
- 29/66522 . . . . . {with an active layer made of a group 13/15 material ([H01L 29/66446](#) takes precedence)}
- 29/6653 . . . . . {using the removal of at least part of spacer, e.g. disposable spacer}
- 29/66537 . . . . . {using a self aligned punch through stopper or threshold implant under the gate region ([H01L 29/66606](#) takes precedence)}
- 29/66545 . . . . . {using a dummy, i.e. replacement gate in a process wherein at least a part of the final gate is self aligned to the dummy gate}

- 29/66553 . . . . . {using inside spacers, permanent or not}
- 29/6656 . . . . . {using multiple spacer layers, e.g. multiple sidewall spacers}
- 29/66568 . . . . . {Lateral single gate silicon transistors}
- 29/66575 . . . . . {where the source and drain or source and drain extensions are self-aligned to the sides of the gate ([H01L 29/66606 takes precedence](#))}
- 29/66583 . . . . . {with initial gate mask or masking layer complementary to the prospective gate location, e.g. with dummy source and drain contacts}
- 29/6659 . . . . . {with both lightly doped source and drain extensions and source and drain self-aligned to the sides of the gate, e.g. lightly doped drain [LDD] MOSFET, double diffused drain [DDD] MOSFET}
- 29/66598 . . . . . {forming drain [D] and lightly doped drain [LDD] simultaneously, e.g. using implantation through the wings a T-shaped layer, or through a specially shaped layer}
- 29/66606 . . . . . {with final source and drain contacts formation strictly before final or dummy gate formation, e.g. contact first technology ([H01L 29/66621 takes precedence](#))}
- 29/66613 . . . . . {with a gate recessing step, e.g. using local oxidation ([making recessed gate LDMOS transistors H01L 29/66704](#))}
- 29/66621 . . . . . {using etching to form a recess at the gate location ([etching of semiconductor bodies H01L 21/302](#))}
- 29/66628 . . . . . {recessing the gate by forming single crystalline semiconductor material at the source or drain location}
- 29/66636 . . . . . {with source or drain recessed by etching or first recessed by etching and then refilled}
- 29/66643 . . . . . {with source or drain regions formed by a Schottky barrier or a conductor-insulator-semiconductor structure}
- 29/66651 . . . . . {with a single crystalline channel formed on the silicon substrate after insulating device isolation}
- 29/66659 . . . . . {with asymmetry in the channel direction, e.g. lateral high-voltage MISFETs with drain offset region, extended drain MISFETs}
- 29/66666 . . . . . {Vertical transistors ([H01L 29/66712](#), [H01L 29/66742 take precedence](#))}
- 29/66674 . . . . . {DMOS transistors, i.e. MISFETs with a channel accommodating body or base region adjoining a drain drift region ([making lateral high-voltage MISFETs with channel well and drain offset region H01L 29/66659](#))}
- 29/66681 . . . . . {Lateral DMOS transistors, i.e. LDMOS transistors}
- 29/66689 . . . . . {with a step of forming an insulating sidewall spacer ([forming insulating material on a substrate H01L 21/02107](#))}
- 29/66696 . . . . . {with a step of recessing the source electrode}
- 29/66704 . . . . . {with a step of recessing the gate electrode, e.g. to form a trench gate electrode}
- 29/66712 . . . . . {Vertical DMOS transistors, i.e. VDMOS transistors}
- 29/66719 . . . . . {With a step of forming an insulating sidewall spacer}
- 29/66727 . . . . . {with a step of recessing the source electrode}
- 29/66734 . . . . . {with a step of recessing the gate electrode, e.g. to form a trench gate electrode}
- 29/66742 . . . . . {Thin film unipolar transistors}
- 29/6675 . . . . . {Amorphous silicon or polysilicon transistors}
- 29/66757 . . . . . {Lateral single gate single channel transistors with non-inverted structure, i.e. the channel layer is formed before the gate}
- 29/66765 . . . . . {Lateral single gate single channel transistors with inverted structure, i.e. the channel layer is formed after the gate}
- 29/66772 . . . . . {Monocrystalline silicon transistors on insulating substrates, e.g. quartz substrates ([H01L 29/66666 takes precedence](#); [thin film FinFETs H01L 29/66795](#))}
- 29/6678 . . . . . {on sapphire substrates, e.g. SOS transistors}
- 29/66787 . . . . . {with a gate at the side of the channel}
- 29/66795 . . . . . {with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}
- 29/66803 . . . . . {with a step of doping the vertical sidewall, e.g. using tilted or multi-angled implants}
- 29/6681 . . . . . {using dummy structures having essentially the same shape as the semiconductor body, e.g. to provide stability}
- 29/66818 . . . . . {the channel being thinned after patterning, e.g. sacrificial oxidation on fin}
- 29/66825 . . . . . {with a floating gate ([H01L 29/6684 takes precedence](#))}
- 29/66833 . . . . . {with a charge trapping gate insulator, e.g. MNOS transistors}

- 29/6684 . . . . . {with a ferroelectric gate insulator}
- 29/66848 . . . . . {with a Schottky gate, i.e. MESFET}
- 29/66856 . . . . . {with an active layer made of a group 13/15 material ([H01L 29/66446](#) takes precedence)}
- 29/66863 . . . . . {Lateral single gate transistors}
- 29/66871 . . . . . {Processes wherein the final gate is made after the formation of the source and drain regions in the active layer, e.g. dummy-gate processes}
- 29/66878 . . . . . {Processes wherein the final gate is made before the formation, e.g. activation anneal, of the source and drain regions in the active layer}
- 29/66886 . . . . . {Lateral transistors with two or more independent gates}
- 29/66893 . . . . . {with a PN junction gate, i.e. JFET}
- 29/66901 . . . . . {with a PN homojunction gate}
- 29/66909 . . . . . {Vertical transistors, e.g. tecnetrans}
- 29/66916 . . . . . {with a PN heterojunction gate}
- 29/66924 . . . . . {with an active layer made of a group 13/15 material ([H01L 29/66446](#) takes precedence)}
- 29/66931 . . . . . {BJT-like unipolar transistors, e.g. hot electron transistors [HET], metal base transistors [MBT], resonant tunneling transistor [RTT], bulk barrier transistor [BBT], planar doped barrier transistor [PDBT], charge injection transistor [CHINT]}
- 29/66939 . . . . . {with an active layer made of a group 13/15 material}
- 29/66946 . . . . . {Charge transfer devices}
- 29/66954 . . . . . {with an insulated gate}
- 29/66962 . . . . . {with a Schottky gate}
- 29/66969 . . . . . {of devices having semiconductor bodies not comprising group 14 or group 13/15 materials ([comprising selenium or tellurium in uncombined form other than as impurities in semiconductor bodies of other materials, comprising cuprous oxide or cuprous iodide \[H01L 21/02365\]\(#\)](#))}
- 29/66977 . . . . . {Quantum effect devices, e.g. using quantum reflection, diffraction or interference effects, i.e. Bragg- or Aharonov-Bohm effects}
- 29/66984 . . . . . {Devices using spin polarized carriers}
- 29/66992 . . . . . {controllable only by the variation of applied heat ([controllable by IR radiation \[H01L 31/00\]\(#\); measuring quantity of heat \[G01K 17/00\]\(#\)](#))}
- 29/68 . . . . . controllable by only the electric current supplied, or only the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched
- 29/685 . . . . . {Hi-Lo semiconductor devices, e.g. memory devices}
- 29/70 . . . . . Bipolar devices
- 29/705 . . . . . {Double base diodes}
- 29/72 . . . . . Transistor-type devices, i.e. able to continuously respond to applied control signals
- 29/73 . . . . . Bipolar junction transistors
- 29/7302 . . . . . {structurally associated with other devices ([assemblies of devices \[H01L 25/00\]\(#\); integrated circuits \[H01L 27/00\]\(#\); IGBT \[H01L 29/7393\]\(#\)](#))}
- 29/7304 . . . . . {the device being a resistive element, e.g. ballasting resistor ([transistors integrated with resistors \[H01L 27/075\]\(#\)](#))}
- 29/7306 . . . . . {Point contact transistors}
- 29/7308 . . . . . {Schottky transistors}
- 29/7311 . . . . . {Tunnel transistors}
- 29/7313 . . . . . {Avalanche transistors}
- 29/7315 . . . . . {Transistors with hook collector}
- 29/7317 . . . . . {Bipolar thin film transistors}
- 29/732 . . . . . Vertical transistors
- 29/7322 . . . . . {having emitter-base and base-collector junctions leaving at the same surface of the body, e.g. planar transistor}
- 29/7325 . . . . . {having an emitter-base junction leaving at a main surface and a base-collector junction leaving at a peripheral surface of the body, e.g. mesa planar transistor}
- 29/7327 . . . . . {Inverse vertical transistors}
- 29/735 . . . . . Lateral transistors
- 29/737 . . . . . Hetero-junction transistors
- 29/7371 . . . . . {Vertical transistors}
- 29/7373 . . . . . {having a two-dimensional base, e.g. modulation-doped base, inversion layer base, delta-doped base}
- 29/7375 . . . . . {having an emitter comprising one or more non-monocrystalline elements of group IV, e.g. amorphous silicon, alloys comprising group IV elements}
- 29/7376 . . . . . {Resonant tunnelling transistors}
- 29/7378 . . . . . {comprising lattice mismatched active layers, e.g. SiGe strained layer transistors}
- 29/739 . . . . . controlled by field-effect, {e.g. bipolar static induction transistors [BSIT] ([unijunction transistors \[H01L 29/705\]\(#\)](#))}
- 29/7391 . . . . . {Gated diode structures}
- 29/7392 . . . . . {with PN junction gate, e.g. field controlled thyristors (FCTh), static induction thyristors (SITh)}
- 29/7393 . . . . . {Insulated gate bipolar mode transistors, i.e. IGBT; IGT; COMFET}
- 29/7394 . . . . . {on an insulating layer or substrate, e.g. thin film device or device isolated from the bulk substrate ([H01L 29/7398](#) takes precedence)}
- 29/7395 . . . . . {Vertical transistors, e.g. vertical IGBT}

**NOTE**

The transistor is called vertical if the emitter and the collector are not on the same main surface or, if they are on the same main surface, at least a part of the main current

H01L

H01L 29/7395

(continued)

- has a component substantially not parallel to the main surface 29/76825 . . . . . {Structures for regeneration, refreshing, leakage compensation or the like}
- 29/7396 . . . . . {with a non planar surface, e.g. with a non planar gate or with a trench or recess or pillar in the surface of the emitter, base or collector region for improving current density or short circuiting the emitter and base regions (H01L 29/7398 takes precedence)}
- 29/7397 . . . . . {and a gate structure lying on a slanted or vertical surface or formed in a groove, e.g. trench gate IGBT}
- 29/7398 . . . . . {with both emitter and collector contacts in the same substrate side}
- 29/74 . . . . . Thyristor-type devices, e.g. having four-zone regenerative action {(two-terminal thyristors H01L 29/87)}
- 29/7404 . . . . . {structurally associated with at least one other device (assemblies H01L 25/00; integrated circuits H01L 27/00)}
- 29/7408 . . . . . {the device being a capacitor or a resistor}
- 29/7412 . . . . . {the device being a diode}
- 29/7416 . . . . . {the device being an antiparallel diode, e.g. RCT (shorted anode structures enabling reverse conduction H01L 29/0834)}
- 29/742 . . . . . {the device being a field effect transistor (for turn-on or turn-off by field effect H01L 29/745, H01L 29/749)}
- 29/7424 . . . . . {having a built-in localised breakdown/breakover region, e.g. self-protected against destructive spontaneous, e.g. voltage breakover, firing}
- 29/7428 . . . . . {having an amplifying gate structure, e.g. cascade (Darlington) configuration}
- 29/7432 . . . . . {Asymmetrical thyristors (with a particular shorted anode structure H01L 29/0834)}
- 29/7436 . . . . . {Lateral thyristors}
- 29/744 . . . . . Gate-turn-off devices
- 29/745 . . . . . with turn-off by field effect
- 29/7455 . . . . . {produced by an insulated gate structure}
- 29/747 . . . . . Bidirectional devices, e.g. triacs
- 29/749 . . . . . with turn-on by field effect
- 29/76 . . . . . Unipolar devices {, e.g. field effect transistors}
- 29/7606 . . . . . {Transistor-like structures, e.g. hot electron transistor [HET]; metal base transistor [MBT]}
- 29/7613 . . . . . {Single electron transistors; Coulomb blockade devices (H01L 29/7888 takes precedence)}
- 29/762 . . . . . Charge transfer devices
- 29/765 . . . . . Charge-coupled devices {(peripheral circuits for CCD storage devices G11C 19/285)}
- 29/768 . . . . . with field effect produced by an insulated gate
- 29/76808 . . . . . {Input structures}
- 29/76816 . . . . . {Output structures}
- 29/76833 . . . . . {Buried channel CCD}
- 29/76841 . . . . . {Two-Phase CCD}
- 29/7685 . . . . . {Three-Phase CCD}
- 29/76858 . . . . . {Four-Phase CCD}
- 29/76866 . . . . . {Surface Channel CCD}
- 29/76875 . . . . . {Two-Phase CCD}
- 29/76883 . . . . . {Three-Phase CCD}
- 29/76891 . . . . . {Four-Phase CCD}
- 29/772 . . . . . Field effect transistors
- 29/7722 . . . . . {using static field induced regions, e.g. SIT, PBT}
- 29/7725 . . . . . {with delta-doped channel (H01L 29/778 takes precedence)}
- 29/7727 . . . . . {Velocity modulation transistors, i.e. VMT}
- 29/775 . . . . . with one dimensional charge carrier gas channel, e.g. quantum wire FET
- 29/778 . . . . . with two-dimensional charge carrier gas channel, e.g. HEMT {; with two-dimensional charge-carrier layer formed at a heterojunction interface (H01L 29/803 takes precedence)}
- 29/7781 . . . . . {with inverted single heterostructure, i.e. with active layer formed on top of wide bandgap layer, e.g. IHEMT}
- 29/7782 . . . . . {with confinement of carriers by at least two heterojunctions, e.g. DHHEMT, quantum well HEMT, DHMODFET}
- 29/7783 . . . . . {using III-V semiconductor material}
- 29/7784 . . . . . {with delta or planar doped donor layer (H01L 29/7785 takes precedence)}
- 29/7785 . . . . . {with more than one donor layer}
- 29/7786 . . . . . {with direct single heterostructure, i.e. with wide bandgap layer formed on top of active layer, e.g. direct single heterostructure MIS-like HEMT}
- 29/7787 . . . . . {with wide bandgap charge-carrier supplying layer, e.g. direct single heterostructure MODFET}
- 29/7788 . . . . . {Vertical transistors}
- 29/7789 . . . . . {the two-dimensional charge carrier gas being at least partially not parallel to a main surface of the semiconductor body}
- 29/78 . . . . . with field effect produced by an insulated gate {(H01L 29/7725, H01L 29/775, H01L 29/778 take precedence)}
- 29/7801 . . . . . {DMOS transistors, i.e. MISFETs with a channel accommodating body or base region adjoining a drain drift region (lateral high-voltage MISFETs with channel well and drain offset region H01L 29/7835)}
- 29/7802 . . . . . {Vertical DMOS transistors, i.e. VDMOS transistors}



<p>29/7803 . . . . . {structurally associated with at least one other device (<a href="#">assemblies H01L 25/00</a>; <a href="#">integrated circuits H01L 27/00</a>)}</p> <p><b>WARNING</b></p> <p>Groups <a href="#">H01L 29/7803</a> – <a href="#">H01L 29/7808</a> are incomplete pending reclassification of documents from group <a href="#">H01L 29/7802</a>.</p> <p>Groups <a href="#">H01L 29/7803</a> – <a href="#">H01L 29/7808</a> and <a href="#">H01L 29/7802</a> should be considered in order to perform a complete search.</p>	<p>29/7816 . . . . . {Lateral DMOS transistors, i.e. LDMOS transistors}</p> <p>29/7817 . . . . . {structurally associated with at least one other device (<a href="#">assemblies H01L 25/00</a>; <a href="#">integrated circuits H01L 27/00</a>)}</p> <p>29/7818 . . . . . {the other device being a pn-junction diode}</p> <p>29/7819 . . . . . {in antiparallel, e.g. freewheel diode}</p> <p>29/782 . . . . . {the other device being a Schottky barrier diode}</p> <p>29/7821 . . . . . {the other device being a breakdown diode, e.g. Zener diode}</p> <p>29/7823 . . . . . {with an edge termination structure (<a href="#">guard regions per se H01L 29/0619</a>; <a href="#">field plates per se H01L 29/402</a>)}</p> <p>29/7824 . . . . . {with a substrate comprising an insulating layer, e.g. SOI-LDMOS transistors}</p> <p>29/7825 . . . . . {with trench gate electrode (<a href="#">trench gate electrodes per se H01L 29/4236</a>)}</p> <p>29/7826 . . . . . {with voltage or current sensing structure, e.g. emulator section, overcurrent sensing cell}</p> <p>29/7827 . . . . . {Vertical transistors (<a href="#">H01L 29/7802</a>, <a href="#">H01L 29/78642</a> take precedence)}</p> <p>29/7828 . . . . . {without inversion channel, e.g. vertical ACCUFETs, normally-on vertical MISFETs}</p> <p>29/783 . . . . . {comprising a gate to body connection, i.e. bulk dynamic threshold voltage MOSFET (<a href="#">for thin film transistors H01L 29/78612</a>, <a href="#">H01L 29/78696</a>)}</p> <p>29/7831 . . . . . {with multiple gate structure (FinFETs or MuGFETs <a href="#">H01L 29/7855</a>, thin film transistors <a href="#">H01L 29/78645</a>)}</p> <p>29/7832 . . . . . {the structure comprising a MOS gate and at least one non-MOS gate, e.g. JFET or MESFET gate}</p> <p>29/7833 . . . . . {with lightly doped drain or source extension, e.g. LDD MOSFET's; DDD MOSFET's (<a href="#">for thin film transistors H01L 29/78618</a>)}</p> <p>29/7834 . . . . . {with a non-planar structure, e.g. the gate or the source or the drain being non-planar}</p> <p><b>NOTE</b></p> <p>Field oxide sunken in the substrate and not filling a groove is not an element characterising a non-planar structure</p> <p>29/7835 . . . . . {with asymmetrical source and drain regions, e.g. lateral high-voltage MISFETs with drain offset region, extended drain MISFETs}</p> <p>29/7836 . . . . . {with a significant overlap between the lightly doped extension and the gate electrode (<a href="#">H01L 29/7834</a>, <a href="#">H01L 29/7835</a> take precedence)}</p>
<p>29/7804 . . . . . {the other device being a pn-junction diode}</p> <p>29/7805 . . . . . {in antiparallel, e.g. freewheel diode}</p> <p>29/7806 . . . . . {the other device being a Schottky barrier diode}</p> <p>29/7808 . . . . . {the other device being a breakdown diode, e.g. Zener diode}</p> <p>29/7809 . . . . . {having both source and drain contacts on the same surface, i.e. Up-Drain VDMOS transistors}</p> <p>29/781 . . . . . {Inverted VDMOS transistors, i.e. Source-Down VDMOS transistors}</p> <p>29/7811 . . . . . {with an edge termination structure (<a href="#">guard regions per se H01L 29/0619</a>; <a href="#">field plates per se H01L 29/402</a>)}</p> <p><b>WARNING</b></p> <p>Group <a href="#">H01L 29/7811</a> is incomplete pending reclassification of documents from group <a href="#">H01L 29/7802</a>.</p> <p>Groups <a href="#">H01L 29/7811</a> and <a href="#">H01L 29/7802</a> should be considered in order to perform a complete search.</p> <p>29/7812 . . . . . {with a substrate comprising an insulating layer, e.g. SOI-VDMOS transistors}</p> <p>29/7813 . . . . . {with trench gate electrode, e.g. UMOS transistors (<a href="#">trench gate electrodes per se H01L 29/4236</a>)}</p> <p>29/7815 . . . . . {with voltage or current sensing structure, e.g. emulator section, overcurrent sensing cell}</p> <p><b>WARNING</b></p> <p>Group <a href="#">H01L 29/7815</a> is incomplete pending reclassification of documents from group <a href="#">H01L 29/7802</a>.</p> <p>Groups <a href="#">H01L 29/7815</a> and <a href="#">H01L 29/7802</a> should be considered in order to perform a complete search.</p>	

29/7838	. . . . .	{without inversion channel, e.g. buried channel lateral MISFETs, normally-on lateral MISFETs, depletion-mode lateral MISFETs}	29/78609	. . . . .	{for preventing leakage current ( <a href="#">H01L 29/78618</a> takes precedence)}
29/7839	. . . . .	{with Schottky drain or source contact}	29/78612	. . . . .	{for preventing the kink- or the snapback effect, e.g. discharging the minority carriers of the channel region for preventing bipolar effect}
29/78391	. . . . .	{the gate comprising a layer which is used for its ferroelectric properties}	29/78615	. . . . .	{with a body contact}
29/7841	. . . . .	{with floating body, e.g. programmable transistors}	29/78618	. . . . .	{characterised by the drain or the source properties, e.g. the doping structure, the composition, the sectional shape or the contact structure ( <a href="#">silicide contacts, electrodes in general H01L 29/458</a> )}
29/7842	. . . . .	{means for exerting mechanical stress on the crystal lattice of the channel region, e.g. using a flexible substrate ( <a href="#">variation of the composition of the channel H01L 29/1054</a> )}	29/78621	. . . . .	{with LDD structure or an extension or an offset region or characterised by the doping profile}
29/7843	. . . . .	{the means being an applied insulating layer}	29/78624	. . . . .	{the source and the drain regions being asymmetrical}
29/7845	. . . . .	{the means being a conductive material, e.g. silicided S/D or Gate}	29/78627	. . . . .	{with a significant overlap between the lightly doped drain and the gate electrode, e.g. GOLDD}
29/7846	. . . . .	{the means being located in the lateral device isolation region, e.g. STI}	2029/7863	. . . . .	{with an LDD consisting of more than one lightly doped zone or having a non-homogeneous dopant distribution, e.g. graded LDD}
29/7847	. . . . .	{using a memorization technique, e.g. re-crystallization under strain, bonding on a substrate having a thermal expansion coefficient different from the one of the region}	29/78633	. . . . .	{with a light shield}
29/7848	. . . . .	{the means being located in the source/drain region, e.g. SiGe source and drain}	29/78636	. . . . .	{with supplementary region or layer for improving the flatness of the device}
29/7849	. . . . .	{the means being provided under the channel}	29/78639	. . . . .	{with a drain or source connected to a bulk conducting substrate}
29/785	. . . . .	{having a channel with a horizontal current flow in a vertical sidewall of a semiconductor body, e.g. FinFET, MuGFET}	29/78642	. . . . .	{Vertical transistors}
29/7851	. . . . .	{with the body tied to the substrate}	29/78645	. . . . .	{with multiple gate}
29/7853	. . . . .	{the body having a non-rectangular crosssection}			<b>NOTE</b>
29/7854	. . . . .	{with rounded corners}			In groups
29/7855	. . . . .	{with at least two independent gates}			<a href="#">H01L 29/78651</a> - <a href="#">H01L 29/78696</a> ,
29/7856	. . . . .	{with an non-uniform gate, e.g. varying doping structure, shape or composition on different sides of the fin, or different gate insulator thickness or composition on opposing fin sides ( <a href="#">H01L 29/7855</a> takes precedence)}			the materials specified for the transistors are the material of the channel region
2029/7857	. . . . .	{of the accumulation type}	29/78648	. . . . .	{arranged on opposing sides of the channel}
2029/7858	. . . . .	{having contacts specially adapted to the FinFET geometry, e.g. wrap-around contacts}	29/78651	. . . . .	{Silicon transistors ( <a href="#">H01L 29/78606</a> - <a href="#">H01L 29/78645</a> take precedence)}
29/786	. . . . .	Thin film transistors, {i.e. transistors with a channel being at least partly a thin film ( <a href="#">transistors having only the source or the drain region on an insulator layer H01L 29/0653</a> ; thin film FinFETs <a href="#">H01L 29/785</a> )}	29/78654	. . . . .	{Monocrystalline silicon transistors}
29/78603	. . . . .	{characterised by the insulating substrate or support ( <a href="#">H01L 29/78657</a> takes precedence)}	29/78657	. . . . .	{SOS transistors}
29/78606	. . . . .	{with supplementary region or layer in the thin film or in the insulated bulk substrate supporting it for controlling or increasing the safety of the device ( <a href="#">H01L 29/78642</a> , <a href="#">H01L 29/78645</a> take precedence)}	29/7866	. . . . .	{Non-monocrystalline silicon transistors}
			29/78663	. . . . .	{Amorphous silicon transistors}
			29/78666	. . . . .	{with normal-type structure, e.g. with top gate}
			29/78669	. . . . .	{with inverted-type structure, e.g. with bottom gate}
			29/78672	. . . . .	{Polycrystalline or microcrystalline silicon transistor}

- 29/78675 . . . . . {with normal-type structure, e.g. with top gate}
- 29/78678 . . . . . {with inverted-type structure, e.g. with bottom gate}
- 29/78681 . . . . . {having a semiconductor body comprising  $A_{III}B_V$  or  $A_{II}B_{VI}$  or  $A_{IV}B_{VI}$  semiconductor materials, or Se or Te}
- 29/78684 . . . . . {having a semiconductor body comprising semiconductor materials of Group IV not being silicon, or alloys including an element of the group IV, e.g. Ge, SiN alloys, SiC alloys (H01L 29/7869 takes precedence)}
- 29/78687 . . . . . {with a multilayer structure or superlattice structure}
- 29/7869 . . . . . {having a semiconductor body comprising an oxide semiconductor material, e.g. zinc oxide, copper aluminium oxide, cadmium stannate}
- 29/78693 . . . . . {the semiconducting oxide being amorphous}
- 29/78696 . . . . . {characterised by the structure of the channel, e.g. multichannel, transverse or longitudinal shape, length or width, doping structure, or the overlap or alignment between the channel and the gate, the source or the drain, or the contacting structure of the channel (H01L 29/78612 takes precedence; transistors having a drain offset region or a lightly doped drain [LDD] H01L 29/78621)}
- 29/788 . . . . . with floating gate {(H01L 29/78391 takes precedence)}
- 29/7881 . . . . . {Programmable transistors with only two possible levels of programming (H01L 29/7888 takes precedence)}
- 29/7882 . . . . . {charging by injection of carriers through a conductive insulator, e.g. Poole-Frankel conduction}
- 29/7883 . . . . . {charging by tunnelling of carriers, e.g. Fowler-Nordheim tunnelling}
- 29/7884 . . . . . {charging by hot carrier injection}
- 29/7885 . . . . . {Hot carrier injection from the channel}
- 29/7886 . . . . . {Hot carrier produced by avalanche breakdown of a PN junction, e.g. FAMOS}
- 29/7887 . . . . . {Programmable transistors with more than two possible different levels of programming}
- 29/7888 . . . . . {Transistors programmable by two single electrons}
- 29/7889 . . . . . {Vertical transistors, i.e. transistors having source and drain not in the same horizontal plane}
- 29/792 . . . . . with charge trapping gate insulator, e.g. MNOS-memory transistors
- 29/7923 . . . . . {Programmable transistors with more than two possible different levels of programming}
- 29/7926 . . . . . {Vertical transistors, i.e. transistors having source and drain not in the same horizontal plane}
- 29/80 . . . . . with field effect produced by a PN or other rectifying junction gate {, i.e. potential-jump barrier}
- 29/802 . . . . . {with heterojunction gate, e.g. transistors with semiconductor layer acting as gate insulating layer, MIS-like transistors (H01L 29/806 takes precedence; with one dimensional electron gas H01L 29/775; with dimensional electron gas H01L 29/778)}
- 29/803 . . . . . {Programmable transistors, e.g. with charge-trapping quantum well}
- 29/806 . . . . . {with Schottky drain or source contact}
- 29/808 . . . . . with a PN junction gate {, e.g. PN homojunction gate (H01L 29/7725, H01L 29/775, H01L 29/778, H01L 29/806 take precedence)}
- 29/8083 . . . . . {Vertical transistors (SIT H01L 29/7722)}
- 29/8086 . . . . . {Thin film JFET's}
- 29/812 . . . . . with a Schottky gate {(H01L 29/7725, H01L 29/775, H01L 29/778, H01L 29/806 take precedence; with Schottky contact on top of heterojunction gate H01L 29/802)}
- 29/8122 . . . . . {Vertical transistors (SIT, PBT H01L 29/7722)}
- 29/8124 . . . . . {with multiple gate}
- 29/8126 . . . . . {Thin film MESFET's}
- 29/8128 . . . . . {with recessed gate}
- 29/82 . . . . . controllable by variation of the magnetic field applied to the device
- 29/84 . . . . . controllable by variation of applied mechanical force, e.g. of pressure
- 29/86 . . . . . controllable only by variation of the electric current supplied, or only the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched
- 29/8605 . . . . . Resistors with PN junctions
- 29/861 . . . . . Diodes
- 29/8611 . . . . . {Planar PN junction diodes}
- 29/8613 . . . . . {Mesa PN junction diodes}
- 29/8615 . . . . . {Hi-lo semiconductor devices, e.g. memory devices}
- 29/8616 . . . . . {Charge trapping diodes}
- 29/8618 . . . . . {Diodes with bulk potential barrier, e.g. Camel diodes, Planar Doped Barrier diodes, Graded bandgap diodes}
- 29/862 . . . . . Point contact diodes
- 29/864 . . . . . Transit-time diodes, e.g. IMPATT, TRAPATT diodes
- 29/866 . . . . . Zener diodes
- 29/868 . . . . . PIN diodes
- 29/87 . . . . . Thyristor diodes, e.g. Shockley diodes, break-over diodes
- 29/872 . . . . . Schottky diodes
- 29/8725 . . . . . {of the trench MOS barrier type [TMBS]}
- 29/88 . . . . . Tunnel-effect diodes
- 29/882 . . . . . {Resonant tunneling diodes, i.e. RTD, RTBD}
- 29/885 . . . . . Esaki diodes
- 29/92 . . . . . Capacitors with potential-jump barrier or surface barrier

- 29/93 . . . . Variable capacitance diodes, e.g. varactors
- 29/94 . . . . Metal-insulator-semiconductors, e.g. MOS
- 29/945 . . . . . {Trench capacitors}
- 31/00**    **Semiconductor devices sensitive to infra-red radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation and adapted either for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof; Details thereof** ([H01L 51/42](#) takes precedence; devices consisting of a plurality of solid state components formed in, or on, a common substrate, other than combinations of radiation-sensitive components with one or more electric light sources, [H01L 27/00](#); measurement of X-radiation, gamma radiation, corpuscular radiation or cosmic radiation with semiconductor detectors [G01T 1/24](#), with resistance detectors [G01T 1/26](#); measurement of neutron radiation with semiconductor detectors [G01T 3/08](#); couplings of light guides with optoelectronic elements [G02B 6/42](#); obtaining energy from radioactive sources [G21H](#))
- 31/02 . . Details
- 31/02002 . . {Arrangements for conducting electric current to or from the device in operations}
- 31/02005 . . . {for device characterised by at least one potential jump barrier or surface barrier}
- 31/02008 . . . . {for solar cells or solar cell modules}
- 31/0201 . . . . . {comprising specially adapted module bus-bar structures}
- 31/02013 . . . . . {comprising output lead wires elements}
- 31/02016 . . {Circuit arrangements of general character for the devices}
- 31/02019 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/02021 . . . . {for solar cells (electrical connection means, e.g. junction boxes, specially adapted for structural association with photovoltaic modules [H02S 40/34](#))}
- 31/02024 . . . . {Position sensitive and lateral effect photodetectors; Quadrant photodiodes}
- 31/02027 . . . . {for devices working in avalanche mode}
- 31/0203 . . Containers; Encapsulations {, e.g. encapsulation of photodiodes} (for photovoltaic devices [H01L 31/048](#); for organic photosensitive devices [H01L 51/44](#))
- 31/0216 . . Coatings ([H01L 31/041](#) takes precedence)
- 31/02161 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/02162 . . . . {for filtering or shielding light, e.g. multicolour filters for photodetectors}
- 31/02164 . . . . . {for shielding light, e.g. light blocking layers, cold shields for infra-red detectors}
- 31/02165 . . . . . {using interference filters, e.g. multilayer dielectric filters (interference filters [G02B 5/28](#))}
- 31/02167 . . . . {for solar cells}
- 31/02168 . . . . . {the coatings being antireflective or having enhancing optical properties for the solar cells}
- 31/0224 . . Electrodes
- 31/022408 . . . {for devices characterised by at least one potential jump barrier or surface barrier}
- 31/022416 . . . . {comprising ring electrodes}
- 31/022425 . . . . . {for solar cells}
- 31/022433 . . . . . {Particular geometry of the grid contacts}
- 31/022441 . . . . . {Electrode arrangements specially adapted for back-contact solar cells}
- 31/02245 . . . . . . {for metallisation wrap-through [MWT] type solar cells}
- 31/022458 . . . . . . {for emitter wrap-through [EWT] type solar cells, e.g. interdigitated emitter-base back-contacts}
- 31/022466 . . . {made of transparent conductive layers, e.g. TCO, ITO layers}
- 31/022475 . . . . {composed of indium tin oxide [ITO]}
- 31/022483 . . . . {composed of zinc oxide [ZnO]}
- 31/022491 . . . . {composed of a thin transparent metal layer, e.g. gold}
- 31/0232 . . Optical elements or arrangements associated with the device ([H01L 31/0236](#) takes precedence; for photovoltaic cells [H01L 31/054](#); for photovoltaic modules [H02S 40/20](#))
- 31/02322 . . . {comprising luminescent members, e.g. fluorescent sheets upon the device}
- 31/02325 . . . {the optical elements not being integrated nor being directly associated with the device}
- 31/02327 . . . {the optical elements being integrated or being directly associated to the device, e.g. back reflectors (optical coatings [H01L 31/0216](#))}
- 31/0236 . . Special surface textures
- 31/02363 . . . {of the semiconductor body itself, e.g. textured active layers}
- 31/02366 . . . {of the substrate or of a layer on the substrate, e.g. textured ITO/glass substrate or superstrate, textured polymer layer on glass substrate}
- 31/024 . . Arrangements for cooling, heating, ventilating or temperature compensation (for photovoltaic devices [H01L 31/052](#))
- 31/0248 . . characterised by their semiconductor bodies
- 31/0256 . . characterised by the material
- 31/0264 . . . Inorganic materials
- 31/0272 . . . . Selenium or tellurium
- 31/02725 . . . . . {characterised by the doping material}
- 31/028 . . . . including, apart from doping material or other impurities, only elements of Group IV of the Periodic System
- 31/0284 . . . . . {comprising porous silicon as part of the active layer(s) (porous silicon as antireflective layer for photodiodes [H01L 31/0216](#); for solar cells [H01L 31/02168](#))}
- 31/0288 . . . . . characterised by the doping material
- 31/0296 . . . . . including, apart from doping material or other impurities, only  $A_{II}B_{VI}$  compounds, e.g. CdS, ZnS, HgCdTe
- 31/02963 . . . . . {characterised by the doping material}
- 31/02966 . . . . . {including ternary compounds, e.g. HgCdTe}
- 31/0304 . . . . including, apart from doping materials or other impurities, only  $A_{III}B_V$  compounds
- 31/03042 . . . . . {characterised by the doping material}
- 31/03044 . . . . . {comprising a nitride compounds, e.g. GaN}

- 31/03046 . . . . . {including ternary or quaternary compounds, e.g. GaAlAs, InGaAs, InGaAsP}
- 31/03048 . . . . . {comprising a nitride compounds, e.g. InGaN}
- 31/0312 . . . . . including, apart from doping materials or other impurities, only  $A_{IV}B_{IV}$  compounds, e.g. SiC
- 31/03125 . . . . . {characterised by the doping material}
- 31/032 . . . . . including, apart from doping materials or other impurities, only compounds not provided for in groups [H01L 31/0272](#) - [H01L 31/0312](#)
- 31/0321 . . . . . {characterised by the doping material ([H01L 31/0323](#), [H01L 31/0325](#) take precedence)}
- 31/0322 . . . . . {comprising only  $A_{I}B_{III}C_{VI}$  chalcopyrite compounds, e.g. Cu In Se<sub>2</sub>, Cu Ga Se<sub>2</sub>, Cu In Ga Se<sub>2</sub>}
- 31/0323 . . . . . {characterised by the doping material}
- 31/0324 . . . . . {comprising only  $A_{IV}B_{VI}$  or  $A_{II}B_{IV}C_{VI}$  chalcogenide compounds, e.g. Pb Sn Te}
- 31/0325 . . . . . {characterised by the doping material}
- 31/0326 . . . . . {comprising  $A_{I}B_{II}C_{IV}D_{VI}$  kesterite compounds, e.g. Cu<sub>2</sub>ZnSnSe<sub>4</sub>, Cu<sub>2</sub>ZnSnS<sub>4</sub>}
- 31/0327 . . . . . {characterised by the doping material}
- 31/0328 . . . . . including, apart from doping materials or other impurities, semiconductor materials provided for in two or more of groups [H01L 31/0272](#) - [H01L 31/032](#)
- 31/0336 . . . . . in different semiconductor regions, e.g. Cu<sub>2</sub>X/CdX hetero-junctions, X being an element of Group VI of the Periodic System
- 31/03365 . . . . . {comprising only Cu<sub>2</sub>X / CdX heterojunctions, X being an element of Group VI of the Periodic System}
- 2031/0344 . . . . . {Organic materials}
- 31/0352 . . . . . characterised by their shape or by the shapes, relative sizes or disposition of the semiconductor regions
- 31/035209 . . . . . {comprising a quantum structures}
- 31/035218 . . . . . {the quantum structure being quantum dots}
- 31/035227 . . . . . {the quantum structure being quantum wires, or nanorods ([carbon nanotubes H01L 51/0048](#))}
- 31/035236 . . . . . {Superlattices; Multiple quantum well structures}
- 31/035245 . . . . . {characterised by amorphous semiconductor layers}
- 31/035254 . . . . . {including, apart from doping materials or other impurities, only elements of Group IV of the Periodic System, e.g. Si-SiGe superlattices}
- 31/035263 . . . . . {Doping superlattices, e.g. nipi superlattices}
- 31/035272 . . . . . {characterised by at least one potential jump barrier or surface barrier}
- 31/035281 . . . . . {Shape of the body}
- 31/03529 . . . . . {Shape of the potential jump barrier or surface barrier}
- 31/036 . . . . . characterised by their crystalline structure or particular orientation of the crystalline planes
- 31/0368 . . . . . including polycrystalline semiconductors ([H01L 31/0392](#) takes precedence)
- 31/03682 . . . . . {including only elements of Group IV of the Periodic System}
- 31/03685 . . . . . {including microcrystalline silicon, uc-Si}
- 31/03687 . . . . . {including microcrystalline  $A_{IV}B_{IV}$  alloys, e.g. uc-SiGe, uc-SiC}
- 31/0376 . . . . . including amorphous semiconductors ([H01L 31/0392](#) takes precedence)
- 31/03762 . . . . . {including only elements of Group IV of the Periodic System}
- 31/03765 . . . . . {including  $A_{IV}B_{IV}$  compounds or alloys, e.g. SiGe, SiC}
- 31/03767 . . . . . {presenting light-induced characteristic variations, e.g. Staebler-Wronski effect}
- 31/0384 . . . . . including other non-monocrystalline materials, e.g. semiconductor particles embedded in an insulating material ([H01L 31/0392](#) takes precedence)
- 31/03845 . . . . . {comprising semiconductor nanoparticles embedded in a semiconductor matrix ([in insulating matrix H01L 31/0384](#))}
- 31/0392 . . . . . including thin films deposited on metallic or insulating substrates {; characterised by specific substrate materials or substrate features or by the presence of intermediate layers, e.g. barrier layers, on the substrate ([textured substrates H01L 31/02366](#))}
- 31/03921 . . . . . {including only elements of Group IV of the Periodic System}
- 31/03923 . . . . . {including  $A_{I}B_{III}C_{VI}$  compound materials, e.g. CIS, CIGS}
- 31/03925 . . . . . {including  $A_{II}B_{VI}$  compound materials, e.g. CdTe, CdS}
- 31/03926 . . . . . {comprising a flexible substrate}
- 31/03928 . . . . . {including  $A_{I}B_{III}C_{VI}$  compound, e.g. CIS, CIGS deposited on metal or polymer foils}
- 31/04 . . . . . adapted as photovoltaic [PV] conversion devices ([testing thereof during manufacture {H01L 22/00}](#); [testing thereof after manufacture H02S 50/10](#))
- 31/041 . . . . . Provisions for preventing damage caused by corpuscular radiation, e.g. for space applications
- 31/042 . . . . . PV modules or arrays of single PV cells ([supporting structures for PV modules H02S 20/00](#))
- 31/043 . . . . . Mechanically stacked PV cells
- 31/044 . . . . . including bypass diodes ([bypass diodes in the junction box H02S 40/34](#))
- 31/0443 . . . . . comprising bypass diodes integrated or directly associated with the devices, e.g. bypass diodes integrated or formed in or on the same substrate as the photovoltaic cells
- 31/0445 . . . . . including thin film solar cells, e.g. single thin film a-Si, CIS or CdTe solar cells
- 31/046 . . . . . PV modules composed of a plurality of thin film solar cells deposited on the same substrate
- 31/0463 . . . . . characterised by special patterning methods to connect the PV cells in a module, e.g. laser cutting of the conductive or active layers
- 31/0465 . . . . . comprising particular structures for the electrical interconnection of adjacent PV cells in the module ([H01L 31/0463](#) takes precedence)

- 31/0468 . . . . comprising specific means for obtaining partial light transmission through the module, e.g. partially transparent thin film solar modules for windows
- 31/047 . . . PV cell arrays including PV cells having multiple vertical junctions or multiple V-groove junctions formed in a semiconductor substrate
- 31/0475 . . . PV cell arrays made by cells in a planar, e.g. repetitive, configuration on a single semiconductor substrate; PV cell microarrays (PV modules composed of a plurality of thin film solar cells deposited on the same substrate [H01L 31/046](#))
- 31/048 . . . Encapsulation of modules
- 31/0481 . . . . {characterised by the composition of the encapsulation material}
- 31/0488 . . . . {Double glass encapsulation, e.g. photovoltaic cells arranged between front and rear glass sheets}
- 31/049 . . . . Protective back sheets
- 31/05 . . . Electrical interconnection means between PV cells inside the PV module, e.g. series connection of PV cells (electrodes [H01L 31/0224](#); electrical interconnection of thin film solar cells formed on a common substrate [H01L 31/046](#); particular structures for electrical interconnecting of adjacent thin film solar cells in the module [H01L 31/0465](#); electrical interconnection means specially adapted for electrically connecting two or more PV modules [H02S 40/36](#))
- 31/0504 . . . . {specially adapted for series or parallel connection of solar cells in a module}
- 31/0508 . . . . . {the interconnection means having a particular shape}
- 31/0512 . . . . . {made of a particular material or composition of materials}
- 31/0516 . . . . . {specially adapted for interconnection of back-contact solar cells}
- 31/052 . . Cooling means directly associated or integrated with the PV cell, e.g. integrated Peltier elements for active cooling or heat sinks directly associated with the PV cells (cooling means in combination with the PV module [H02S 40/42](#))
- 31/0521 . . . {using a gaseous or a liquid coolant, e.g. air flow ventilation, water circulation}
- 31/0525 . . . including means to utilise heat energy directly associated with the PV cell, e.g. integrated Seebeck elements
- 31/053 . . Energy storage means directly associated or integrated with the PV cell, e.g. a capacitor integrated with a PV cell (energy storage means associated with the PV module [H02S 40/38](#))
- 31/054 . . Optical elements directly associated or integrated with the PV cell, e.g. light-reflecting means or light-concentrating means
- 31/0543 . . . {comprising light concentrating means of the refractive type, e.g. lenses}
- 31/0547 . . . {comprising light concentrating means of the reflecting type, e.g. parabolic mirrors, concentrators using total internal reflection}
- 31/0549 . . . {comprising spectrum splitting means, e.g. dichroic mirrors}
- 31/055 . . . where light is absorbed and re-emitted at a different wavelength by the optical element directly associated or integrated with the PV cell, e.g. by using luminescent material, fluorescent concentrators or up-conversion arrangements
- 31/056 . . . the light-reflecting means being of the back surface reflector [BSR] type
- 31/06 . . characterised by at least one potential-jump barrier or surface barrier
- 31/061 . . . the potential barriers being of the point-contact type ([H01L 31/07](#) takes precedence)
- 31/062 . . . the potential barriers being only of the metal-insulator-semiconductor type
- 31/065 . . . the potential barriers being only of the graded gap type
- 31/068 . . . the potential barriers being only of the PN homojunction type, e.g. bulk silicon PN homojunction solar cells or thin film polycrystalline silicon PN homojunction solar cells
- 31/0682 . . . . {back-junction, i.e. rearside emitter, solar cells, e.g. interdigitated base-emitter regions back-junction cells}
- 31/0684 . . . . {double emitter cells, e.g. bifacial solar cells}
- 31/0687 . . . . Multiple junction or tandem solar cells
- 31/06875 . . . . . {inverted grown metamorphic [IMM] multiple junction solar cells, e.g. III-V compounds inverted metamorphic multi-junction cells}
- 31/0693 . . . . the devices including, apart from doping material or other impurities, only  $A_{III}B_V$  compounds, e.g. GaAs or InP solar cells
- 31/07 . . . the potential barriers being only of the Schottky type
- 31/072 . . . the potential barriers being only of the PN heterojunction type
- 31/0725 . . . . Multiple junction or tandem solar cells
- 31/073 . . . . comprising only  $A_{II}B_{VI}$  compound semiconductors, e.g. CdS/CdTe solar cells
- 31/0735 . . . . comprising only  $A_{III}B_V$  compound semiconductors, e.g. GaAs/AlGaAs or InP/GaNAs solar cells
- 31/074 . . . . comprising a heterojunction with an element of Group IV of the Periodic System, e.g. ITO/Si, GaAs/Si or CdTe/Si solar cells
- 31/0745 . . . . comprising a  $A_{IV}B_{IV}$  heterojunction, e.g. Si/Ge, SiGe/Si or Si/SiC solar cells
- 31/0747 . . . . . comprising a heterojunction of crystalline and amorphous materials, e.g. heterojunction with intrinsic thin layer or HIT® solar cells; solar cells
- 31/0749 . . . . including a  $A_{I}B_{III}C_{VI}$  compound, e.g. CdS/CuInSe<sub>2</sub> [CIS] heterojunction solar cells
- 31/075 . . . the potential barriers being only of the PIN type
- 31/076 . . . . Multiple junction or tandem solar cells
- 31/077 . . . . the devices comprising monocrystalline or polycrystalline materials
- 31/078 . . . including different types of potential barriers provided for in two or more of groups [H01L 31/062](#) - [H01L 31/075](#)
- 31/08 . . in which radiation controls flow of current through the device, e.g. photoresistors

- 31/085 . . . {the device being sensitive to very short wavelength, e.g. X-ray, Gamma-rays}
- 31/09 . . . Devices sensitive to infra-red, visible or ultraviolet radiation ([H01L 31/101 takes precedence](#))
- 31/095 . . . {comprising amorphous semiconductors}
- 31/10 . . . characterised by at least one potential-jump barrier or surface barrier, e.g. phototransistors
- 31/101 . . . Devices sensitive to infra-red, visible or ultraviolet radiation
- 31/1013 . . . . {devices sensitive to two or more wavelengths, e.g. multi-spectrum radiation detection devices}
- 31/1016 . . . . {comprising transparent or semitransparent devices}
- 31/102 . . . . characterised by only one potential barrier or surface barrier
- 31/1025 . . . . . {the potential barrier being of the point contact type}
- 31/103 . . . . . the potential barrier being of the PN homojunction type
- 31/1032 . . . . . {the devices comprising active layers formed only by  $A_{II}B_{VI}$  compounds, e.g. HgCdTe IR photodiodes}
- 31/1035 . . . . . {the devices comprising active layers formed only by  $A_{III}B_V$  compounds}
- 31/1037 . . . . . {the devices comprising active layers formed only by  $A_{IV}B_{VI}$  compounds}
- 31/105 . . . . . the potential barrier being of the PIN type
- 31/1055 . . . . . {the devices comprising amorphous materials of Group IV of the Periodic System}
- 31/107 . . . . . the potential barrier working in avalanche mode, e.g. avalanche photodiode
- 31/1075 . . . . . {in which the active layers, e.g. absorption or multiplication layers, form an heterostructure, e.g. SAM structure}
- 31/108 . . . . . the potential barrier being of the Schottky type
- 31/1085 . . . . . {the devices being of the Metal-Semiconductor-Metal [MSM] Schottky barrier type}
- 31/109 . . . . . the potential barrier being of the PN heterojunction type
- 31/11 . . . . . characterised by two potential barriers or surface barriers, e.g. bipolar phototransistor
- 31/1105 . . . . . {the device being a bipolar phototransistor}
- 31/111 . . . . . characterised by at least three potential barriers, e.g. photothyristor
- 31/1113 . . . . . {the device being a photothyristor}
- 31/1116 . . . . . {of the static induction type}
- 31/112 . . . . . characterised by field-effect operation, e.g. junction field-effect phototransistor
- 31/1121 . . . . . {Devices with Schottky gate}
- 31/1122 . . . . . {the device being a CCD device}
- 31/1123 . . . . . {the device being a photo MESFET}
- 31/1124 . . . . . {Devices with PN homojunction gate}
- 31/1125 . . . . . {the device being a CCD device}
- 31/1126 . . . . . {the device being a field-effect phototransistor}
- 31/1127 . . . . . {Devices with PN heterojunction gate}
- 31/1128 . . . . . {the device being a CCD device}
- 31/1129 . . . . . {the device being a field-effect phototransistor}
- 31/113 . . . . . being of the conductor-insulator-semiconductor type, e.g. metal-insulator-semiconductor field-effect transistor
- 31/1133 . . . . . {the device being a conductor-insulator-semiconductor diode or a CCD device}
- 31/1136 . . . . . {the device being a metal-insulator-semiconductor field-effect transistor}
- 31/115 . . . . . Devices sensitive to very short wavelength, e.g. X-rays, gamma-rays or corpuscular radiation
- 31/117 . . . . . of the bulk effect radiation detector type, e.g. Ge-Li compensated PIN gamma-ray detectors
- 31/1175 . . . . . {Li compensated PIN gamma-ray detectors}
- 31/118 . . . . . of the surface barrier or shallow PN junction detector type, e.g. surface barrier alpha-particle detectors
- 31/1185 . . . . . {of the shallow PN junction detector type}
- 31/119 . . . . . characterised by field-effect operation, e.g. MIS type detectors
- 31/12 . . . . . structurally associated with, e.g. formed in or on a common substrate with, one or more electric light sources, e.g. electroluminescent light sources, and electrically or optically coupled thereto ([semiconductor devices with at least one potential barrier or surface barrier adapted for light emission H01L 33/00](#); [amplifiers using electroluminescent element and photocell H03F 17/00](#); [electroluminescent light sources per se H05B 33/00](#))
- 31/125 . . . . . {Composite devices with photosensitive elements and electroluminescent elements within one single body}
- 31/14 . . . . . the light source or sources being controlled by the semiconductor device sensitive to radiation, e.g. image converters, image amplifiers, image storage devices
- 31/141 . . . . . {the semiconductor device sensitive to radiation being without a potential-jump barrier or surface barrier}
- 31/143 . . . . . {the light source being a semiconductor device with at least one potential-jump barrier or surface barrier, e.g. light emitting diode}
- 31/145 . . . . . {the semiconductor device sensitive to radiation being characterised by at least one potential-jump barrier or surface barrier}
- 31/147 . . . . . the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier
- 31/153 . . . . . formed in, or on, a common substrate
- 31/16 . . . . . the semiconductor device sensitive to radiation being controlled by the light source or sources
- 31/161 . . . . . {Semiconductor device sensitive to radiation without a potential-jump or surface barrier, e.g. photoresistors}
- 31/162 . . . . . {the light source being a semiconductor device with at least one potential-jump barrier or surface barrier, e.g. a light emitting diode}
- 31/164 . . . . . {Optical potentiometers}

- 31/165 . . . {the semiconductor sensitive to radiation being characterised by at least one potential-jump or surface barrier}
- 31/167 . . . the light sources and the devices sensitive to radiation all being semiconductor devices characterised by at least one potential or surface barrier
- 31/173 . . . . formed in, or on, a common substrate
- 31/18 . . . Processes or apparatus peculiar to the manufacture or treatment of these devices or of parts thereof (not peculiar thereto [H01L 21/00](#))
- 31/1804 . . {comprising only elements of Group IV of the Periodic System}
- 31/1808 . . . {including only Ge}
- 31/1812 . . . {including only  $A_{IV}B_{IV}$  alloys, e.g. SiGe}
- 31/1816 . . . . {Special manufacturing methods for microcrystalline layers, e.g. uc-SiGe, uc-SiC}
- 31/182 . . . {Special manufacturing methods for polycrystalline Si, e.g. Si ribbon, poly Si ingots, thin films of polycrystalline Si}
- 31/1824 . . . . {Special manufacturing methods for microcrystalline Si, uc-Si}
- 31/1828 . . {the active layers comprising only  $A_{II}B_{VI}$  compounds, e.g. CdS, ZnS, CdTe}
- 31/1832 . . . {comprising ternary compounds, e.g. Hg Cd Te}
- 31/1836 . . . {comprising a growth substrate not being an  $A_{II}B_{VI}$  compound}
- 31/184 . . {the active layers comprising only  $A_{III}B_V$  compounds, e.g. GaAs, InP}
- 31/1844 . . . {comprising ternary or quaternary compounds, e.g. Ga Al As, In Ga As P}
- 31/1848 . . . . {comprising nitride compounds, e.g. InGaN, InGaAlN}
- 31/1852 . . . {comprising a growth substrate not being an  $A_{III}B_V$  compound}
- 31/1856 . . . {comprising nitride compounds, e.g. GaN}
- 31/186 . . {Particular post-treatment for the devices, e.g. annealing, impurity gettering, short-circuit elimination, recrystallisation}
- 31/1864 . . . {Annealing}
- 31/1868 . . . {Passivation}
- 31/1872 . . . {Recrystallisation}
- 31/1876 . . {Particular processes or apparatus for batch treatment of the devices}
- 31/188 . . . {Apparatus specially adapted for automatic interconnection of solar cells in a module}
- 31/1884 . . {Manufacture of transparent electrodes, e.g. TCO, ITO}
- 31/1888 . . . {methods for etching transparent electrodes}
- 31/1892 . . {methods involving the use of temporary, removable substrates}
- 31/1896 . . . {for thin-film semiconductors}
- 31/20 . . such devices or parts thereof comprising amorphous semiconductor materials
- 31/202 . . . {including only elements of Group IV of the Periodic System}
- 31/204 . . . . {including  $A_{IV}B_{IV}$  alloys, e.g. SiGe, SiC}
- 31/206 . . . {Particular processes or apparatus for continuous treatment of the devices, e.g. roll-to roll processes, multi-chamber deposition}
- 31/208 . . . {Particular post-treatment of the devices, e.g. annealing, short-circuit elimination}
- 33/00** **Semiconductor devices with at least one potential-jump barrier or surface barrier specially adapted for light emission; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof** ([H01L 51/50](#) takes precedence; devices consisting of a plurality of semiconductor components formed in or on a common substrate and including semiconductor components with at least one potential-jump barrier or surface barrier, specially adapted for light emission [H01L 27/15](#); semiconductor lasers [H01S 5/00](#))
- NOTES**
1. This group covers light emitting diodes [LEDs] or superluminescent diodes [SLDs], including LEDs or SLDs emitting infra-red [IR] light or ultra-violet [UV] light.
  2. In this group, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.
- 33/0004 . . {Devices characterised by their operation}
- 33/0008 . . . {having p-n or hi-lo junctions}
- 33/0012 . . . . {p-i-n devices}
- 33/0016 . . . . {having at least two p-n junctions}
- 33/002 . . . {having heterojunctions or graded gap}
- 33/0025 . . . . {comprising only  $A_{III}B_V$  compounds}
- 33/0029 . . . . {comprising only  $A_{II}B_{VI}$  compounds}
- 33/0033 . . . {having Schottky barriers}
- 33/0037 . . . {having a MIS barrier layer}
- 33/0041 . . . {characterised by field-effect operation}
- 33/0045 . . . {the devices being superluminescent diodes}
- 33/005 . . {Processes}
- 33/0054 . . . {for devices with an active region comprising only group IV elements}
- 33/0058 . . . . {comprising amorphous semiconductors}
- 33/0062 . . . {for devices with an active region comprising only III-V compounds}
- 33/0066 . . . . {with a substrate not being a III-V compound}
- 33/007 . . . . . {comprising nitride compounds}
- 33/0075 . . . . {comprising nitride compounds}
- 33/0079 . . . . {wafer bonding or at least partial removal of the growth substrate}
- 33/0083 . . . {for devices with an active region comprising only II-VI compounds}
- 33/0087 . . . . {with a substrate not being a II-VI compound}
- 33/0091 . . . {for devices with an active region comprising only IV-VI compounds}
- 33/0095 . . . {Post-treatments of the devices, e.g. annealing, recrystallisation, short-circuit elimination}
- 33/02 . . characterised by the semiconductor bodies
- 33/025 . . . {Physical imperfections, e.g. particular concentration or distribution of impurities}
- 33/04 . . . with a quantum effect structure or superlattice, e.g. tunnel junction
- 33/06 . . . . within the light emitting region, e.g. quantum confinement structure or tunnel barrier



- 33/08 . . with a plurality of light emitting regions, e.g. laterally discontinuous light emitting layer or photoluminescent region integrated within the semiconductor body ([H01L 27/15](#) takes precedence)
- 33/10 . . with a light reflecting structure, e.g. semiconductor Bragg reflector
- 33/105 . . . {with a resonant cavity structure}
- 33/12 . . with a stress relaxation structure, e.g. buffer layer
- 33/14 . . with a carrier transport control structure, e.g. highly-doped semiconductor layer or current-blocking structure
- 33/145 . . . {with a current-blocking structure}
- 33/16 . . with a particular crystal structure or orientation, e.g. polycrystalline, amorphous or porous
- 33/18 . . . within the light emitting region
- NOTE**
- When classifying in this group, classification is also made in group [H01L 33/26](#) or one of its subgroups in order to identify the chemical composition of the light emitting region
- 33/20 . . with a particular shape, e.g. curved or truncated substrate
- 33/22 . . . Roughened surfaces, e.g. at the interface between epitaxial layers
- 33/24 . . . of the light emitting region, e.g. non-planar junction
- 33/26 . . Materials of the light emitting region
- 33/28 . . . containing only elements of group II and group VI of the periodic system
- 33/285 . . . . {characterised by the doping materials}
- 33/30 . . . containing only elements of group III and group V of the periodic system
- 33/305 . . . . {characterised by the doping materials}
- 33/32 . . . . containing nitrogen
- 33/325 . . . . . {characterised by the doping materials}
- 33/34 . . . containing only elements of group IV of the periodic system
- 33/343 . . . . {characterised by the doping materials}
- 33/346 . . . . {containing porous silicon}
- 33/36 . characterised by the electrodes
- 33/38 . . with a particular shape
- 33/382 . . . {the electrode extending partially in or entirely through the semiconductor body}
- 33/385 . . . {the electrode extending at least partially onto a side surface of the semiconductor body}
- 33/387 . . . {with a plurality of electrode regions in direct contact with the semiconductor body and being electrically interconnected by another electrode layer}
- 33/40 . . Materials therefor
- 33/405 . . . {Reflective materials}
- 33/42 . . . Transparent materials
- 33/44 . characterised by the coatings, e.g. passivation layer or anti-reflective coating
- 33/46 . . Reflective coating, e.g. dielectric Bragg reflector
- 33/465 . . . {with a resonant cavity structure}
- 33/48 . . characterised by the semiconductor body packages
- NOTE**
- This group covers elements in intimate contact with the semiconductor body or integrated with the package
- 33/483 . . {Containers}
- 33/486 . . . {adapted for surface mounting}
- 33/50 . . Wavelength conversion elements
- 33/501 . . . {characterised by the materials, e.g. binder}
- 33/502 . . . . {Wavelength conversion materials}
- 33/504 . . . . . {Elements with two or more wavelength conversion materials}
- 33/505 . . . {characterised by the shape, e.g. plate or foil}
- 33/507 . . . {the elements being in intimate contact with parts other than the semiconductor body or integrated with parts other than the semiconductor body}
- 33/508 . . . {having a non-uniform spatial arrangement or non-uniform concentration, e.g. patterned wavelength conversion layer, wavelength conversion layer with a concentration gradient of the wavelength conversion material}
- 33/52 . . Encapsulations
- 33/54 . . . having a particular shape
- 33/56 . . . Materials, e.g. epoxy or silicone resin
- 33/58 . . Optical field-shaping elements
- 33/60 . . . Reflective elements
- 33/62 . . Arrangements for conducting electric current to or from the semiconductor body, e.g. lead-frames, wire-bonds or solder balls
- 33/64 . . Heat extraction or cooling elements
- 33/641 . . . {characterized by the materials}
- 33/642 . . . {characterized by the shape}
- 33/644 . . . {in intimate contact or integrated with parts of the device other than the semiconductor body}
- 33/645 . . . {the elements being electrically controlled, e.g. Peltier elements}
- 33/647 . . . {the elements conducting electric current to or from the semiconductor body}
- 33/648 . . . {the elements comprising fluids, e.g. heat-pipes}
- 35/00 Thermoelectric devices comprising a junction of dissimilar materials, i.e. exhibiting Seebeck or Peltier effect with or without other thermoelectric effects or thermomagnetic effects; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof; Details thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); refrigerating machines using electric or magnetic effects [F25B 21/00](#); thermometers using thermoelectric or thermomagnetic elements [G01K 7/00](#); obtaining energy from radioactive sources [G21H](#))**
- 35/02 . Details
- 35/04 . . Structural details of the junction; Connections of leads
- 35/06 . . . detachable, e.g. using a spring
- 35/08 . . . non-detachable, e.g. cemented, sintered, soldered {, e.g. thin films}
- 35/10 . . . Connections of leads
- 35/12 . Selection of the material for the legs of the junction

- 35/14 . . using inorganic compositions
- 35/16 . . . comprising tellurium or selenium or sulfur
- 35/18 . . . comprising arsenic or antimony or bismuth ([H01L 35/16](#) takes precedence), {e.g.  $A_{III}B_V$  compounds}
- 35/20 . . . comprising metals only ([H01L 35/16](#), [H01L 35/18](#) take precedence)
- 35/22 . . . comprising compounds containing boron, carbon, oxygen or nitrogen {or germanium or silicon, e.g. superconductors}
- 35/225 . . . . {Superconducting materials}
- 35/24 . . using organic compositions
- 35/26 . . using compositions changing continuously or discontinuously inside the material
- 35/28 . operating with Peltier or Seebeck effect only
- 35/30 . . characterised by the heat-exchanging means at the junction
- 35/32 . . characterised by the structure or configuration of the cell or thermo-couple forming the device {including details about, e.g., housing, insulation, geometry, module}
- 35/325 . . . {Cascades of thermo-couples}
- 35/34 . Processes or apparatus peculiar to the manufacture or treatment of these devices or of parts thereof (not peculiar thereto [H01L 21/00](#))
- 37/00 Thermoelectric devices without a junction of dissimilar materials; Thermomagnetic devices, e.g. using Nernst-Ettinghausen effect; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); {radiation pyrometers using pyroelectric detectors [G01J 5/34](#)} thermometers using thermo-electric or thermomagnetic elements [G01K 7/00](#); selection of materials for magnetography, e.g. for Curie-point writing [G03G 5/00](#))**
- 37/02 . using thermal change of dielectric constant, e.g. working above and below Curie point {, e.g. pyroelectric devices}
- 37/025 . . {Selection of materials}
- 37/04 . using thermal change of magnetic permeability, e.g. working above and below the Curie point {, e.g. pyromagnetic devices}
- 39/00 Devices using superconductivity; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); {light detection [G01J](#), [G02F 2/00](#); application to memories [G11C 11/44](#), [G11C 15/00](#), [G11C 19/32](#)} ; superconducting conductors cables or transmission lines [H01B 12/00](#); {microwaves [H01P 7/00](#), [H01P 11/00](#)} ; superconductive coils or windings [H01F](#); amplifiers using superconductivity [H03F 19/00](#); {impulse generators and logic circuits [H03K 3/38](#), [H03K 17/92](#), [H03K 19/195](#); lasers [H01S 3/00](#), [H01S 5/00](#))}**
- NOTE**
- In this group, in the absence of an indication to the contrary, an invention is classified in the last appropriate place
- 39/005 . {Alleged superconductivity}
- 39/02 . Details
- 39/025 . . {for Josephson devices}
- 39/04 . . Containers; Mountings
- 39/045 . . . {for Josephson devices}
- 39/06 . . characterised by the current path
- 39/08 . . characterised by the shape of the element
- 39/10 . . characterised by the means for switching {between superconductive and normal states}
- 39/12 . . characterised by the material
- 39/121 . . . {Organic materials}
- 39/123 . . . . {Fullerene superconductors, e.g. soccerball-shaped allotrope of carbon, e.g.  $C_{60}$ ,  $C_{94}$  (fullerenes in general [C07C 13/00](#))}
- 39/125 . . . {Ceramic materials}
- 39/126 . . . . {comprising copper oxide}
- 39/128 . . . . . {Multi-layered structures, e.g. super lattices}
- 39/14 . Permanent superconductor devices
- 39/141 . . {comprising metal borides, e.g.  $MgB_2$ }
- 39/143 . . {comprising high Tc ceramic materials}
- 39/145 . . {Three or more electrode devices ([H01L 39/228](#) takes precedence)}
- 39/146 . . . {Field effect devices}
- 39/148 . . {Abrikosov vortex devices}
- 39/16 . Devices switchable between superconductive and normal states {, e.g. switches, current limiters (circuits for current limitation using superconductor elements [H02H 9/023](#))}
- 39/18 . . Cryotrons
- 39/20 . . . Power cryotrons
- 39/22 . Devices comprising a junction of dissimilar materials, e.g. Josephson-effect devices
- 39/221 . . {Single electron tunnelling devices}
- 39/223 . . {Josephson-effect devices}
- 39/225 . . . {comprising high Tc ceramic materials}
- 39/226 . . . {comprising metal borides, e.g.  $MgB_2$ }
- 39/228 . . {three or more electrode devices, e.g. transistor-like structures}
- 39/24 . Processes or apparatus peculiar to the manufacture or treatment of devices provided for in [H01L 39/00](#) or of parts thereof
- 39/2403 . . {Processes peculiar to the manufacture or treatment of composite superconductor filaments (comprising copper oxide [H01L 39/2419](#))}
- 39/2406 . . {of devices comprising Nb or an alloy of Nb with one or more of the elements of group 4, e.g. Ti, Zr, Hf}
- 39/2409 . . {of devices comprising an intermetallic compound of type A-15, e.g.  $Nb_3Sn$ }
- 39/2412 . . {of devices comprising molybdenum chalcogenides}
- 39/2416 . . {of devices comprising nitrides or carbonitrides}
- 39/2419 . . {the superconducting material comprising copper oxide}
- 39/2422 . . . {Processes for depositing or forming superconductor layers}
- 39/2425 . . . . {from a solution}
- 39/2429 . . . . {from a suspension or slurry, e.g. screen printing; doctor blade casting}
- 39/2432 . . . . {by evaporation independent of heat source, e.g. MBE}
- 39/2435 . . . . {by sputtering}

- 39/2438 . . . . {by chemical vapour deposition [CVD]}
- 39/2441 . . . . {by metalloorganic chemical vapour deposition [MOCVD]}
- 39/2445 . . . . {by thermal spraying, e.g. plasma deposition}
- 39/2448 . . . . {Pulsed laser deposition, e.g. laser sputtering; laser ablation}
- 39/2451 . . . . {Precursor deposition followed by after-treatment, e.g. oxidation}
- 39/2454 . . . . {characterised by the substrate}
- 39/2458 . . . . {Monocrystalline substrates, e.g. epitaxial growth}
- 39/2461 . . . . {Intermediate layers, e.g. for growth control}
- 39/2464 . . . {After-treatment, e.g. patterning}
- 39/2467 . . . . {Etching}
- 39/247 . . . . {Passivation}
- 39/2474 . . . {Manufacture or deposition of contacts or electrodes}
- 39/2477 . . . {Processes including the use of precursors}
- 39/248 . . . {Processes peculiar to the manufacture or treatment of filaments or composite wires}
- 39/2483 . . . {Introducing flux pinning centres}
- 39/2487 . . {of devices comprising metal borides, e.g. MgB<sub>2</sub>}
- 39/249 . . {Treatment of superconductive layers by irradiation, e.g. ion-beam, electron-beam, laser beam, X-rays (irradiation devices [G21K](#), [H01J](#))}
- 39/2493 . . {for Josephson devices}
- 39/2496 . . . {comprising high T<sub>c</sub> ceramic materials}
- 41/00 Piezo-electric devices in general; Electrostrictive devices in general; Magnetostrictive devices in general; Processes or apparatus specially adapted for the manufacture or treatment thereof or of parts thereof; Details thereof (devices consisting of a plurality of solid-state components formed in or on a common substrate [H01L 27/00](#))**
- WARNING**
- Groups [H01L 41/23-H01L 41/47](#) are incomplete pending reclassification of documents from group [H01L 41/22](#).
- Groups [H01L 41/23-H01L 41/47](#) and [H01L 41/22](#) should be considered in order to perform a complete search.
- 41/02 . Details
- 41/04 . . of piezo-electric or electrostrictive devices
- 41/042 . . . {Drive or control circuitry or methods for piezo-electric or electrostrictive devices not otherwise provided for}
- 41/044 . . . . {for piezoelectric transformers (conversion of DC or AC power [H02M](#); for operating discharge lamps [H05B 41/282](#))}
- 41/047 . . . Electrodes {or electrical connection arrangements}
- 41/0471 . . . . {Individual layer electrodes of multilayer piezo-electric or electrostrictive devices, e.g. internal electrodes}
- 41/0472 . . . . {Connection electrodes of multilayer piezo-electric or electrostrictive devices, e.g. external electrodes}
- 41/0474 . . . . {embedded within piezo-electric or electrostrictive material, e.g. via connections}
- 41/0475 . . . . {Further connection or lead arrangements, e.g. flexible wiring boards, terminal pins}
- 41/0477 . . . . {Conductive materials (in general [H01B 1/00](#))}
- 41/0478 . . . . {the principal material being non-metallic, e.g. oxide or carbon based}
- 41/053 . . . Mounts, supports, enclosures or casings
- 41/0533 . . . . {Further insulation means against electrical, physical or chemical damage, e.g. protective coatings}
- 41/0536 . . . . {Mechanical prestressing means, e.g. springs (in general [F16F 1/00](#))}
- 41/06 . . of magnetostrictive devices
- 41/08 . Piezo-electric or electrostrictive devices
- 41/0805 . . {based on piezo-electric or electrostrictive films or coatings}
- 41/081 . . . {characterised by the underlying base, e.g. substrates}
- 41/0815 . . . . {Intermediate layers, e.g. barrier, adhesion or growth control buffer layers}
- 41/082 . . {based on piezo-electric or electrostrictive fibres}
- 41/0825 . . {with electrical and mechanical input and output, e.g. having combined actuator and sensor parts}
- 41/083 . . having a stacked or multilayer structure
- 41/0831 . . . {with non-rectangular cross-section in stacking direction, e.g. polygonal, trapezoidal}
- 41/0833 . . . {with non-rectangular cross-section orthogonal to the stacking direction, e.g. polygonal, circular}
- 41/0835 . . . . {Annular cross-section}
- 41/0836 . . . {of cylindrical shape with stacking in radial direction, e.g. coaxial or spiral type rolls}
- 41/0838 . . . {adapted for alleviating internal stress, e.g. cracking control layers ("Sollbruchstellen")}
- 41/087 . . formed as coaxial cables
- 41/09 . . with electrical input and mechanical output {, e.g. actuators, vibrators (in frequency selective networks [H03H 9/00](#))}
- 41/0906 . . . {using longitudinal or thickness displacement combined with bending, shear or torsion displacement}
- 41/0913 . . . . {with polygonal or rectangular shape}
- 41/092 . . . . {with cylindrical or annular shape}
- 41/0926 . . . {using bending displacement, e.g. unimorph, bimorph or multimorph cantilever or membrane benders}
- 41/0933 . . . . {Beam type}
- 41/094 . . . . {Cantilevers, i.e. having one fixed end}
- 41/0946 . . . . . {connected at their free ends, e.g. parallelogram type}
- 41/0953 . . . . . {with multiple segments mechanically connected in series, e.g. zig-zag type}
- 41/096 . . . . . {adapted for in-plane bending displacement}
- 41/0966 . . . . . {adapted for multi-directional bending displacement}
- 41/0973 . . . . {Membrane type}
- 41/098 . . . . . {with non-planar shape}
- 41/0986 . . . {using longitudinal or thickness displacement only, e.g. d33 or d31 type devices}
- 41/0993 . . . {using shear or torsion displacement, e.g. d15 type devices}
- 41/107 . . with electrical input and electrical output {, e.g. transformers}

- 41/113 . . with mechanical input and electrical output {, e.g. generators, sensors}
- 41/1132 . . . {Sensors}
- 41/1134 . . . {Beam type}
- 41/1136 . . . . {Cantilevers}
- 41/1138 . . . {Membrane type}
- 41/12 . . Magnetostrictive devices
- 41/125 . . {with mechanical input and electrical output, e.g. generators, sensors}
- 41/16 . . Selection of materials
- 41/18 . . for piezo-electric or electrostrictive devices {, e.g. bulk piezo-electric crystals}
- 41/183 . . . {Composite materials, e.g. having 1-3 or 2-2 type connectivity}
- 41/187 . . . Ceramic compositions {, i.e. synthetic inorganic polycrystalline compounds incl. epitaxial, quasi-crystalline materials}
- 41/1871 . . . . {Alkaline earth metal based oxides, e.g. barium titanates}
- 41/1873 . . . . {Alkali metal based oxides, e.g. lithium, sodium or potassium niobates}
- 41/1875 . . . . {Lead based oxides}
- 41/1876 . . . . . {Lead zirconate titanate based}
- 41/1878 . . . . {Bismuth based oxides}
- 41/193 . . . Macromolecular compositions {, e.g. piezo-electric polymers}
- 41/20 . . for magnetostrictive devices
- 41/22 . . Processes or apparatus specially adapted for the assembly, manufacture or treatment of piezo-electric or electrostrictive devices or of parts thereof
- 41/23 . . Forming enclosures or casings
- 41/25 . . Assembling devices that include piezo-electric or electrostrictive parts
- 41/253 . . Treating devices or parts thereof to modify a piezo-electric or electrostrictive property, e.g. polarisation characteristics, vibration characteristics or mode tuning
- 41/257 . . . by polarising
- 41/27 . . Manufacturing multilayered piezo-electric or electrostrictive devices or parts thereof, e.g. by stacking piezo-electric bodies and electrodes
- 41/273 . . . by integrally sintering piezo-electric or electrostrictive bodies and electrodes
- 41/277 . . . by stacking bulk piezo-electric or electrostrictive bodies and electrodes
- 41/29 . . Forming electrodes, leads or terminal arrangements
- 41/293 . . . Connection electrodes of multilayered piezo-electric or electrostrictive parts
- NOTE**
- Integral individual layer electrode and connection electrode are classified in both [H01L 41/293](#) and [H01L 41/297](#)
- 41/297 . . . Individual layer electrodes of multilayered piezo-electric or electrostrictive parts
- NOTE**
- Integral individual layer electrode and connection electrode are classified in both [H01L 41/293](#) and [H01L 41/297](#)
- 41/31 . . Applying piezo-electric or electrostrictive parts or bodies onto an electrical element or another base
- 41/311 . . . Mounting of piezo-electric or electrostrictive parts together with semiconductor elements, or other circuit elements, on a common substrate
- 41/312 . . . by laminating or bonding of piezo-electric or electrostrictive bodies
- 41/313 . . . . by metal fusing or with adhesives
- 41/314 . . . by depositing piezo-electric or electrostrictive layers, e.g. aerosol or screen printing
- 41/316 . . . . by vapour phase deposition
- 41/317 . . . . by liquid phase deposition
- 41/318 . . . . . by sol-gel deposition
- 41/319 . . . . using intermediate layers, e.g. for growth control
- 41/33 . . Shaping or machining of piezo-electric or electrostrictive bodies
- 41/331 . . . by coating or depositing using masks, e.g. lift-off
- 41/332 . . . by etching, e.g. lithography
- 41/333 . . . by moulding or extrusion
- 41/335 . . . by machining
- 41/337 . . . . by polishing or grinding
- 41/338 . . . . by cutting or dicing
- 41/339 . . . . by punching
- 41/35 . . Forming piezo-electric or electrostrictive materials
- 41/37 . . . Composite materials
- 41/39 . . . Inorganic materials
- 41/41 . . . . by melting
- 41/43 . . . . by sintering
- 41/45 . . . Organic materials
- 41/47 . . Processes or apparatus specially adapted for the assembly, manufacture or treatment of magnetostrictive devices or of parts thereof
- 43/00** **Devices using galvano-magnetic or similar magnetic effects; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); devices with potential-jump barrier, or surface barrier controllable by variation of a magnetic field [H01L 29/82](#))**
- 43/02 . . Details
- 43/04 . . of Hall-effect devices
- 43/06 . . Hall-effect devices
- 43/065 . . {Semiconductor Hall-effect devices}
- 43/08 . . Magnetic-field-controlled resistors
- 43/10 . . Selection of materials
- 43/12 . . Processes or apparatus peculiar to the manufacture or treatment of these devices or of parts thereof ([not peculiar thereto \[H01L 21/00\]\(#\)](#))
- 43/14 . . for Hall-effect devices

- 45/00 Solid state devices adapted for rectifying, amplifying, oscillating or switching without a potential-jump barrier or surface barrier, e.g. dielectric triodes; Ovshinsky-effect devices; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#); devices using superconductivity [H01L 39/00](#); piezo-electric devices [H01L 41/00](#); bulk negative resistance effect devices [H01L 47/00](#); {memories [G11C 11/34](#); [G11C 13/0002](#); amplifying circuits [H03F 11/00](#); pulse generation [H03K 3/02](#); electronic switching circuits [H03K 17/00](#); logic circuits [H03K 19/00](#))}**
- 45/005 . {Charge density wave transport devices}
  - 45/02 . Solid state travelling-wave devices
  - 45/04 . {Bistable or multistable switching devices, e.g. for resistance switching non-volatile memory}
  - 45/06 . . {based on solid-state phase change, e.g. between amorphous and crystalline phases, Ovshinsky effect}
  - 45/065 . . . {between different crystalline phases, e.g. cubic and hexagonal}
  - 45/08 . . {based on migration or redistribution of ionic species, e.g. anions, vacancies}
  - 45/085 . . . {the species being metal cations, e.g. programmable metallization cells}
  - 45/10 . . {based on bulk electronic defects, e.g. trapping of electrons}
  - 45/12 . . {Details}
  - 45/1206 . . . {Three or more terminal devices, e.g. transistor like devices}
  - 45/1213 . . . {Radiation or particle beam assisted switching devices, e.g. optically controlled devices}
  - 45/122 . . . {Device geometry}
  - 45/1226 . . . . {adapted for essentially horizontal current flow, e.g. bridge type devices}
  - 45/1233 . . . . {adapted for essentially vertical current flow, e.g. sandwich or pillar type devices}
  - 45/124 . . . . . {on sidewalls of dielectric structures, e.g. mesa or cup type devices}
  - 45/1246 . . . . {Further means within the switching material region to limit current flow, e.g. constrictions}
  - 45/1253 . . . {Electrodes}
  - 45/126 . . . . {adapted for resistive heating}
  - 45/1266 . . . . {adapted for supplying ionic species}
  - 45/1273 . . . . {adapted for electric field or current focusing, e.g. tip shaped}
  - 45/128 . . . {Thermal details}
  - 45/1286 . . . . {Heating or cooling means other than resistive heating electrodes, e.g. heater in parallel}
  - 45/1293 . . . . {Thermal insulation means}
  - 45/14 . . {Selection of switching materials}
  - 45/141 . . . {Compounds of sulfur, selenium or tellurium, e.g. chalcogenides}
  - 45/142 . . . . {Sulfides, e.g. CuS}
  - 45/143 . . . . {Selenides, e.g. GeSe}
  - 45/144 . . . . {Tellurides, e.g. GeSbTe}
  - 45/145 . . . {Oxides or nitrides}
  - 45/146 . . . . {Binary metal oxides, e.g. TaOx}
  - 45/147 . . . . {Complex metal oxides, e.g. perovskites, spinels}
  - 45/148 . . . {Other compounds of groups 13-15, e.g. elemental or compound semiconductors}
  - 45/149 . . . . {Carbon or carbides}
  - 45/16 . . {Manufacturing}
  - 45/1608 . . . {Formation of the switching material, e.g. layer deposition}
  - 45/1616 . . . . {by chemical vapor deposition, e.g. MOCVD, ALD}
  - 45/1625 . . . . {by physical vapor deposition, e.g. sputtering}
  - 45/1633 . . . . {by conversion of electrode material, e.g. oxidation}
  - 45/1641 . . . {Modification of the switching material, e.g. post-treatment, doping}
  - 45/165 . . . . {by implantation}
  - 45/1658 . . . . {by diffusion, e.g. photo-dissolution}
  - 45/1666 . . . {Patterning of the switching material}
  - 45/1675 . . . . {by etching of pre-deposited switching material layers, e.g. lithography}
  - 45/1683 . . . . {by filling of openings, e.g. damascene method}
  - 45/1691 . . . . {Patterning process specially adapted for achieving sub-lithographic dimensions, e.g. using spacers}
- 47/00 Bulk negative resistance effect devices, e.g. Gunn-effect devices; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof (devices consisting of a plurality of solid state components formed in or on a common substrate [H01L 27/00](#))**
- 47/005 . {Processes or apparatus peculiar to the manufacture or treatment of these devices or of parts thereof (not peculiar thereto [H01L 21/00](#))}
  - 47/02 . Gunn-effect devices {or transferred electron devices}
  - 47/023 . . {controlled by electromagnetic radiation}
  - 47/026 . . {Gunn diodes ([H01L 47/02](#) takes precedence)}
- 49/00 Solid state devices not provided for in groups [H01L 27/00](#) - [H01L 47/00](#) and [H01L 51/00](#) and not provided for in any other subclass; Processes or apparatus peculiar to the manufacture or treatment thereof or of parts thereof**
- 49/003 . {Devices using Mott metal-insulator transition, e.g. field effect transistors}
  - 49/006 . {Quantum devices, e.g. Quantum Interference Devices, Metal Single Electron Transistor (using semiconductors in the active part [H01L 29/00](#))}
  - 49/02 . Thin-film or thick-film devices
- 51/00 Solid state devices using organic materials as the active part, or using a combination of organic materials with other materials as the active part; Processes or apparatus specially adapted for the manufacture or treatment of such devices, or of parts thereof (devices consisting of a plurality of components formed in or on a common substrate [H01L 27/28](#); thermoelectric devices using organic material [H01L 35/00](#), [H01L 37/00](#); piezoelectric, electrostrictive or magnetostrictive elements using organic material [H01L 41/00](#))**

- 51/0001 . {Processes specially adapted for the manufacture or treatment of devices or of parts thereof ([multistep processes H01L 51/0098](#), [H01L 51/05](#), [H01L 51/42](#), [H01L 51/50](#))}
- 51/0002 . . {Deposition of organic semiconductor materials on a substrate}
- 51/0003 . . . {using liquid deposition, e.g. spin coating}
- 51/0004 . . . . {using printing techniques, e.g. ink-jet printing, screen printing}
- 51/0005 . . . . . {ink-jet printing}
- 51/0006 . . . . . {Electrolytic deposition using an external electrical current, e.g. in-situ electropolymerisation}
- 51/0007 . . . . . {characterised by the solvent}
- 51/0008 . . . {using physical deposition, e.g. sublimation, sputtering}
- 51/0009 . . . . {using laser ablation}
- 51/001 . . . . {Vacuum deposition}
- 51/0011 . . . . {selective deposition, e.g. using a mask}
- 51/0012 . . . {special provisions for the orientation or alignment of the layer to be deposited}
- 51/0013 . . . {using non liquid printing techniques, e.g. thermal transfer printing from a donor sheet}
- 51/0014 . . {for changing the shape of the device layer, e.g. patterning}
- 51/0015 . . . {by selective transformation of an existing layer}
- 51/0016 . . . {lift off techniques}
- 51/0017 . . . {etching of an existing layer}
- 51/0018 . . . . {using photolithographic techniques}
- 51/0019 . . . . {using printing techniques, e.g. applying the etch liquid using an ink jet printer}
- 51/002 . . {Making n- or p-doped regions}
- 51/0021 . . {Formation of conductors}
- 51/0022 . . . {using printing techniques, e.g. ink jet printing}
- 51/0023 . . . {Patterning of conductive layers}
- 51/0024 . . {for forming devices by joining two substrates together, e.g. lamination technique}
- 51/0025 . . {Purification process of the organic semiconductor material}
- 51/0026 . . {Thermal treatment of the active layer, e.g. annealing}
- 51/0027 . . . {using coherent electromagnetic radiation, e.g. laser annealing}
- 51/0028 . . . {Thermal treatment in the presence of solvent vapors, e.g. solvent annealing}
- 51/0029 . . {Special provisions for controlling the atmosphere during processing ([H01L 51/0026 takes precedence](#))}
- 51/003 . . {using a temporary substrate}
- 51/0031 . . {Testing, e.g. accelerated lifetime tests of photoelectric devices}
- 51/0032 . {Selection of organic semiconducting materials, e.g. organic light sensitive or organic light emitting materials}
- 51/0034 . . {Organic polymers or oligomers ([organic macromolecular compounds or compositions per se C08](#))}
- 51/0035 . . . {comprising aromatic, heteroaromatic, or aryllic chains, e.g. polyaniline ([per se C08G 73/026](#)), polyphenylene ([per se C08G 61/10](#)), polyphenylene vinylene ([per se C08G 61/02](#))}
- 51/0036 . . . . {Heteroaromatic compounds comprising sulfur or seleno, e.g. polythiophene ([per se C08G 61/126](#))}
- 51/0037 . . . . . {Polyethylene dioxythiophene [PEDOT] and derivatives}
- 51/0038 . . . . {Poly-phenylenevinylene and derivatives ([per se C08G 61/10](#))}
- 51/0039 . . . . {Polyfluorene and derivatives}
- 51/004 . . . {comprising aliphatic or olefinic chains, e.g. poly N-vinylcarbazol, PVC, PTFE}
- 51/0041 . . . . {Poly acetylene ([per se C08G 61/04](#), [C08F 38/02](#), [C08F 138/02](#), [C08F 238/02](#)) or derivatives}
- 51/0042 . . . . {poly N-vinylcarbazol and derivatives}
- 51/0043 . . . {Copolymers}
- 51/0044 . . . {Ladder-type polymers}
- 51/0045 . . {Carbon containing materials, e.g. carbon nanotubes, fullerenes ([per se C01B 32/15](#))}
- 51/0046 . . . {Fullerenes, e.g. C<sub>60</sub>, C<sub>70</sub>}
- 51/0047 . . . . {comprising substituents, e.g. PCBM}
- 51/0048 . . . {Carbon nanotubes}
- 51/0049 . . . . {comprising substituents}
- 51/005 . . {Macromolecular systems with low molecular weight, e.g. cyanine dyes, coumarine dyes, tetrathiafulvalene ([H01L 51/0045](#), [H01L 51/0077](#), [H01L 51/0093](#), [H01L 51/0094 take precedence](#))}
- 51/0051 . . . {Charge transfer complexes}
- 51/0052 . . . {Polycyclic condensed aromatic hydrocarbons, e.g. anthracene}
- 51/0053 . . . . {Aromatic anhydride or imide compounds, e.g. perylene tetra-carboxylic dianhydride, perylene tetracarboxylic diimide}
- 51/0054 . . . . . {containing four rings, e.g. pyrene}
- 51/0055 . . . . . {containing five rings, e.g. pentacene}
- 51/0056 . . . . . {containing six or more rings}
- 51/0057 . . . . . {containing at least one aromatic ring having 7 or more carbon atoms, e.g. azulene}
- 51/0058 . . . . . {containing more than one polycyclic condensed aromatic rings, e.g. bis-anthracene}
- 51/0059 . . . {Amine compounds having at least two aryl rest on at least one amine-nitrogen atom, e.g. triphenylamine ([per se C07C 211/00](#))}
- 51/006 . . . . {comprising polycyclic condensed aromatic hydrocarbons as substituents on the nitrogen atom}
- 51/0061 . . . . {comprising heteroaromatic hydrocarbons as substituents on the nitrogen atom}

**NOTE**

This group only covers the selection of organic materials for their electrical or other properties insofar as they are specific for their use in devices covered by the group [H01L 51/00](#).

For the materials [per se](#), [see](#) the relevant subclasses.

Attention is drawn to the following places:

- 51/0062 . . . {aromatic compounds comprising a hetero atom, e.g.: N,P,S}
- 2051/0063 . . . . {Oxadiazole Compounds}
- 51/0064 . . . . {Cyanine Dyes}
- 51/0065 . . . . {comprising only oxygen as heteroatom}
- 51/0067 . . . . {comprising only nitrogen as heteroatom (H01L 51/0064 takes precedence)}
- 51/0068 . . . . {comprising only sulfur as heteroatom}
- 51/0069 . . . . {comprising two or more different heteroatoms per ring, e.g. S and N (H01L 51/0064 takes precedence)}
- 51/007 . . . . . {oxadiazole compounds}
- 51/0071 . . . . {Polycyclic condensed heteroaromatic hydrocarbons}
- 51/0072 . . . . . {comprising only nitrogen in the heteroaromatic polycondensed ringsystem, e.g. phenanthroline, carbazole}
- 51/0073 . . . . . {comprising only oxygen in the heteroaromatic polycondensed ringsystem, e.g. cumarine dyes}
- 51/0074 . . . . . {comprising only sulfur in the heteroaromatic polycondensed ringsystem, e.g. benzothiophene}
- 51/0075 . . {Langmuir Blodgett films (per se B05D 1/202)}
- 51/0076 . . {Liquid crystalline materials (per se C09K 19/00)}
- 51/0077 . . {Coordination compounds, e.g. porphyrin}
- 51/0078 . . . {Phthalocyanine (per se C09B 47/04)}
- 51/0079 . . . {Metal complexes comprising a IIIB-metal (B, Al, Ga, In or Tl), e.g. Tris (8-hydroxyquinoline) gallium (Gaq<sub>3</sub>)}
- 51/008 . . . . . {comprising boron}
- 51/0081 . . . . . {comprising aluminium, e.g. Alq<sub>3</sub>}
- 51/0082 . . . . . {comprising gallium}
- 51/0083 . . . {Metal complexes comprising an iron-series metal, e.g. Fe, Co, Ni}
- 51/0084 . . . {Transition metal complexes, e.g. Ru(II)polypyridine complexes}
- 51/0085 . . . . . {comprising Iridium}
- 51/0086 . . . . . {comprising Ruthenium}
- 51/0087 . . . . . {comprising platinum}
- 51/0088 . . . . . {comprising osmium}
- 51/0089 . . . {Metal complexes comprising Lanthanides or Actinides, e.g. Eu}
- 51/009 . . . {Polynuclear complexes, i.e. complexes having two or more metal centers}
- 51/0091 . . . {Metal complexes comprising a IB-metal (Cu, Ag, Au)}
- 51/0092 . . . {Metal complexes comprising a IIB-metal (Zn, Cd, Hg)}
- 51/0093 . . . {Biomolecules or bio-macromolecules, e.g. proteins, ATP, chlorophyl, beta-carotene, lipids, enzymes}
- 51/0094 . . . {Silicon-containing organic semiconductors}
- 51/0095 . . . {Starburst compounds}
- 51/0096 . . . {Substrates}
- 51/0097 . . . {flexible substrates}
- 51/0098 . . . {Molecular electronic devices (molecular computers G06F 15/80; molecular memories G11C 11/00, G11C 13/02)}
- 51/05 . . . specially adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential- jump barrier or surface barrier {multistep processes for their manufacture}
- 51/0504 . . . {the devices being controllable only by the electric current supplied or the electric potential applied, to an electrode which does not carry the current to be rectified, amplified or switched, e.g. three-terminal devices}
- 51/0508 . . . . {Field-effect devices, e.g. TFTs}
- 51/0512 . . . . . {insulated gate field effect transistors}
- 51/0516 . . . . . {characterised by the gate dielectric}
- 51/052 . . . . . {the gate dielectric comprising only organic materials}
- 51/0525 . . . . . {the gate dielectric comprising only inorganic materials}
- 51/0529 . . . . . {the gate dielectric having a multilayered structure}
- 51/0533 . . . . . {Combinations of organic and inorganic layers}
- 51/0537 . . . . . {the gate dielectric comprising composite materials, e.g. TiO<sub>2</sub> particles in a polymer matrix}
- 51/0541 . . . . . {Lateral single gate single channel transistors with non inverted structure, i.e. the organic semiconductor layer is formed before the gate electrode}
- 51/0545 . . . . . {Lateral single gate single channel transistors with inverted structure, i.e. the organic semiconductor layer is formed after the gate electrode}
- 51/055 . . . . . {characterised by the gate conductor}
- 51/0554 . . . . . {the transistor having two or more gate electrodes}
- 51/0558 . . . . . {characterised by the channel of the transistor}
- 51/0562 . . . . . {the channel comprising two or more active layers, e.g. forming pn - hetero junction}
- 51/0566 . . . . . {the channel comprising a composite layer, e.g. a mixture of donor and acceptor moieties, forming pn - bulk hetero junction}
- 51/057 . . . . . {having a vertical structure, e.g. vertical carbon nanotube field effect transistors [CNT-FETs]}
- 51/0575 . . . {the devices being controllable only by variation of the electric current supplied or the electric potential applied, to one or more of the electrodes carrying the current to be rectified, amplified, oscillated or switched, e.g. two-terminal devices}
- 51/0579 . . . . {Schottky diodes}
- 51/0583 . . . . {comprising an organic/organic junction, e.g. hetero-junction}
- 51/0587 . . . . {comprising an organic/inorganic hetero-junction, e.g. hetero-junction}
- 51/0591 . . . . {Bi-stable switching devices}
- 51/0595 . . . . {molecular electronic devices (molecular computers G06F 15/80; molecular memories G11C 11/00, G11C 13/02)}
- 51/10 . . . Details of devices
- 51/102 . . . . {Electrodes}
- 51/105 . . . . . {Ohmic contacts, e.g. source and drain electrodes}
- 51/107 . . . . {Passivation, containers, encapsulations}

- 51/42 . . . specially adapted for sensing infra-red radiation, light, electro-magnetic radiation of shorter wavelength or corpuscular radiation and adapted for the conversion of the energy of such radiation into electrical energy or for the control of electrical energy by such radiation {using organic materials as the active part, or using a combination of organic materials with other material as the active part; Multistep processes for their manufacture}
- 51/4206 . . . {Metal-organic semiconductor-metal devices}
- 51/4213 . . . {Comprising organic semiconductor-inorganic semiconductor hetero-junctions ([H01L 51/4253](#) takes precedence)}
- 51/422 . . . . {Majority carrier devices using sensitisation of widebandgap semiconductors, e.g. TiO<sub>2</sub> (photoelectrochemical devices with a liquid or solid electrolyte [H01G 9/20](#))}
- 51/4226 . . . . {the wideband gap semiconductor comprising titanium oxide, e.g. TiO<sub>2</sub>}
- 51/4233 . . . . {the wideband gap semiconductor comprising zinc oxide, e.g. ZnO}
- 51/424 . . . {comprising organic semiconductor-organic semiconductor hetero-junctions ([H01L 51/4253](#) takes precedence)}
- 51/4246 . . . . {comprising multi-junctions, e.g. double hetero-junctions}
- 51/4253 . . . {comprising bulk hetero-junctions, e.g. interpenetrating networks}
- 51/426 . . . . {comprising inorganic nanostructures, e.g. CdSe nanoparticles}
- 51/4266 . . . . {the inorganic nanostructures being nanotubes or nanowires, e.g. CdTe nanotubes in P3HT}
- 51/4273 . . . . {comprising blocking layers, e.g. exciton blocking layers}
- 51/428 . . . {light sensitive field effect devices}
- 51/4286 . . . {Devices having a m-i-s structure}
- 51/4293 . . . {Devices having a p-i-n structure}
- 51/44 . . . Details of devices
- 51/441 . . . . {Electrodes}
- 51/442 . . . . . {transparent electrodes, e.g. ITO, TCO}
- 51/444 . . . . . {comprising carbon nanotubes}
- 51/445 . . . . . {comprising arrangements for extracting the current from the cell, e.g. metal finger grid systems to reduce the serial resistance of transparent electrodes}
- 51/447 . . . . {Light trapping means}
- 51/448 . . . . {Passivation, containers, encapsulations}
- 51/50 . . . specially adapted for light emission, e.g. organic light emitting diodes [OLED] or polymer light emitting devices [PLED]; (organic semiconductor lasers [H01S 5/36](#); {circuit arrangements for OLED or PLED [H05B 33/0896](#); control arrangements for organic electroluminescent displays [G09G 3/3208](#))}
- 51/5004 . . . {characterised by the interrelation between parameters of constituting active layers, e.g. HOMO-LUMO relation}
- 51/5008 . . . {Intermediate layers comprising a mixture of materials of the adjoining active layers}
- 51/5012 . . . {Electroluminescent [EL] layer}
- 51/5016 . . . . {Triplet emission}
- 51/502 . . . . {comprising active inorganic nanostructures, e.g. luminescent quantum dots}
- 51/5024 . . . . {having a host comprising an emissive dopant and further additive materials, e.g. for improving the dispersability, for improving the stabilisation, for assisting energy transfer}
- 51/5028 . . . . . {for assisting energy transfer, e.g. sensitization}
- 51/5032 . . . . {Light emitting electrochemical cells [LEC], i.e. with mobile ions in the active layer}
- 51/5036 . . . . {Multi-colour light emission, e.g. colour tuning, polymer blend, stack of electroluminescent layers}
- 51/504 . . . . . {Stack of electroluminescent layers}
- 51/5044 . . . . . {with spacer layers between the emissive layers}
- 51/5048 . . . . {Carrier transporting layer}
- 51/5052 . . . . {Doped transporting layer}
- 51/5056 . . . . {Hole transporting layer}
- 51/506 . . . . . {comprising a dopant}
- 51/5064 . . . . . {having a multilayered structure}
- 51/5068 . . . . . {arranged between the light emitting layer and the cathode}
- 51/5072 . . . . {Electron transporting layer}
- 51/5076 . . . . . {comprising a dopant}
- 51/508 . . . . . {having a multilayered structure}
- 51/5084 . . . . . {arranged between the light emitting layer and the anode}
- 51/5088 . . . . {Carrier injection layer}
- 51/5092 . . . . {Electron injection layer}
- 51/5096 . . . . {Carrier blocking layer}
- 51/52 . . . Details of devices
- 51/5203 . . . . {Electrodes}
- 51/5206 . . . . . {Anodes, i.e. with high work-function material}
- WARNING**
- Groups [H01L 51/5209](#) – [H01L 51/5218](#) are incomplete pending reclassification of documents from group [H01L 51/5206](#).
- Groups [H01L 51/5209](#) – [H01L 51/5218](#) and [H01L 51/5206](#) should be considered in order to perform a complete search.
- 51/5209 . . . . . {characterised by the shape}
- 51/5212 . . . . . {combined with auxiliary electrode, e.g. ITO layer combined with metal lines}
- 51/5215 . . . . . {composed of transparent multilayers}
- 51/5218 . . . . . {Reflective anodes, e.g. ITO combined with thick metallic layer}
- 51/5221 . . . . . {Cathodes, i.e. with low work-function material}
- WARNING**
- Groups [H01L 51/5225](#) – [H01L 51/5234](#) are incomplete pending reclassification of documents from group [H01L 51/5221](#).
- Groups [H01L 51/5225](#) – [H01L 51/5234](#) and [H01L 51/5221](#) should be considered in order to perform a complete search.
- 51/5225 . . . . . {characterised by the shape}
- 51/5228 . . . . . {combined with auxiliary electrodes}
- 51/5231 . . . . . {composed of opaque multilayers}
- 51/5234 . . . . . {Transparent, e.g. including thin metal film}



- 51/5237 . . . {Passivation; Containers; Encapsulation, e.g. against humidity}
- WARNING**
- Groups [H01L 51/524](#) – [H01L 51/5259](#) are incomplete pending reclassification of documents from group [H01L 51/5237](#).
- Groups [H01L 51/524](#) – [H01L 51/5259](#) and [H01L 51/5237](#) should be considered in order to perform a complete search.
- 51/524 . . . . {Sealing arrangements having a self-supporting structure, e.g. containers}
- 51/5243 . . . . . {the sealing arrangements being made of metallic material}
- 51/5246 . . . . . {characterised by the peripheral sealing arrangements, e.g. adhesives, sealants}
- 51/525 . . . . . {Vertical spacers, e.g. arranged between the sealing arrangement and the OLED}
- 51/5253 . . . . . {Protective coatings}
- 51/5256 . . . . . {having repetitive multilayer structures}
- 51/5259 . . . . . {including getter material or desiccant}
- 51/5262 . . . {Arrangements for extracting light from the device}
- 51/5265 . . . . . {comprising a resonant cavity structure, e.g. Bragg reflector pair}
- 51/5268 . . . . . {Scattering means}
- 51/5271 . . . . . {Reflective means}
- 51/5275 . . . . . {Refractive means, e.g. lens}
- 51/5278 . . . . . {comprising a repetitive electroluminescent unit between one set of electrodes}
- 51/5281 . . . {Arrangements for contrast improvement, e.g. preventing reflection of ambient light}
- 51/5284 . . . . . {comprising a light absorbing layer, e.g. black layer}
- 51/5287 . . . {OLED having a fiber structure}
- 51/529 . . . {Arrangements for heating or cooling}
- 51/5293 . . . {Arrangements for polarized light emission ([H01L 51/5281](#) takes precedence)}
- 51/5296 . . . {Light emitting organic transistors}
- 51/56 . . Processes or apparatus specially adapted for the manufacture or treatment of such devices or of parts thereof
- 2221/00** **Processes or apparatus adapted for the manufacture or treatment of semiconductor or solid state devices or of parts thereof covered by [H01L 21/00](#)**
- 2221/10 . . Applying interconnections to be used for carrying current between separate components within a device
- 2221/1005 . . Formation and after-treatment of dielectrics
- 2221/101 . . . Forming openings in dielectrics
- 2221/1015 . . . . for dual damascene structures
- 2221/1021 . . . . . Pre-forming the dual damascene structure in a resist layer
- 2221/1026 . . . . . the via being formed by burying a sacrificial pillar in the dielectric and removing the pillar
- 2221/1031 . . . . . Dual damascene by forming vias in the via-level dielectric prior to deposition of the trench-level dielectric
- 2221/1036 . . . . . Dual damascene with different via-level and trench-level dielectrics
- 2221/1042 . . . the dielectric comprising air gaps
- 2221/1047 . . . . the air gaps being formed by pores in the dielectric
- 2221/1052 . . . Formation of thin functional dielectric layers
- 2221/1057 . . . . in via holes or trenches
- 2221/1063 . . . . . Sacrificial or temporary thin dielectric films in openings in a dielectric
- 2221/1068 . . Formation and after-treatment of conductors
- 2221/1073 . . . Barrier, adhesion or liner layers
- 2221/1078 . . . . Multiple stacked thin films not being formed in openings in dielectrics
- 2221/1084 . . . . Layers specifically deposited to enhance or enable the nucleation of further layers, i.e. seed layers
- 2221/1089 . . . . . Stacks of seed layers
- 2221/1094 . . . Conducting structures comprising nanotubes or nanowires
- 2221/67 . . Apparatus for handling semiconductor or electric solid state devices during manufacture or treatment thereof; Apparatus for handling wafers during manufacture or treatment of semiconductor or electric solid state devices or components; Apparatus not specifically provided for elsewhere
- 2221/683 . . for supporting or gripping
- 2221/68304 . . . using temporarily an auxiliary support
- 2221/68309 . . . . Auxiliary support including alignment aids
- 2221/68313 . . . . Auxiliary support including a cavity for storing a finished device, e.g. IC package, or a partly finished device, e.g. die, during manufacturing or mounting
- 2221/68318 . . . . Auxiliary support including means facilitating the separation of a device or wafer from the auxiliary support
- 2221/68322 . . . . . Auxiliary support including means facilitating the selective separation of some of a plurality of devices from the auxiliary support
- 2221/68327 . . . . . used during dicing or grinding
- 2221/68331 . . . . . of passive members, e.g. die mounting substrate
- 2221/68336 . . . . . involving stretching of the auxiliary support post dicing
- 2221/6834 . . . . . used to protect an active side of a device or wafer
- 2221/68345 . . . . . used as a support during the manufacture of self supporting substrates
- 2221/6835 . . . . . used as a support during build up manufacturing of active devices
- 2221/68354 . . . . . used to support diced chips prior to mounting
- 2221/68359 . . . . . used as a support during manufacture of interconnect decals or build up layers
- 2221/68363 . . . . . used in a transfer process involving transfer directly from an origin substrate to a target substrate without use of an intermediate handle substrate
- 2221/68368 . . . . . used in a transfer process involving at least two transfer steps, i.e. including an intermediate handle substrate
- 2221/68372 . . . . . used to support a device or wafer when forming electrical connections thereto ([when forming bonding pads \[H01L 24/03\]\(#\); when forming bump connectors \[H01L 24/11\]\(#\); when forming layer connectors \[H01L 24/27\]\(#\)](#))

- 2221/68377 . . . . with parts of the auxiliary support remaining in the finished device
- 2221/68381 . . . . Details of chemical or physical process used for separating the auxiliary support from a device or wafer
- 2221/68386 . . . . . Separation by peeling
- 2221/6839 . . . . . using peeling wedge or knife or bar
- 2221/68395 . . . . . using peeling wheel
- 2223/00** **Details relating to semiconductor or other solid state devices covered by the group [H01L 23/00](#)**
- 2223/544 . . Marks applied to semiconductor devices or parts
- 2223/54406 . . comprising alphanumeric information
- 2223/54413 . . comprising digital information, e.g. bar codes, data matrix
- 2223/5442 . . comprising non digital, non alphanumeric information, e.g. symbols
- 2223/54426 . . for alignment
- 2223/54433 . . containing identification or tracking information
- 2223/5444 . . . for electrical read out
- 2223/54446 . . . Wireless electrical read out
- 2223/54453 . . for use prior to dicing
- 2223/5446 . . . Located in scribe lines
- 2223/54466 . . . Located in a dummy or reference die
- 2223/54473 . . for use after dicing
- 2223/5448 . . . Located on chip prior to dicing and remaining on chip after dicing
- 2223/54486 . . . Located on package parts, e.g. encapsulation, leads, package substrate
- 2223/54493 . . Peripheral marks on wafers, e.g. orientation flats, notches, lot number
- 2223/58 . . Structural electrical arrangements for semiconductor devices not otherwise provided for
- 2223/64 . . Impedance arrangements
- 2223/66 . . . High-frequency adaptations
- 2223/6605 . . . . High-frequency electrical connections
- 2223/6611 . . . . . Wire connections
- 2223/6616 . . . . . Vertical connections, e.g. vias
- 2223/6622 . . . . . Coaxial feed-throughs in active or passive substrates
- 2223/6627 . . . . . Waveguides, e.g. microstrip line, strip line, coplanar line
- 2223/6633 . . . . . Transition between different waveguide types
- 2223/6638 . . . . . Differential pair signal lines
- 2223/6644 . . . . Packaging aspects of high-frequency amplifiers ([amplifiers per se H03F](#))
- 2223/665 . . . . . Bias feed arrangements
- 2223/6655 . . . . . Matching arrangements, e.g. arrangement of inductive and capacitive components
- 2223/6661 . . . . for passive devices ([passive components per se H01L 28/00](#))
- 2223/6666 . . . . . for decoupling, e.g. bypass capacitors
- 2223/6672 . . . . . for integrated passive components, e.g. semiconductor device with passive components only ([integrated circuits with passive components only per se H01L 27/01](#))
- 2223/6677 . . . . . for antenna, e.g. antenna included within housing of semiconductor device ([antennas per se H01Q](#))
- 2223/6683 . . . . for monolithic microwave integrated circuit [MMIC]
- 2223/6688 . . . . Mixed frequency adaptations, i.e. for operation at different frequencies
- 2223/6694 . . . . Optical signal interface included within high-frequency semiconductor device housing
- 2224/00** **Indexing scheme for arrangements for connecting or disconnecting semiconductor or solid-state bodies and methods related thereto as covered by [H01L 24/00](#)**
- 2224/01 . . Means for bonding being attached to, or being formed on, the surface to be connected, e.g. chip-to-package, die-attach, "first-level" interconnects; Manufacturing methods related thereto
- 2224/02 . . Bonding areas; Manufacturing methods related thereto
- 2224/0212 . . . Auxiliary members for bonding areas, e.g. spacers
- 2224/02122 . . . . being formed on the semiconductor or solid-state body
- 2224/02123 . . . . . inside the bonding area
- 2224/02125 . . . . . Reinforcing structures
- 2224/02126 . . . . . Collar structures
- 2224/0213 . . . . . Alignment aids
- 2224/02135 . . . . . Flow barrier
- 2224/0214 . . . . . Structure of the auxiliary member
- 2224/02141 . . . . . Multilayer auxiliary member
- 2224/02145 . . . . . Shape of the auxiliary member
- 2224/0215 . . . . . Material of the auxiliary member
- 2224/02163 . . . . . on the bonding area
- 2224/02165 . . . . . Reinforcing structures
- 2224/02166 . . . . . Collar structures
- 2224/0217 . . . . . Alignment aids
- 2224/02175 . . . . . Flow barrier
- 2224/0218 . . . . . Structure of the auxiliary member
- 2224/02181 . . . . . Multilayer auxiliary member
- 2224/02185 . . . . . Shape of the auxiliary member
- 2224/0219 . . . . . Material of the auxiliary member
- 2224/022 . . . . . Protective coating, i.e. protective bond-through coating
- 2224/02205 . . . . . Structure of the protective coating
- 2224/02206 . . . . . Multilayer protective coating
- 2224/0221 . . . . . Shape of the protective coating
- 2224/02215 . . . . . Material of the protective coating
- 2224/02233 . . . . . not in direct contact with the bonding area
- 2224/02235 . . . . . Reinforcing structures
- 2224/0224 . . . . . Alignment aids
- 2224/02245 . . . . . Flow barrier
- 2224/0225 . . . . . Structure of the auxiliary member
- 2224/02251 . . . . . Multilayer auxiliary member
- 2224/02255 . . . . . Shape of the auxiliary member
- 2224/0226 . . . . . Material of the auxiliary member
- 2224/023 . . . Redistribution layers [RDL] for bonding areas
- 2224/0231 . . . . Manufacturing methods of the redistribution layers
- 2224/02311 . . . . . Additive methods
- 2224/02313 . . . . . Subtractive methods
- 2224/02315 . . . . . Self-assembly processes
- 2224/02317 . . . . . by local deposition
- 2224/02319 . . . . . by using a preform
- 2224/02321 . . . . . Reworking
- 2224/0233 . . . . Structure of the redistribution layers
- 2224/02331 . . . . . Multilayer structure
- 2224/02333 . . . . . being a bump

- 2224/02335 . . . . . Free-standing redistribution layers
- 2224/0235 . . . . . Shape of the redistribution layers
- 2224/02351 . . . . . comprising interlocking features
- 2224/0236 . . . . . Shape of the insulating layers therebetween
- 2224/0237 . . . . . Disposition of the redistribution layers
- 2224/02371 . . . . . connecting the bonding area on a surface of the semiconductor or solid-state body with another surface of the semiconductor or solid-state body
- 2224/02372 . . . . . connecting to a via connection in the semiconductor or solid-state body
- 2224/02373 . . . . . Layout of the redistribution layers
- 2224/02375 . . . . . Top view
- 2224/02377 . . . . . Fan-in arrangement
- 2224/02379 . . . . . Fan-out arrangement
- 2224/02381 . . . . . Side view
- 2224/0239 . . . . . Material of the redistribution layers
- 2224/024 . . . . . Material of the insulating layers therebetween
- 2224/03 . . . . . Manufacturing methods
- 2224/03001 . . . . . Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/03002 . . . . . for supporting the semiconductor or solid-state body
- 2224/03003 . . . . . for holding or transferring a preform
- 2224/03005 . . . . . for aligning the bonding area, e.g. marks, spacers
- 2224/03009 . . . . . for protecting parts during manufacture
- 2224/03011 . . . . . Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature
- 2224/03013 . . . . . for holding or confining the bonding area, e.g. solder flow barrier
- 2224/03015 . . . . . for aligning the bonding area, e.g. marks, spacers
- 2224/03019 . . . . . for protecting parts during the process
- 2224/031 . . . . . Manufacture and pre-treatment of the bonding area preform
- 2224/0311 . . . . . Shaping
- 2224/0312 . . . . . Applying permanent coating
- 2224/033 . . . . . by local deposition of the material of the bonding area
- 2224/0331 . . . . . in liquid form
- 2224/03312 . . . . . Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion
- 2224/03318 . . . . . by dispensing droplets
- 2224/0332 . . . . . Screen printing, i.e. using a stencil
- 2224/0333 . . . . . in solid form
- 2224/03332 . . . . . using a powder
- 2224/03334 . . . . . using a preform
- 2224/034 . . . . . by blanket deposition of the material of the bonding area
- 2224/0341 . . . . . in liquid form
- 2224/03416 . . . . . Spin coating
- 2224/03418 . . . . . Spray coating
- 2224/0342 . . . . . Curtain coating
- 2224/03422 . . . . . by dipping, e.g. in a solder bath ([hot-dipping C23C 2/00](#))
- 2224/03424 . . . . . Immersion coating, e.g. in a solder bath ([immersion processes C23C 2/00](#))
- 2224/03426 . . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
- 2224/03428 . . . . . Wave coating
- 2224/0343 . . . . . in solid form
- 2224/03436 . . . . . Lamination of a preform, e.g. foil, sheet or layer
- 2224/03438 . . . . . the preform being at least partly pre-patterned
- 2224/0344 . . . . . by transfer printing
- 2224/03442 . . . . . using a powder
- 2224/03444 . . . . . in gaseous form
- 2224/0345 . . . . . Physical vapour deposition [PVD], e.g. evaporation, or sputtering
- 2224/03452 . . . . . Chemical vapour deposition [CVD], e.g. laser CVD
- 2224/0346 . . . . . Plating
- 2224/03462 . . . . . Electroplating
- 2224/03464 . . . . . Electroless plating
- 2224/03466 . . . . . Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface
- 2224/0347 . . . . . using a lift-off mask
- 2224/03472 . . . . . Profile of the lift-off mask
- 2224/03474 . . . . . Multilayer masks
- 2224/0348 . . . . . Permanent masks, i.e. masks left in the finished device, e.g. passivation layers
- 2224/035 . . . . . by chemical or physical modification of a pre-existing or pre-deposited material
- 2224/03502 . . . . . Pre-existing or pre-deposited material
- 2224/03505 . . . . . Sintering
- 2224/0351 . . . . . Anodisation
- 2224/03515 . . . . . Curing and solidification, e.g. of a photosensitive material
- 2224/0352 . . . . . Self-assembly, e.g. self-agglomeration of the material in a fluid
- 2224/03522 . . . . . Auxiliary means therefor, e.g. for self-assembly activation
- 2224/03524 . . . . . with special adaptation of the surface of the body to be connected or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process
- 2224/0355 . . . . . Selective modification
- 2224/03552 . . . . . using a laser or a focussed ion beam [FIB]
- 2224/03554 . . . . . Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin
- 2224/036 . . . . . by patterning a pre-deposited material ([treatment of parts prior to assembly of the devices H01L 21/48](#))
- 2224/03602 . . . . . Mechanical treatment, e.g. polishing, grinding
- 2224/0361 . . . . . Physical or chemical etching
- 2224/03612 . . . . . by physical means only
- 2224/03614 . . . . . by chemical means only
- 2224/03616 . . . . . Chemical mechanical polishing [CMP]
- 2224/03618 . . . . . with selective exposure, development and removal of a photosensitive material, e.g. of a photosensitive conductive resin
- 2224/0362 . . . . . Photolithography
- 2224/03622 . . . . . using masks
- 2224/0363 . . . . . using a laser or a focused ion beam [FIB]

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- 2224/03632 . . . . . Ablation by means of a laser or focused ion beam [FIB]
- 2224/037 . . . . . involving monitoring, e.g. feedback loop
- 2224/038 . . . . . Post-treatment of the bonding area
- 2224/0381 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/0382 . . . . . Applying permanent coating, e.g. in-situ coating
- 2224/03821 . . . . . Spray coating
- 2224/03822 . . . . . by dipping, e.g. in a solder bath
- 2224/03823 . . . . . Immersion coating, e.g. in a solder bath
- 2224/03824 . . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
- 2224/03825 . . . . . Plating, e.g. electroplating, electroless plating
- 2224/03826 . . . . . Physical vapour deposition [PVD], e.g. evaporation, or sputtering
- 2224/03827 . . . . . Chemical vapour deposition [CVD], e.g. laser CVD
- 2224/03828 . . . . . Applying flux
- 2224/03829 . . . . . Applying a precursor material
- 2224/0383 . . . . . Reworking, e.g. shaping ([reflowing H01L 2224/03849](#))
- 2224/03831 . . . . . involving a chemical process, e.g. etching the bonding area
- 2224/0384 . . . . . involving a mechanical process, e.g. planarising the bonding area
- 2224/03845 . . . . . Chemical mechanical polishing [CMP]
- 2224/03848 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/03849 . . . . . Reflowing
- 2224/039 . . . . . Methods of manufacturing bonding areas involving a specific sequence of method steps
- 2224/03901 . . . . . with repetition of the same manufacturing step
- 2224/03902 . . . . . Multiple masking steps
- 2224/03903 . . . . . using different masks
- 2224/03906 . . . . . with modification of the same mask
- 2224/0391 . . . . . Forming a passivation layer after forming the bonding area
- 2224/03912 . . . . . the bump being used as a mask for patterning the bonding area
- 2224/03914 . . . . . the bonding area, e.g. under bump metallisation [UBM], being used as a mask for patterning other parts
- 2224/03916 . . . . . a passivation layer being used as a mask for patterning the bonding area
- 2224/0392 . . . . . specifically adapted to include a probing step
- 2224/03921 . . . . . by repairing the bonding area damaged by the probing step
- 2224/04 . . . . . Structure, shape, material or disposition of the bonding areas prior to the connecting process
- 2224/0401 . . . . . Bonding areas specifically adapted for bump connectors, e.g. under bump metallisation [UBM]
- 2224/04026 . . . . . Bonding areas specifically adapted for layer connectors
- 2224/04034 . . . . . Bonding areas specifically adapted for strap connectors
- 2224/04042 . . . . . Bonding areas specifically adapted for wire connectors, e.g. wirebond pads
- 2224/0405 . . . . . Bonding areas specifically adapted for tape automated bonding [TAB] connectors
- 2224/04073 . . . . . Bonding areas specifically adapted for connectors of different types
- 2224/04105 . . . . . Bonding areas formed on an encapsulation of the semiconductor or solid-state body, e.g. bonding areas on chip-scale packages
- 2224/05 . . . . . of an individual bonding area
- 2224/05001 . . . . . Internal layers
- 2224/05005 . . . . . Structure
- 2224/05006 . . . . . Dual damascene structure
- 2224/05007 . . . . . comprising a core and a coating
- 2224/05008 . . . . . Bonding area integrally formed with a redistribution layer on the semiconductor or solid-state body, e.g.
- 2224/05009 . . . . . Bonding area integrally formed with a via connection of the semiconductor or solid-state body
- 2224/0501 . . . . . Shape
- 2224/05011 . . . . . comprising apertures or cavities
- 2224/05012 . . . . . in top view
- 2224/05013 . . . . . being rectangular
- 2224/05014 . . . . . being square
- 2224/05015 . . . . . being circular or elliptical
- 2224/05016 . . . . . in side view
- 2224/05017 . . . . . comprising protrusions or indentations
- 2224/05018 . . . . . being a conformal layer on a patterned surface
- 2224/05019 . . . . . being a non conformal layer on a patterned surface
- 2224/0502 . . . . . Disposition
- 2224/05022 . . . . . the internal layer being at least partially embedded in the surface
- 2224/05023 . . . . . the whole internal layer protruding from the surface
- 2224/05024 . . . . . the internal layer being disposed on a redistribution layer on the semiconductor or solid-state body
- 2224/05025 . . . . . the internal layer being disposed on a via connection of the semiconductor or solid-state body
- 2224/05026 . . . . . the internal layer being disposed in a recess of the surface
- 2224/05027 . . . . . the internal layer extending out of an opening
- 2224/05073 . . . . . Single internal layer
- 2224/05075 . . . . . Plural internal layers
- 2224/05076 . . . . . being mutually engaged together, e.g. through inserts
- 2224/05078 . . . . . being disposed next to each other, e.g. side-to-side arrangements
- 2224/0508 . . . . . being stacked
- 2224/05082 . . . . . Two-layer arrangements
- 2224/05083 . . . . . Three-layer arrangements
- 2224/05084 . . . . . Four-layer arrangements
- 2224/05085 . . . . . with additional elements, e.g. vias arrays, interposed between the stacked layers
- 2224/05086 . . . . . Structure of the additional element

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2224/05087	. . . . .	being a via with at least a lining layer	2224/05157	. . . . .	Cobalt [Co] as principal constituent
2224/05088	. . . . .	Shape of the additional element	2224/0516	. . . . .	Iron [Fe] as principal constituent
2224/05089	. . . . .	Disposition of the additional element	2224/05163	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/0509	. . . . .	of a single via	2224/05164	. . . . .	Palladium [Pd] as principal constituent
2224/05091	. . . . .	at the center of the internal layers	2224/05166	. . . . .	Titanium [Ti] as principal constituent
2224/05092	. . . . .	at the periphery of the internal layers	2224/05169	. . . . .	Platinum [Pt] as principal constituent
2224/05093	. . . . .	of a plurality of vias	2224/0517	. . . . .	Zirconium [Zr] as principal constituent
2224/05094	. . . . .	at the center of the internal layers	2224/05171	. . . . .	Chromium [Cr] as principal constituent
2224/05095	. . . . .	at the periphery of the internal layers	2224/05172	. . . . .	Vanadium [V] as principal constituent
2224/05096	. . . . .	Uniform arrangement, i.e. array	2224/05173	. . . . .	Rhodium [Rh] as principal constituent
2224/05097	. . . . .	Random arrangement	2224/05176	. . . . .	Ruthenium [Ru] as principal constituent
2224/05098	. . . . .	Material of the additional element	2224/05178	. . . . .	Iridium [Ir] as principal constituent
2224/05099	. . . . .	Material	2224/05179	. . . . .	Niobium [Nb] as principal constituent
2224/051	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/0518	. . . . .	Molybdenum [Mo] as principal constituent
2224/05101	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/05181	. . . . .	Tantalum [Ta] as principal constituent
2224/05105	. . . . .	Gallium [Ga] as principal constituent	2224/05183	. . . . .	Rhenium [Re] as principal constituent
2224/05109	. . . . .	Indium [In] as principal constituent	2224/05184	. . . . .	Tungsten [W] as principal constituent
2224/05111	. . . . .	Tin [Sn] as principal constituent	2224/05186	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05113	. . . . .	Bismuth [Bi] as principal constituent	2224/05187	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05188</a> )
2224/05114	. . . . .	Thallium [Tl] as principal constituent	2224/05188	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05116	. . . . .	Lead [Pb] as principal constituent	2224/0519	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05117	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05191	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05118	. . . . .	Zinc [Zn] as principal constituent	2224/05193	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/051</a> - <a href="#">H01L 2224/05191</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/0512	. . . . .	Antimony [Sb] as principal constituent	2224/05194	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/051</a> - <a href="#">H01L 2224/05191</a>
2224/05123	. . . . .	Magnesium [Mg] as principal constituent	2224/05195	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/051</a> - <a href="#">H01L 2224/05191</a>
2224/05124	. . . . .	Aluminium [Al] as principal constituent			
2224/05138	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C			
2224/05139	. . . . .	Silver [Ag] as principal constituent			
2224/05144	. . . . .	Gold [Au] as principal constituent			
2224/05147	. . . . .	Copper [Cu] as principal constituent			
2224/05149	. . . . .	Manganese [Mn] as principal constituent			
2224/05155	. . . . .	Nickel [Ni] as principal constituent			

2224/05198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/05266	Titanium [Ti] as principal constituent
2224/05199	Material of the matrix	2224/05269	Platinum [Pt] as principal constituent
2224/052	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/0527	Zirconium [Zr] as principal constituent
2224/05201	the principal constituent melting at a temperature of less than 400°C	2224/05271	Chromium [Cr] as principal constituent
2224/05205	Gallium [Ga] as principal constituent	2224/05272	Vanadium [V] as principal constituent
2224/05209	Indium [In] as principal constituent	2224/05273	Rhodium [Rh] as principal constituent
2224/05211	Tin [Sn] as principal constituent	2224/05276	Ruthenium [Ru] as principal constituent
2224/05213	Bismuth [Bi] as principal constituent	2224/05278	Iridium [Ir] as principal constituent
2224/05214	Thallium [Tl] as principal constituent	2224/05279	Niobium [Nb] as principal constituent
2224/05216	Lead [Pb] as principal constituent	2224/0528	Molybdenum [Mo] as principal constituent
2224/05217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05281	Tantalum [Ta] as principal constituent
2224/05218	Zinc [Zn] as principal constituent	2224/05283	Rhenium [Re] as principal constituent
2224/0522	Antimony [Sb] as principal constituent	2224/05284	Tungsten [W] as principal constituent
2224/05223	Magnesium [Mg] as principal constituent	2224/05286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05224	Aluminium [Al] as principal constituent	2224/05287	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05288</a> )
2224/05238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05288	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05239	Silver [Ag] as principal constituent	2224/0529	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05244	Gold [Au] as principal constituent	2224/05291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05247	Copper [Cu] as principal constituent	2224/05293	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/052</a> - <a href="#">H01L 2224/05291</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05249	Manganese [Mn] as principal constituent	2224/05294	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/052</a> - <a href="#">H01L 2224/05291</a>
2224/05255	Nickel [Ni] as principal constituent	2224/05295	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/052</a> - <a href="#">H01L 2224/05291</a>
2224/05257	Cobalt [Co] as principal constituent	2224/05298	Fillers
2224/0526	Iron [Fe] as principal constituent	2224/05299	Base material
2224/05263	the principal constituent melting at a temperature of greater than 1550°C		
2224/05264	Palladium [Pd] as principal constituent		

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2224/053	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05371	Chromium [Cr] as principal constituent
2224/05301	the principal constituent melting at a temperature of less than 400°C	2224/05372	Vanadium [V] as principal constituent
2224/05305	Gallium [Ga] as principal constituent	2224/05373	Rhodium [Rh] as principal constituent
2224/05309	Indium [In] as principal constituent	2224/05376	Ruthenium [Ru] as principal constituent
2224/05311	Tin [Sn] as principal constituent	2224/05378	Iridium [Ir] as principal constituent
2224/05313	Bismuth [Bi] as principal constituent	2224/05379	Niobium [Nb] as principal constituent
2224/05314	Thallium [Tl] as principal constituent	2224/0538	Molybdenum [Mo] as principal constituent
2224/05316	Lead [Pb] as principal constituent	2224/05381	Tantalum [Ta] as principal constituent
2224/05317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05383	Rhenium [Re] as principal constituent
2224/05318	Zinc [Zn] as principal constituent	2224/05384	Tungsten [W] as principal constituent
2224/0532	Antimony [Sb] as principal constituent	2224/05386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05323	Magnesium [Mg] as principal constituent	2224/05387	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05388</a> )
2224/05324	Aluminium [Al] as principal constituent	2224/05388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/0539	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05339	Silver [Ag] as principal constituent	2224/05391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05344	Gold [Au] as principal constituent	2224/05393	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/053</a> - <a href="#">H01L 2224/05391</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05347	Copper [Cu] as principal constituent	2224/05394	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/053</a> - <a href="#">H01L 2224/05391</a>
2224/05349	Manganese [Mn] as principal constituent	2224/05395	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/053</a> - <a href="#">H01L 2224/05391</a>
2224/05355	Nickel [Ni] as principal constituent	2224/05398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/05357	Cobalt [Co] as principal constituent	2224/05399	Coating material
2224/0536	Iron [Fe] as principal constituent		
2224/05363	the principal constituent melting at a temperature of greater than 1550°C		
2224/05364	Palladium [Pd] as principal constituent		
2224/05366	Titanium [Ti] as principal constituent		
2224/05369	Platinum [Pt] as principal constituent		
2224/0537	Zirconium [Zr] as principal constituent		

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2224/054	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05471	Chromium [Cr] as principal constituent
2224/05401	the principal constituent melting at a temperature of less than 400°C	2224/05472	Vanadium [V] as principal constituent
2224/05405	Gallium [Ga] as principal constituent	2224/05473	Rhodium [Rh] as principal constituent
2224/05409	Indium [In] as principal constituent	2224/05476	Ruthenium [Ru] as principal constituent
2224/05411	Tin [Sn] as principal constituent	2224/05478	Iridium [Ir] as principal constituent
2224/05413	Bismuth [Bi] as principal constituent	2224/05479	Niobium [Nb] as principal constituent
2224/05414	Thallium [Tl] as principal constituent	2224/0548	Molybdenum [Mo] as principal constituent
2224/05416	Lead [Pb] as principal constituent	2224/05481	Tantalum [Ta] as principal constituent
2224/05417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05483	Rhenium [Re] as principal constituent
2224/05418	Zinc [Zn] as principal constituent	2224/05484	Tungsten [W] as principal constituent
2224/0542	Antimony [Sb] as principal constituent	2224/05486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/05423	Magnesium [Mg] as principal constituent	2224/05487	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05488</a> )
2224/05424	Aluminium [Al] as principal constituent	2224/05488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/05438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/0549	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/05439	Silver [Ag] as principal constituent	2224/05491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/05444	Gold [Au] as principal constituent	2224/05493	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/054</a> - <a href="#">H01L 2224/05491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/05447	Copper [Cu] as principal constituent	2224/05494	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/054</a> - <a href="#">H01L 2224/05491</a>
2224/05449	Manganese [Mn] as principal constituent	2224/05495	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/054</a> - <a href="#">H01L 2224/05491</a>
2224/05455	Nickel [Ni] as principal constituent	2224/05498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/05457	Cobalt [Co] as principal constituent	2224/05499	Shape or distribution of the fillers
2224/0546	Iron [Fe] as principal constituent	2224/0554	External layer
2224/05463	the principal constituent melting at a temperature of greater than 1550°C	2224/05541	Structure
2224/05464	Palladium [Pd] as principal constituent	2224/05546	Dual damascene structure
2224/05466	Titanium [Ti] as principal constituent	2224/05547	comprising a core and a coating
2224/05469	Platinum [Pt] as principal constituent		
2224/0547	Zirconium [Zr] as principal constituent		



2224/05548	. . . . .	Bonding area integrally formed with a redistribution layer on the semiconductor or solid-state body	2224/05609	. . . . .	Indium [In] as principal constituent
2224/05555	. . . . .	Shape	2224/05611	. . . . .	Tin [Sn] as principal constituent
2224/05551	. . . . .	comprising apertures or cavities	2224/05613	. . . . .	Bismuth [Bi] as principal constituent
2224/05552	. . . . .	in top view	2224/05614	. . . . .	Thallium [Tl] as principal constituent
2224/05553	. . . . .	being rectangular	2224/05616	. . . . .	Lead [Pb] as principal constituent
2224/05554	. . . . .	being square	2224/05617	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/05555	. . . . .	being circular or elliptic	2224/05618	. . . . .	Zinc [Zn] as principal constituent
2224/05556	. . . . .	in side view	2224/0562	. . . . .	Antimony [Sb] as principal constituent
2224/05557	. . . . .	comprising protrusions or indentations	2224/05623	. . . . .	Magnesium [Mg] as principal constituent
2224/05558	. . . . .	conformal layer on a patterned surface	2224/05624	. . . . .	Aluminium [Al] as principal constituent
2224/05559	. . . . .	non conformal layer on a patterned surface	2224/05638	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/0556	. . . . .	Disposition	2224/05639	. . . . .	Silver [Ag] as principal constituent
2224/05561	. . . . .	On the entire surface of the internal layer	2224/05644	. . . . .	Gold [Au] as principal constituent
2224/05562	. . . . .	On the entire exposed surface of the internal layer	2224/05647	. . . . .	Copper [Cu] as principal constituent
2224/05563	. . . . .	Only on parts of the surface of the internal layer	2224/05649	. . . . .	Manganese [Mn] as principal constituent
2224/05564	. . . . .	Only on the bonding interface of the bonding area	2224/05655	. . . . .	Nickel [Ni] as principal constituent
2224/05565	. . . . .	Only outside the bonding interface of the bonding area	2224/05657	. . . . .	Cobalt [Co] as principal constituent
2224/05566	. . . . .	Both on and outside the bonding interface of the bonding area	2224/0566	. . . . .	Iron [Fe] as principal constituent
2224/05567	. . . . .	the external layer being at least partially embedded in the surface	2224/05663	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/05568	. . . . .	the whole external layer protruding from the surface	2224/05664	. . . . .	Palladium [Pd] as principal constituent
2224/05569	. . . . .	the external layer being disposed on a redistribution layer on the semiconductor or solid-state body	2224/05666	. . . . .	Titanium [Ti] as principal constituent
2224/0557	. . . . .	the external layer being disposed on a via connection of the semiconductor or solid-state body	2224/05669	. . . . .	Platinum [Pt] as principal constituent
2224/05571	. . . . .	the external layer being disposed in a recess of the surface	2224/0567	. . . . .	Zirconium [Zr] as principal constituent
2224/05572	. . . . .	the external layer extending out of an opening	2224/05671	. . . . .	Chromium [Cr] as principal constituent
2224/05573	. . . . .	Single external layer	2224/05672	. . . . .	Vanadium [V] as principal constituent
2224/05575	. . . . .	Plural external layers	2224/05673	. . . . .	Rhodium [Rh] as principal constituent
2224/05576	. . . . .	being mutually engaged together, e.g. through inserts	2224/05676	. . . . .	Ruthenium [Ru] as principal constituent
2224/05578	. . . . .	being disposed next to each other, e.g. side-to-side arrangements	2224/05678	. . . . .	Iridium [Ir] as principal constituent
2224/0558	. . . . .	being stacked	2224/05679	. . . . .	Niobium [Nb] as principal constituent
2224/05582	. . . . .	Two-layer coating	2224/0568	. . . . .	Molybdenum [Mo] as principal constituent
2224/05583	. . . . .	Three-layer coating	2224/05681	. . . . .	Tantalum [Ta] as principal constituent
2224/05584	. . . . .	Four-layer coating	2224/05683	. . . . .	Rhenium [Re] as principal constituent
2224/05599	. . . . .	Material			
2224/056	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof			
2224/05601	. . . . .	the principal constituent melting at a temperature of less than 400°C			
2224/05605	. . . . .	Gallium [Ga] as principal constituent			

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2224/05684 . . . . .	Tungsten [W] as principal constituent	2224/05718 . . . . .	Zinc [Zn] as principal constituent
2224/05686 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/0572 . . . . .	Antimony [Sb] as principal constituent
2224/05687 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05688</a> )	2224/05723 . . . . .	Magnesium [Mg] as principal constituent
2224/05688 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/05724 . . . . .	Aluminium [Al] as principal constituent
2224/0569 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/05738 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/05691 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/05739 . . . . .	Silver [Ag] as principal constituent
2224/05693 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/056</a> - <a href="#">H01L 2224/05691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/05744 . . . . .	Gold [Au] as principal constituent
2224/05694 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/056</a> - <a href="#">H01L 2224/05691</a>	2224/05747 . . . . .	Copper [Cu] as principal constituent
2224/05695 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/056</a> - <a href="#">H01L 2224/05691</a>	2224/05749 . . . . .	Manganese [Mn] as principal constituent
2224/05698 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/05755 . . . . .	Nickel [Ni] as principal constituent
2224/05699 . . . . .	Material of the matrix	2224/05757 . . . . .	Cobalt [Co] as principal constituent
2224/057 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/0576 . . . . .	Iron [Fe] as principal constituent
2224/05701 . . . . .	the principal constituent melting at a temperature of less than 400°C	2224/05763 . . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/05705 . . . . .	Gallium [Ga] as principal constituent	2224/05764 . . . . .	Palladium [Pd] as principal constituent
2224/05709 . . . . .	Indium [In] as principal constituent	2224/05766 . . . . .	Titanium [Ti] as principal constituent
2224/05711 . . . . .	Tin [Sn] as principal constituent	2224/05769 . . . . .	Platinum [Pt] as principal constituent
2224/05713 . . . . .	Bismuth [Bi] as principal constituent	2224/0577 . . . . .	Zirconium [Zr] as principal constituent
2224/05714 . . . . .	Thallium [Tl] as principal constituent	2224/05771 . . . . .	Chromium [Cr] as principal constituent
2224/05716 . . . . .	Lead [Pb] as principal constituent	2224/05772 . . . . .	Vanadium [V] as principal constituent
2224/05717 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05773 . . . . .	Rhodium [Rh] as principal constituent
		2224/05776 . . . . .	Ruthenium [Ru] as principal constituent
		2224/05778 . . . . .	Iridium [Ir] as principal constituent
		2224/05779 . . . . .	Niobium [Nb] as principal constituent
		2224/0578 . . . . .	Molybdenum [Mo] as principal constituent
		2224/05781 . . . . .	Tantalum [Ta] as principal constituent
		2224/05783 . . . . .	Rhenium [Re] as principal constituent
		2224/05784 . . . . .	Tungsten [W] as principal constituent
		2224/05786 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
		2224/05787 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05788</a> )

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2224/05788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/05839	. . . . .	Silver [Ag] as principal constituent
2224/0579	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/05844	. . . . .	Gold [Au] as principal constituent
2224/05791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/05847	. . . . .	Copper [Cu] as principal constituent
2224/05793	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/057</a> - <a href="#">H01L 2224/05791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/05849	. . . . .	Manganese [Mn] as principal constituent
2224/05794	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/057</a> - <a href="#">H01L 2224/05791</a>	2224/05855	. . . . .	Nickel [Ni] as principal constituent
2224/05795	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/057</a> - <a href="#">H01L 2224/05791</a>	2224/05857	. . . . .	Cobalt [Co] as principal constituent
2224/05798	. . . . .	Fillers	2224/0586	. . . . .	Iron [Fe] as principal constituent
2224/05799	. . . . .	Base material	2224/05863	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/058	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05864	. . . . .	Palladium [Pd] as principal constituent
2224/05801	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/05866	. . . . .	Titanium [Ti] as principal constituent
2224/05805	. . . . .	Gallium [Ga] as principal constituent	2224/05869	. . . . .	Platinum [Pt] as principal constituent
2224/05809	. . . . .	Indium [In] as principal constituent	2224/0587	. . . . .	Zirconium [Zr] as principal constituent
2224/05811	. . . . .	Tin [Sn] as principal constituent	2224/05871	. . . . .	Chromium [Cr] as principal constituent
2224/05813	. . . . .	Bismuth [Bi] as principal constituent	2224/05872	. . . . .	Vanadium [V] as principal constituent
2224/05814	. . . . .	Thallium [Tl] as principal constituent	2224/05873	. . . . .	Rhodium [Rh] as principal constituent
2224/05816	. . . . .	Lead [Pb] as principal constituent	2224/05876	. . . . .	Ruthenium [Ru] as principal constituent
2224/05817	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05878	. . . . .	Iridium [Ir] as principal constituent
2224/05818	. . . . .	Zinc [Zn] as principal constituent	2224/05879	. . . . .	Niobium [Nb] as principal constituent
2224/0582	. . . . .	Antimony [Sb] as principal constituent	2224/0588	. . . . .	Molybdenum [Mo] as principal constituent
2224/05823	. . . . .	Magnesium [Mg] as principal constituent	2224/05881	. . . . .	Tantalum [Ta] as principal constituent
2224/05824	. . . . .	Aluminium [Al] as principal constituent	2224/05883	. . . . .	Rhenium [Re] as principal constituent
2224/05838	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05884	. . . . .	Tungsten [W] as principal constituent
			2224/05886	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
			2224/05887	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/05888</a> )
			2224/05888	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
			2224/0589	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
			2224/05891	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene

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2224/05893	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/058</a> - <a href="#">H01L 2224/05891</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/05947	Copper [Cu] as principal constituent
2224/05894	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/058</a> - <a href="#">H01L 2224/05891</a>	2224/05949	Manganese [Mn] as principal constituent
2224/05895	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/058</a> - <a href="#">H01L 2224/05891</a>	2224/05955	Nickel [Ni] as principal constituent
2224/05898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/05957	Cobalt [Co] as principal constituent
2224/05899	Coating material	2224/0596	Iron [Fe] as principal constituent
2224/059	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/05963	the principal constituent melting at a temperature of greater than 1550°C
2224/05901	the principal constituent melting at a temperature of less than 400°C	2224/05964	Palladium [Pd] as principal constituent
2224/05905	Gallium [Ga] as principal constituent	2224/05966	Titanium [Ti] as principal constituent
2224/05909	Indium [In] as principal constituent	2224/05969	Platinum [Pt] as principal constituent
2224/05911	Tin [Sn] as principal constituent	2224/0597	Zirconium [Zr] as principal constituent
2224/05913	Bismuth [Bi] as principal constituent	2224/05971	Chromium [Cr] as principal constituent
2224/05914	Thallium [Tl] as principal constituent	2224/05972	Vanadium [V] as principal constituent
2224/05916	Lead [Pb] as principal constituent	2224/05973	Rhodium [Rh] as principal constituent
2224/05917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/05976	Ruthenium [Ru] as principal constituent
2224/05918	Zinc [Zn] as principal constituent	2224/05978	Iridium [Ir] as principal constituent
2224/0592	Antimony [Sb] as principal constituent	2224/05979	Niobium [Nb] as principal constituent
2224/05923	Magnesium [Mg] as principal constituent	2224/0598	Molybdenum [Mo] as principal constituent
2224/05924	Aluminium [Al] as principal constituent	2224/05981	Tantalum [Ta] as principal constituent
2224/05938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/05983	Rhenium [Re] as principal constituent
2224/05939	Silver [Ag] as principal constituent	2224/05984	Tungsten [W] as principal constituent
2224/05944	Gold [Au] as principal constituent	2224/05986	with a principal constituent of the material being a non metallic, non metalloid inorganic material
		2224/05987	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/05988</a> )
		2224/05988	Glasses, e.g. amorphous oxides, nitrides or fluorides
		2224/0599	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
		2224/05991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
		2224/05993	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/059</a> - <a href="#">H01L 2224/05991</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond

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2224/05994	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/059</a> - <a href="#">H01L 2224/05991</a>	2224/06147	with specially adapted redistribution layers [RDL]
2224/05995	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/059</a> - <a href="#">H01L 2224/05991</a>	2224/06148	being disposed in a single wiring level, i.e. planar layout
2224/05998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/06149	being disposed in different wiring levels, i.e. resurf layout
2224/05999	Shape or distribution of the fillers	2224/0615	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
2224/06	of a plurality of bonding areas	2224/06151	being uniform, i.e. having a uniform pitch across the array
2224/0601	Structure	2224/06152	being non uniform, i.e. having a non uniform pitch across the array
2224/0603	Bonding areas having different sizes, e.g. different heights or widths	2224/06153	with a staggered arrangement, e.g. depopulated array
2224/0605	Shape	2224/06154	covering only portions of the surface to be connected
2224/06051	Bonding areas having different shapes	2224/06155	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/061	Disposition	2224/06156	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/06102	the bonding areas being at different heights	2224/06157	with specially adapted redistribution layers [RDL]
2224/0612	Layout	2224/06158	being disposed in a single wiring level, i.e. planar layout
2224/0613	Square or rectangular array	2224/06159	being disposed in different wiring levels, i.e. resurf layout
2224/06131	being uniform, i.e. having a uniform pitch across the array	2224/0616	Random array, i.e. array with no symmetry
2224/06132	being non uniform, i.e. having a non uniform pitch across the array	2224/06163	with a staggered arrangement
2224/06133	with a staggered arrangement, e.g. depopulated array	2224/06164	covering only portions of the surface to be connected
2224/06134	covering only portions of the surface to be connected	2224/06165	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/06135	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/06166	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/06136	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/06167	with specially adapted redistribution layers [RDL]
2224/06137	with specially adapted redistribution layers [RDL]	2224/06168	being disposed in a single wiring level, i.e. planar layout
2224/06138	being disposed in a single wiring level, i.e. planar layout	2224/06169	being disposed in different wiring levels, i.e. resurf layout
2224/06139	being disposed in different wiring levels, i.e. resurf layout	2224/06177	Combinations of arrays with different layouts
2224/0614	Circular array, i.e. array with radial symmetry	2224/06179	Corner adaptations, i.e. disposition of the bonding areas at the corners of the semiconductor or solid-state body
2224/06141	being uniform, i.e. having a uniform pitch across the array	2224/0618	being disposed on at least two different sides of the body, e.g. dual array
2224/06142	being non uniform, i.e. having a non uniform pitch across the array	2224/06181	On opposite sides of the body
2224/06143	with a staggered arrangement, e.g. depopulated array	2224/06182	with specially adapted redistribution layers [RDL]
2224/06144	covering only portions of the surface to be connected	2224/06183	On contiguous sides of the body
2224/06145	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/06187	with specially adapted redistribution layers [RDL]
2224/06146	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/06188	being disposed in a single wiring level, i.e. planar layout
		2224/06189	being disposed in different wiring levels, i.e. resurf layout
		2224/065	Material

2224/06505	. . . . . Bonding areas having different materials	2224/08155	. . . . . the item being non-metallic, e.g. being an insulating substrate with or without metallisation
2224/0651	. . . . . Function		
2224/06515	. . . . . Bonding areas having different functions	2224/0816	. . . . . the bonding area connecting to a pin of the item
2224/06517	. . . . . including bonding areas providing primarily mechanical bonding	2224/08163	. . . . . the bonding area connecting to a potential ring of the item
2224/06519	. . . . . including bonding areas providing primarily thermal dissipation	2224/08165	. . . . . the bonding area connecting to a via metallisation of the item
2224/07	. . . Structure, shape, material or disposition of the bonding areas after the connecting process	2224/08167	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08	. . . . . of an individual bonding area	2224/08168	. . . . . the bonding area connecting to a bonding area protruding from the surface of the item
2224/0801	. . . . . Structure	2224/08175	. . . . . the item being metallic
2224/0805	. . . . . Shape	2224/08183	. . . . . the bonding area connecting to a potential ring of the item
2224/08052	. . . . . in top view	2224/08187	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08053	. . . . . being non uniform along the bonding area	2224/08188	. . . . . the bonding area connecting to a bonding area protruding from the surface of the item
2224/08054	. . . . . being rectangular	2224/08195	. . . . . the item being a discrete passive component
2224/08055	. . . . . being square	2224/08197	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08056	. . . . . being circular or elliptic	2224/08198	. . . . . the bonding area connecting to a bonding area protruding from the surface of the item
2224/08057	. . . . . in side view	2224/08221	. . . . . the body and the item being stacked
2224/08058	. . . . . being non uniform along the bonding area	2224/08225	. . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
2224/08059	. . . . . comprising protrusions or indentations	2224/0823	. . . . . the bonding area connecting to a pin of the item
2224/0807	. . . . . of bonding interfaces, e.g. interlocking features	2224/08233	. . . . . the bonding area connecting to a potential ring of the item
2224/081	. . . . . Disposition	2224/08235	. . . . . the bonding area connecting to a via metallisation of the item
2224/08111	. . . . . the bonding area being disposed in a recess of the surface of the body	2224/08237	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08112	. . . . . the bonding area being at least partially embedded in the surface of the body	2224/08238	. . . . . the bonding area connecting to a bonding area protruding from the surface of the item
2224/08113	. . . . . the whole bonding area protruding from the surface of the body	2224/08245	. . . . . the item being metallic
2224/0812	. . . . . the bonding area connecting directly to another bonding area, i.e. connectorless bonding, e.g. bumpless bonding	2224/08253	. . . . . the bonding area connecting to a potential ring of the item
2224/08121	. . . . . the connected bonding areas being not aligned with respect to each other	2224/08257	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
2224/08123	. . . . . the bonding area connecting directly to at least two bonding areas	2224/08258	. . . . . the bonding area connecting to a bonding area protruding from the surface of the item
2224/08135	. . . . . the bonding area connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip	2224/08265	. . . . . the item being a discrete passive component
2224/08137	. . . . . the bodies being arranged next to each other, e.g. on a common substrate		
2224/08145	. . . . . the bodies being stacked		
2224/08146	. . . . . the bonding area connecting to a via connection in the body		
2224/08147	. . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the body		
2224/08148	. . . . . the bonding area connecting to a bonding area protruding from the surface of the body		
2224/08151	. . . . . the bonding area connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive		
2224/08153	. . . . . the body and the item being arranged next to each other, e.g. on a common substrate		

- 2224/08267 . . . . . the bonding area connecting to a bonding area disposed in a recess of the surface of the item
- 2224/08268 . . . . . the bonding area connecting to a bonding area protruding from the surface of the item
- 2224/085 . . . . . Material
- 2224/08501 . . . . . at the bonding interface
- 2224/08502 . . . . . comprising an eutectic alloy
- 2224/08503 . . . . . comprising an intermetallic compound
- 2224/08505 . . . . . outside the bonding interface
- 2224/08506 . . . . . comprising an eutectic alloy
- 2224/09 . . . . . of a plurality of bonding areas
- 2224/0901 . . . . . Structure
- 2224/0903 . . . . . Bonding areas having different sizes, e.g. different diameters, heights or widths
- 2224/0905 . . . . . Shape
- 2224/09051 . . . . . Bonding areas having different shapes
- 2224/09055 . . . . . of their bonding interfaces
- 2224/091 . . . . . Disposition
- 2224/09102 . . . . . the bonding areas being at different heights
- 2224/09103 . . . . . on the semiconductor or solid-state body
- 2224/09104 . . . . . outside the semiconductor or solid-state body
- 2224/0912 . . . . . Layout ([layout of bonding areas prior to the connecting process H01L 2224/0612](#))
- 2224/0913 . . . . . Square or rectangular array
- 2224/09132 . . . . . being non uniform, i.e. having a non uniform pitch across the array
- 2224/09133 . . . . . with a staggered arrangement, e.g. depopulated array
- 2224/09134 . . . . . covering only portions of the surface to be connected
- 2224/09135 . . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
- 2224/0914 . . . . . Circular array, i.e. array with radial symmetry
- 2224/09142 . . . . . being non uniform, i.e. having a non uniform pitch across the array
- 2224/09143 . . . . . with a staggered arrangement
- 2224/09144 . . . . . covering only portions of the surface to be connected
- 2224/09145 . . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
- 2224/0915 . . . . . Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
- 2224/09151 . . . . . being uniform, i.e. having a uniform pitch across the array
- 2224/09152 . . . . . being non uniform, i.e. having a non uniform pitch across the array
- 2224/09153 . . . . . with a staggered arrangement, e.g. depopulated array
- 2224/09154 . . . . . covering only portions of the surface to be connected
- 2224/09155 . . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
- 2224/09156 . . . . . Covering only the central area of the surface to be connected, i.e. central arrangements
- 2224/0916 . . . . . Random array, i.e. array with no symmetry
- 2224/09163 . . . . . with a staggered arrangement
- 2224/09164 . . . . . covering only portions of the surface to be connected
- 2224/09165 . . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
- 2224/09177 . . . . . Combinations of arrays with different layouts
- 2224/09179 . . . . . Corner adaptations, i.e. disposition of the bonding areas at the corners of the semiconductor or solid-state body
- 2224/0918 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/09181 . . . . . On opposite sides of the body
- 2224/09183 . . . . . On contiguous sides of the body
- 2224/095 . . . . . Material
- 2224/09505 . . . . . Bonding areas having different materials
- 2224/0951 . . . . . Function
- 2224/09515 . . . . . Bonding areas having different functions
- 2224/09517 . . . . . including bonding areas providing primarily mechanical support
- 2224/09519 . . . . . including bonding areas providing primarily thermal dissipation
- 2224/10 . . . . . Bump connectors; Manufacturing methods related thereto
- 2224/1012 . . . . . Auxiliary members for bump connectors, e.g. spacers
- 2224/10122 . . . . . being formed on the semiconductor or solid-state body to be connected
- 2224/10125 . . . . . Reinforcing structures
- 2224/10126 . . . . . Bump collar
- 2224/10135 . . . . . Alignment aids
- 2224/10145 . . . . . Flow barriers
- 2224/10152 . . . . . being formed on an item to be connected not being a semiconductor or solid-state body
- 2224/10155 . . . . . Reinforcing structures
- 2224/10156 . . . . . Bump collar
- 2224/10165 . . . . . Alignment aids
- 2224/10175 . . . . . Flow barriers
- 2224/11 . . . . . Manufacturing methods
- 2224/11001 . . . . . Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/11002 . . . . . for supporting the semiconductor or solid-state body
- 2224/11003 . . . . . for holding or transferring the bump preform
- 2224/11005 . . . . . for aligning the bump connector, e.g. marks, spacers
- 2224/11009 . . . . . for protecting parts during manufacture
- 2224/11011 . . . . . Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature

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2224/11013	. . . . .	for holding or confining the bump connector, e.g. solder flow barrier	2224/11515	. . . . .	Curing and solidification, e.g. of a photosensitive bump material
2224/11015	. . . . .	for aligning the bump connector, e.g. marks, spacers	2224/1152	. . . . .	Self-assembly, e.g. self-agglomeration of the bump material in a fluid
2224/11019	. . . . .	for protecting parts during the process	2224/11522	. . . . .	Auxiliary means therefor, e.g. for self-assembly activation
2224/111	. . . . .	Manufacture and pre-treatment of the bump connector preform	2224/11524	. . . . .	with special adaptation of the surface or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process
2224/1111	. . . . .	Shaping	2224/11526	. . . . .	involving the material of the bonding area, e.g. bonding pad or under bump metallisation [UBM]
2224/1112	. . . . .	Applying permanent coating	2224/1155	. . . . .	Selective modification
2224/113	. . . . .	by local deposition of the material of the bump connector	2224/11552	. . . . .	using a laser or a focussed ion beam [FIB]
2224/1131	. . . . .	in liquid form	2224/11554	. . . . .	Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin
2224/11312	. . . . .	Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion	2224/116	. . . . .	by patterning a pre-deposited material (treatment of parts prior to assembly of the devices <a href="#">H01L 21/48</a> )
2224/11318	. . . . .	by dispensing droplets	2224/11602	. . . . .	Mechanical treatment, e.g. polishing, grinding
2224/1132	. . . . .	Screen printing, i.e. using a stencil	2224/1161	. . . . .	Physical or chemical etching
2224/1133	. . . . .	in solid form	2224/11612	. . . . .	by physical means only
2224/11332	. . . . .	using a powder	2224/11614	. . . . .	by chemical means only
2224/11334	. . . . .	using preformed bumps	2224/11616	. . . . .	Chemical mechanical polishing [CMP]
2224/1134	. . . . .	Stud bumping, i.e. using a wire-bonding apparatus	2224/11618	. . . . .	with selective exposure, development and removal of a photosensitive bump material, e.g. of a photosensitive conductive resin
2224/114	. . . . .	by blanket deposition of the material of the bump connector	2224/1162	. . . . .	using masks
2224/1141	. . . . .	in liquid form	2224/11622	. . . . .	Photolithography
2224/11416	. . . . .	Spin coating	2224/1163	. . . . .	using a laser or a focused ion beam [FIB]
2224/11418	. . . . .	Spray coating	2224/11632	. . . . .	Ablation by means of a laser or focused ion beam [FIB]
2224/1142	. . . . .	Curtain coating	2224/117	. . . . .	involving monitoring, e.g. feedback loop
2224/11422	. . . . .	by dipping, e.g. in a solder bath ( <a href="#">hot-dipping C23C 2/00</a> )	2224/118	. . . . .	Post-treatment of the bump connector
2224/11424	. . . . .	Immersion coating, e.g. in a solder bath ( <a href="#">immersion processes C23C 2/00</a> )	2224/1181	. . . . .	Cleaning, e.g. oxide removal step, desmearing
2224/11426	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor	2224/1182	. . . . .	Applying permanent coating, e.g. in-situ coating
2224/11428	. . . . .	Wave coating	2224/11821	. . . . .	Spray coating
2224/1143	. . . . .	in solid form	2224/11822	. . . . .	by dipping, e.g. in a solder bath
2224/11436	. . . . .	Lamination of a preform, e.g. foil, sheet or layer	2224/11823	. . . . .	Immersion coating, e.g. in a solder bath
2224/11438	. . . . .	the preform being at least partly pre-patterned	2224/11824	. . . . .	Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/1144	. . . . .	by transfer printing	2224/11825	. . . . .	Plating, e.g. electroplating, electroless plating
2224/11442	. . . . .	using a powder	2224/11826	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering
2224/11444	. . . . .	in gaseous form	2224/11827	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD
2224/1145	. . . . .	Physical vapour deposition [PVD], e.g. evaporation, or sputtering	2224/1183	. . . . .	Reworking, e.g. shaping ( <a href="#">reflowing H01L 2224/11849</a> )
2224/11452	. . . . .	Chemical vapour deposition [CVD], e.g. laser CVD	2224/11831	. . . . .	involving a chemical process, e.g. etching the bump connector
2224/1146	. . . . .	Plating	2224/1184	. . . . .	involving a mechanical process, e.g. planarising the bump connector
2224/11462	. . . . .	Electroplating	2224/11845	. . . . .	Chemical mechanical polishing [CMP]
2224/11464	. . . . .	Electroless plating	2224/11848	. . . . .	Thermal treatments, e.g. annealing, controlled cooling
2224/11466	. . . . .	Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface	2224/11849	. . . . .	Reflowing
2224/1147	. . . . .	using a lift-off mask			
2224/11472	. . . . .	Profile of the lift-off mask			
2224/11474	. . . . .	Multilayer masks			
2224/1148	. . . . .	Permanent masks, i.e. masks left in the finished device, e.g. passivation layers			
2224/115	. . . . .	by chemical or physical modification of a pre-existing or pre-deposited material			
2224/11502	. . . . .	Pre-existing or pre-deposited material			
2224/11505	. . . . .	Sintering			
2224/1151	. . . . .	Anodisation			



2224/119	. . . .	Methods of manufacturing bump connectors involving a specific sequence of method steps	2224/13024	. . . . .	the bump connector being disposed on a redistribution layer on the semiconductor or solid-state body
2224/11901	. . . . .	with repetition of the same manufacturing step	2224/13025	. . . . .	the bump connector being disposed on a via connection of the semiconductor or solid-state body
2224/11902	. . . . .	Multiple masking steps	2224/13026	. . . . .	relative to the bonding area, e.g. bond pad, of the semiconductor or solid-state body
2224/11903	. . . . .	using different masks	2224/13027	. . . . .	the bump connector being offset with respect to the bonding area, e.g. bond pad
2224/11906	. . . . .	with modification of the same mask	2224/13028	. . . . .	the bump connector being disposed on at least two separate bonding areas, e.g. bond pads
2224/1191	. . . . .	Forming a passivation layer after forming the bump connector	2224/13075	. . . . .	Plural core members
2224/11912	. . . . .	the bump being used as a mask for patterning other parts	2224/13076	. . . . .	being mutually engaged together, e.g. through inserts
2224/11914	. . . . .	the under bump metallisation [UBM] being used as a mask for patterning other parts	2224/13078	. . . . .	being disposed next to each other, e.g. side-to-side arrangements
2224/11916	. . . . .	a passivation layer being used as a mask for patterning other parts	2224/1308	. . . . .	being stacked
2224/12	. . . .	Structure, shape, material or disposition of the bump connectors prior to the connecting process	2224/13082	. . . . .	Two-layer arrangements
2224/12105	. . . . .	Bump connectors formed on an encapsulation of the semiconductor or solid-state body, e.g. bumps on chip-scale packages	2224/13083	. . . . .	Three-layer arrangements
2224/13	. . . . .	of an individual bump connector	2224/13084	. . . . .	Four-layer arrangements
2224/13001	. . . . .	Core members of the bump connector	2224/13099	. . . . .	Material
2224/13005	. . . . .	Structure	2224/131	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13006	. . . . .	Bump connector larger than the underlying bonding area, e.g. than the under bump metallisation [UBM]	2224/13101	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/13007	. . . . .	Bump connector smaller than the underlying bonding area, e.g. than the under bump metallisation [UBM]	2224/13105	. . . . .	Gallium [Ga] as principal constituent
2224/13008	. . . . .	Bump connector integrally formed with a redistribution layer on the semiconductor or solid-state body	2224/13109	. . . . .	Indium [In] as principal constituent
2224/13009	. . . . .	Bump connector integrally formed with a via connection of the semiconductor or solid-state body	2224/13111	. . . . .	Tin [Sn] as principal constituent
2224/1301	. . . . .	Shape	2224/13113	. . . . .	Bismuth [Bi] as principal constituent
2224/13011	. . . . .	comprising apertures or cavities, e.g. hollow bump	2224/13114	. . . . .	Thallium [Tl] as principal constituent
2224/13012	. . . . .	in top view	2224/13116	. . . . .	Lead [Pb] as principal constituent
2224/13013	. . . . .	being rectangular or square	2224/13117	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13014	. . . . .	being circular or elliptic	2224/13118	. . . . .	Zinc [Zn] as principal constituent
2224/13015	. . . . .	comprising protrusions or indentations	2224/1312	. . . . .	Antimony [Sb] as principal constituent
2224/13016	. . . . .	in side view	2224/13123	. . . . .	Magnesium [Mg] as principal constituent
2224/13017	. . . . .	being non uniform along the bump connector	2224/13124	. . . . .	Aluminium [Al] as principal constituent
2224/13018	. . . . .	comprising protrusions or indentations	2224/13138	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13019	. . . . .	at the bonding interface of the bump connector, i.e. on the surface of the bump connector	2224/13139	. . . . .	Silver [Ag] as principal constituent
2224/1302	. . . . .	Disposition	2224/13144	. . . . .	Gold [Au] as principal constituent
2224/13021	. . . . .	the bump connector being disposed in a recess of the surface	2224/13147	. . . . .	Copper [Cu] as principal constituent
2224/13022	. . . . .	the bump connector being at least partially embedded in the surface			
2224/13023	. . . . .	the whole bump connector protruding from the surface			

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2224/13149 . . . . .	Manganese [Mn] as principal constituent	2224/13195 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/131</a> - <a href="#">H01L 2224/13191</a>
2224/13155 . . . . .	Nickel [Ni] as principal constituent	2224/13198 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/13157 . . . . .	Cobalt [Co] as principal constituent	2224/13199 . . . . .	Material of the matrix
2224/1316 . . . . .	Iron [Fe] as principal constituent	2224/132 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13163 . . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/13201 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/13164 . . . . .	Palladium [Pd] as principal constituent	2224/13205 . . . . .	Gallium [Ga] as principal constituent
2224/13166 . . . . .	Titanium [Ti] as principal constituent	2224/13209 . . . . .	Indium [In] as principal constituent
2224/13169 . . . . .	Platinum [Pt] as principal constituent	2224/13211 . . . . .	Tin [Sn] as principal constituent
2224/1317 . . . . .	Zirconium [Zr] as principal constituent	2224/13213 . . . . .	Bismuth [Bi] as principal constituent
2224/13171 . . . . .	Chromium [Cr] as principal constituent	2224/13214 . . . . .	Thallium [Tl] as principal constituent
2224/13172 . . . . .	Vanadium [V] as principal constituent	2224/13216 . . . . .	Lead [Pb] as principal constituent
2224/13173 . . . . .	Rhodium [Rh] as principal constituent	2224/13217 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13176 . . . . .	Ruthenium [Ru] as principal constituent	2224/13218 . . . . .	Zinc [Zn] as principal constituent
2224/13178 . . . . .	Iridium [Ir] as principal constituent	2224/1322 . . . . .	Antimony [Sb] as principal constituent
2224/13179 . . . . .	Niobium [Nb] as principal constituent	2224/13223 . . . . .	Magnesium [Mg] as principal constituent
2224/1318 . . . . .	Molybdenum [Mo] as principal constituent	2224/13224 . . . . .	Aluminium [Al] as principal constituent
2224/13181 . . . . .	Tantalum [Ta] as principal constituent	2224/13238 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13183 . . . . .	Rhenium [Re] as principal constituent	2224/13239 . . . . .	Silver [Ag] as principal constituent
2224/13184 . . . . .	Tungsten [W] as principal constituent	2224/13244 . . . . .	Gold [Au] as principal constituent
2224/13186 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13247 . . . . .	Copper [Cu] as principal constituent
2224/13187 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13188</a> )	2224/13249 . . . . .	Manganese [Mn] as principal constituent
2224/13188 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13255 . . . . .	Nickel [Ni] as principal constituent
2224/1319 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13257 . . . . .	Cobalt [Co] as principal constituent
2224/13191 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/1326 . . . . .	Iron [Fe] as principal constituent
2224/13193 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/131</a> - <a href="#">H01L 2224/13191</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond		
2224/13194 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/131</a> - <a href="#">H01L 2224/13191</a>		

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2224/13263	the principal constituent melting at a temperature of greater than 1550°C	2224/133	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13264	Palladium [Pd] as principal constituent	2224/13301	the principal constituent melting at a temperature of less than 400°C
2224/13266	Titanium [Ti] as principal constituent	2224/13305	Gallium [Ga] as principal constituent
2224/13269	Platinum [Pt] as principal constituent	2224/13309	Indium [In] as principal constituent
2224/1327	Zirconium [Zr] as principal constituent	2224/13311	Tin [Sn] as principal constituent
2224/13271	Chromium [Cr] as principal constituent	2224/13313	Bismuth [Bi] as principal constituent
2224/13272	Vanadium [V] as principal constituent	2224/13314	Thallium [Tl] as principal constituent
2224/13273	Rhodium [Rh] as principal constituent	2224/13316	Lead [Pb] as principal constituent
2224/13276	Ruthenium [Ru] as principal constituent	2224/13317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13278	Iridium [Ir] as principal constituent	2224/13318	Zinc [Zn] as principal constituent
2224/13279	Niobium [Nb] as principal constituent	2224/1332	Antimony [Sb] as principal constituent
2224/1328	Molybdenum [Mo] as principal constituent	2224/13323	Magnesium [Mg] as principal constituent
2224/13281	Tantalum [Ta] as principal constituent	2224/13324	Aluminium [Al] as principal constituent
2224/13283	Rhenium [Re] as principal constituent	2224/13338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13284	Tungsten [W] as principal constituent	2224/13339	Silver [Ag] as principal constituent
2224/13286	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13344	Gold [Au] as principal constituent
2224/13287	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13288</a> )	2224/13347	Copper [Cu] as principal constituent
2224/13288	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13349	Manganese [Mn] as principal constituent
2224/1329	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13355	Nickel [Ni] as principal constituent
2224/13291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13357	Cobalt [Co] as principal constituent
2224/13293	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/132</a> - <a href="#">H01L 2224/13291</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/1336	Iron [Fe] as principal constituent
2224/13294	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/132</a> - <a href="#">H01L 2224/13291</a>	2224/13363	the principal constituent melting at a temperature of greater than 1550°C
2224/13295	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/132</a> - <a href="#">H01L 2224/13291</a>	2224/13364	Palladium [Pd] as principal constituent
2224/13298	Fillers	2224/13366	Titanium [Ti] as principal constituent
2224/13299	Base material	2224/13369	Platinum [Pt] as principal constituent
		2224/1337	Zirconium [Zr] as principal constituent

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2224/13371 . . . . .	Chromium [Cr] as principal constituent	2224/134 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13372 . . . . .	Vanadium [V] as principal constituent	2224/13401 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/13373 . . . . .	Rhodium [Rh] as principal constituent	2224/13405 . . . . .	Gallium [Ga] as principal constituent
2224/13376 . . . . .	Ruthenium [Ru] as principal constituent	2224/13409 . . . . .	Indium [In] as principal constituent
2224/13378 . . . . .	Iridium [Ir] as principal constituent	2224/13411 . . . . .	Tin [Sn] as principal constituent
2224/13379 . . . . .	Niobium [Nb] as principal constituent	2224/13413 . . . . .	Bismuth [Bi] as principal constituent
2224/1338 . . . . .	Molybdenum [Mo] as principal constituent	2224/13414 . . . . .	Thallium [Tl] as principal constituent
2224/13381 . . . . .	Tantalum [Ta] as principal constituent	2224/13416 . . . . .	Lead [Pb] as principal constituent
2224/13383 . . . . .	Rhenium [Re] as principal constituent	2224/13417 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13384 . . . . .	Tungsten [W] as principal constituent	2224/13418 . . . . .	Zinc [Zn] as principal constituent
2224/13386 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/1342 . . . . .	Antimony [Sb] as principal constituent
2224/13387 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13388</a> )	2224/13423 . . . . .	Magnesium [Mg] as principal constituent
2224/13388 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13424 . . . . .	Aluminium [Al] as principal constituent
2224/1339 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13438 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13391 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13439 . . . . .	Silver [Ag] as principal constituent
2224/13393 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/133</a> - <a href="#">H01L 2224/13391</a>	2224/13444 . . . . .	Gold [Au] as principal constituent
	e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13447 . . . . .	Copper [Cu] as principal constituent
2224/13394 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/133</a> - <a href="#">H01L 2224/13391</a>	2224/13449 . . . . .	Manganese [Mn] as principal constituent
2224/13395 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/133</a> - <a href="#">H01L 2224/13391</a>	2224/13455 . . . . .	Nickel [Ni] as principal constituent
2224/13398 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13457 . . . . .	Cobalt [Co] as principal constituent
2224/13399 . . . . .	Coating material	2224/1346 . . . . .	Iron [Fe] as principal constituent
		2224/13463 . . . . .	the principal constituent melting at a temperature of greater than 1550°C
		2224/13464 . . . . .	Palladium [Pd] as principal constituent
		2224/13466 . . . . .	Titanium [Ti] as principal constituent
		2224/13469 . . . . .	Platinum [Pt] as principal constituent
		2224/1347 . . . . .	Zirconium [Zr] as principal constituent

2224/13471	Chromium [Cr] as principal constituent	2224/13552	comprising protrusions or indentations
2224/13472	Vanadium [V] as principal constituent	2224/13553	at the bonding interface of the bump connector, i.e. on the surface of the bump connector
2224/13473	Rhodium [Rh] as principal constituent	2224/13556	Disposition
2224/13476	Ruthenium [Ru] as principal constituent	2224/13561	On the entire surface of the core, i.e. integral coating
2224/13478	Iridium [Ir] as principal constituent	2224/13562	On the entire exposed surface of the core
2224/13479	Niobium [Nb] as principal constituent	2224/13563	Only on parts of the surface of the core, i.e. partial coating
2224/1348	Molybdenum [Mo] as principal constituent	2224/13564	Only on the bonding interface of the bump connector
2224/13481	Tantalum [Ta] as principal constituent	2224/13565	Only outside the bonding interface of the bump connector
2224/13483	Rhenium [Re] as principal constituent	2224/13566	Both on and outside the bonding interface of the bump connector
2224/13484	Tungsten [W] as principal constituent	2224/1357	Single coating layer
2224/13486	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13575	Plural coating layers
2224/13487	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13488</a> )	2224/13576	being mutually engaged together, e.g. through inserts
2224/13488	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13578	being disposed next to each other, e.g. side-to-side arrangements
2224/1349	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/1358	being stacked
2224/13491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13582	Two-layer coating
2224/13493	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/134</a> - <a href="#">H01L 2224/13491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/13583	Three-layer coating
2224/13494	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/134</a> - <a href="#">H01L 2224/13491</a>	2224/13584	Four-layer coating
2224/13495	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/134</a> - <a href="#">H01L 2224/13491</a>	2224/13599	Material
2224/13498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/136	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13499	Shape or distribution of the fillers	2224/13601	the principal constituent melting at a temperature of less than 400°C
2224/1354	Coating	2224/13605	Gallium [Ga] as principal constituent
2224/13541	Structure	2224/13609	Indium [In] as principal constituent
2224/1355	Shape	2224/13611	Tin [Sn] as principal constituent
2224/13551	being non uniform	2224/13613	Bismuth [Bi] as principal constituent
		2224/13614	Thallium [Tl] as principal constituent
		2224/13616	Lead [Pb] as principal constituent
		2224/13617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
		2224/13618	Zinc [Zn] as principal constituent
		2224/1362	Antimony [Sb] as principal constituent
		2224/13623	Magnesium [Mg] as principal constituent
		2224/13624	Aluminium [Al] as principal constituent
		2224/13638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
		2224/13639	Silver [Ag] as principal constituent

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2224/13644 . . . . .	Gold [Au] as principal constituent	2224/13694 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/136</a> - <a href="#">H01L 2224/13691</a>
2224/13647 . . . . .	Copper [Cu] as principal constituent	2224/13695 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/136</a> - <a href="#">H01L 2224/13691</a>
2224/13649 . . . . .	Manganese [Mn] as principal constituent	2224/13698 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/13655 . . . . .	Nickel [Ni] as principal constituent	2224/13699 . . . . .	Material of the matrix
2224/13657 . . . . .	Cobalt [Co] as principal constituent	2224/137 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/1366 . . . . .	Iron [Fe] as principal constituent	2224/13701 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/13663 . . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/13705 . . . . .	Gallium [Ga] as principal constituent
2224/13664 . . . . .	Palladium [Pd] as principal constituent	2224/13709 . . . . .	Indium [In] as principal constituent
2224/13666 . . . . .	Titanium [Ti] as principal constituent	2224/13711 . . . . .	Tin [Sn] as principal constituent
2224/13669 . . . . .	Platinum [Pt] as principal constituent	2224/13713 . . . . .	Bismuth [Bi] as principal constituent
2224/1367 . . . . .	Zirconium [Zr] as principal constituent	2224/13714 . . . . .	Thallium [Tl] as principal constituent
2224/13671 . . . . .	Chromium [Cr] as principal constituent	2224/13716 . . . . .	Lead [Pb] as principal constituent
2224/13672 . . . . .	Vanadium [V] as principal constituent	2224/13717 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13673 . . . . .	Rhodium [Rh] as principal constituent	2224/13718 . . . . .	Zinc [Zn] as principal constituent
2224/13676 . . . . .	Ruthenium [Ru] as principal constituent	2224/1372 . . . . .	Antimony [Sb] as principal constituent
2224/13678 . . . . .	Iridium [Ir] as principal constituent	2224/13723 . . . . .	Magnesium [Mg] as principal constituent
2224/13679 . . . . .	Niobium [Nb] as principal constituent	2224/13724 . . . . .	Aluminium [Al] as principal constituent
2224/1368 . . . . .	Molybdenum [Mo] as principal constituent	2224/13738 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13681 . . . . .	Tantalum [Ta] as principal constituent	2224/13739 . . . . .	Silver [Ag] as principal constituent
2224/13683 . . . . .	Rhenium [Re] as principal constituent	2224/13744 . . . . .	Gold [Au] as principal constituent
2224/13684 . . . . .	Tungsten [W] as principal constituent	2224/13747 . . . . .	Copper [Cu] as principal constituent
2224/13686 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13749 . . . . .	Manganese [Mn] as principal constituent
2224/13687 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13688</a> )	2224/13755 . . . . .	Nickel [Ni] as principal constituent
2224/13688 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13757 . . . . .	Cobalt [Co] as principal constituent
2224/1369 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy		
2224/13691 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene		
2224/13693 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/136</a> - <a href="#">H01L 2224/13691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond		

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2224/1376	Iron [Fe] as principal constituent	2224/13799	Base material
2224/13763	the principal constituent melting at a temperature of greater than 1550°C	2224/138	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13764	Palladium [Pd] as principal constituent	2224/13801	the principal constituent melting at a temperature of less than 400°C
2224/13766	Titanium [Ti] as principal constituent	2224/13805	Gallium [Ga] as principal constituent
2224/13769	Platinum [Pt] as principal constituent	2224/13809	Indium [In] as principal constituent
2224/1377	Zirconium [Zr] as principal constituent	2224/13811	Tin [Sn] as principal constituent
2224/13771	Chromium [Cr] as principal constituent	2224/13813	Bismuth [Bi] as principal constituent
2224/13772	Vanadium [V] as principal constituent	2224/13814	Thallium [Tl] as principal constituent
2224/13773	Rhodium [Rh] as principal constituent	2224/13816	Lead [Pb] as principal constituent
2224/13776	Ruthenium [Ru] as principal constituent	2224/13817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13778	Iridium [Ir] as principal constituent	2224/13818	Zinc [Zn] as principal constituent
2224/13779	Niobium [Nb] as principal constituent	2224/1382	Antimony [Sb] as principal constituent
2224/1378	Molybdenum [Mo] as principal constituent	2224/13823	Magnesium [Mg] as principal constituent
2224/13781	Tantalum [Ta] as principal constituent	2224/13824	Aluminium [Al] as principal constituent
2224/13783	Rhenium [Re] as principal constituent	2224/13838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13784	Tungsten [W] as principal constituent	2224/13839	Silver [Ag] as principal constituent
2224/13786	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/13844	Gold [Au] as principal constituent
2224/13787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13788</a> )	2224/13847	Copper [Cu] as principal constituent
2224/13788	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13849	Manganese [Mn] as principal constituent
2224/1379	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13855	Nickel [Ni] as principal constituent
2224/13791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13857	Cobalt [Co] as principal constituent
2224/13793	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/137</a> - <a href="#">H01L 2224/13791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/1386	Iron [Fe] as principal constituent
2224/13794	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/137</a> - <a href="#">H01L 2224/13791</a>	2224/13863	the principal constituent melting at a temperature of greater than 1550°C
2224/13795	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/137</a> - <a href="#">H01L 2224/13791</a>	2224/13864	Palladium [Pd] as principal constituent
2224/13798	Fillers	2224/13866	Titanium [Ti] as principal constituent
		2224/13869	Platinum [Pt] as principal constituent
		2224/1387	Zirconium [Zr] as principal constituent

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2224/13871	Chromium [Cr] as principal constituent	2224/139	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/13872	Vanadium [V] as principal constituent	2224/13901	the principal constituent melting at a temperature of less than 400°C
2224/13873	Rhodium [Rh] as principal constituent	2224/13905	Gallium [Ga] as principal constituent
2224/13876	Ruthenium [Ru] as principal constituent	2224/13909	Indium [In] as principal constituent
2224/13878	Iridium [Ir] as principal constituent	2224/13911	Tin [Sn] as principal constituent
2224/13879	Niobium [Nb] as principal constituent	2224/13913	Bismuth [Bi] as principal constituent
2224/1388	Molybdenum [Mo] as principal constituent	2224/13914	Thallium [Tl] as principal constituent
2224/13881	Tantalum [Ta] as principal constituent	2224/13916	Lead [Pb] as principal constituent
2224/13883	Rhenium [Re] as principal constituent	2224/13917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/13884	Tungsten [W] as principal constituent	2224/13918	Zinc [Zn] as principal constituent
2224/13886	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/1392	Antimony [Sb] as principal constituent
2224/13887	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13888</a> )	2224/13923	Magnesium [Mg] as principal constituent
2224/13888	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/13924	Aluminium [Al] as principal constituent
2224/1389	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/13938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/13891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/13939	Silver [Ag] as principal constituent
2224/13893	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/138</a> - <a href="#">H01L 2224/13891</a>	2224/13944	Gold [Au] as principal constituent
2224/13894	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/138</a> - <a href="#">H01L 2224/13891</a>	2224/13947	Copper [Cu] as principal constituent
2224/13895	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/138</a> - <a href="#">H01L 2224/13891</a>	2224/13949	Manganese [Mn] as principal constituent
2224/13898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/13955	Nickel [Ni] as principal constituent
2224/13899	Coating material	2224/13957	Cobalt [Co] as principal constituent
		2224/1396	Iron [Fe] as principal constituent
		2224/13963	the principal constituent melting at a temperature of greater than 1550°C
		2224/13964	Palladium [Pd] as principal constituent
		2224/13966	Titanium [Ti] as principal constituent
		2224/13969	Platinum [Pt] as principal constituent
		2224/1397	Zirconium [Zr] as principal constituent



2224/13971	Chromium [Cr] as principal constituent	2224/1405	Shape
2224/13972	Vanadium [V] as principal constituent	2224/14051	Bump connectors having different shapes
2224/13973	Rhodium [Rh] as principal constituent	2224/141	Disposition
2224/13976	Ruthenium [Ru] as principal constituent	2224/14104	relative to the bonding areas, e.g. bond pads, of the semiconductor or solid-state body
2224/13978	Iridium [Ir] as principal constituent	2224/1411	the bump connectors being bonded to at least one common bonding area
2224/13979	Niobium [Nb] as principal constituent	2224/1412	Layout
2224/1398	Molybdenum [Mo] as principal constituent	2224/1413	Square or rectangular array
2224/13981	Tantalum [Ta] as principal constituent	2224/14131	being uniform, i.e. having a uniform pitch across the array
2224/13983	Rhenium [Re] as principal constituent	2224/14132	being non uniform, i.e. having a non uniform pitch across the array
2224/13984	Tungsten [W] as principal constituent	2224/14133	with a staggered arrangement, e.g. depopulated array
2224/13986	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/14134	covering only portions of the surface to be connected
2224/13987	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/13988</a> )	2224/14135	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/13988	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/14136	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/1399	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/1414	Circular array, i.e. array with radial symmetry
2224/13991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/14141	being uniform, i.e. having a uniform pitch across the array
2224/13993	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/139</a> - <a href="#">H01L 2224/13991</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/14142	being non uniform, i.e. having a non uniform pitch across the array
2224/13994	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/139</a> - <a href="#">H01L 2224/13991</a>	2224/14143	with a staggered arrangement, e.g. depopulated array
2224/13995	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/139</a> - <a href="#">H01L 2224/13991</a>	2224/14144	covering only portions of the surface to be connected
2224/13998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/14145	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/13999	Shape or distribution of the fillers	2224/14146	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/14	of a plurality of bump connectors	2224/1415	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
2224/1401	Structure	2224/14151	being uniform, i.e. having a uniform pitch across the array
2224/1403	Bump connectors having different sizes, e.g. different diameters, heights or widths	2224/14152	being non uniform, i.e. having a non uniform pitch across the array
		2224/14153	with a staggered arrangement, e.g. depopulated array
		2224/14154	covering only portions of the surface to be connected
		2224/14155	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
		2224/14156	Covering only the central area of the surface to be connected, i.e. central arrangements
		2224/1416	Random layout, i.e. layout with no symmetry
		2224/14163	with a staggered arrangement
		2224/14164	covering only portions of the surface to be connected

- 2224/14165 . . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
- 2224/14166 . . . . . Covering only the central area of the surface to be connected, i.e. central arrangements
- 2224/14177 . . . . . Combinations of arrays with different layouts
- 2224/14179 . . . . . Corner adaptations, i.e. disposition of the bump connectors at the corners of the semiconductor or solid-state body
- 2224/1418 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/14181 . . . . . On opposite sides of the body
- 2224/14183 . . . . . On contiguous sides of the body
- 2224/145 . . . . . Material
- 2224/14505 . . . . . Bump connectors having different materials
- 2224/1451 . . . . . Function
- 2224/14515 . . . . . Bump connectors having different functions
- 2224/14517 . . . . . including bump connectors providing primarily mechanical bonding
- 2224/14519 . . . . . including bump connectors providing primarily thermal dissipation
- 2224/15 . . . . . Structure, shape, material or disposition of the bump connectors after the connecting process
- 2224/16 . . . . . of an individual bump connector
- 2224/1601 . . . . . Structure
- 2224/16012 . . . . . relative to the bonding area, e.g. bond pad
- 2224/16013 . . . . . the bump connector being larger than the bonding area, e.g. bond pad
- 2224/16014 . . . . . the bump connector being smaller than the bonding area, e.g. bond pad
- 2224/1605 . . . . . Shape
- 2224/16052 . . . . . in top view
- 2224/16054 . . . . . being rectangular or square
- 2224/16055 . . . . . being circular or elliptic
- 2224/16056 . . . . . comprising protrusions or indentations
- 2224/16057 . . . . . in side view
- 2224/16058 . . . . . being non uniform along the bump connector
- 2224/16059 . . . . . comprising protrusions or indentations
- 2224/1607 . . . . . of bonding interfaces, e.g. interlocking features
- 2224/161 . . . . . Disposition
- 2224/16104 . . . . . relative to the bonding area, e.g. bond pad
- 2224/16105 . . . . . the bump connector connecting bonding areas being not aligned with respect to each other
- 2224/16106 . . . . . the bump connector connecting one bonding area to at least two respective bonding areas
- 2224/16108 . . . . . the bump connector not being orthogonal to the surface
- 2224/16111 . . . . . the bump connector being disposed in a recess of the surface
- 2224/16112 . . . . . the bump connector being at least partially embedded in the surface
- 2224/16113 . . . . . the whole bump connector protruding from the surface
- 2224/1613 . . . . . the bump connector connecting within a semiconductor or solid-state body, i.e. connecting two bonding areas on the same semiconductor or solid-state body
- 2224/16135 . . . . . the bump connector connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
- 2224/16137 . . . . . the bodies being arranged next to each other, e.g. on a common substrate
- 2224/16141 . . . . . the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
- 2224/16145 . . . . . the bodies being stacked
- 2224/16146 . . . . . the bump connector connecting to a via connection in the semiconductor or solid-state body
- 2224/16147 . . . . . the bump connector connecting to a bonding area disposed in a recess of the surface
- 2224/16148 . . . . . the bump connector connecting to a bonding area protruding from the surface
- 2224/16151 . . . . . the bump connector connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
- 2224/16153 . . . . . the body and the item being arranged next to each other, e.g. on a common substrate
- 2224/16155 . . . . . the item being non-metallic, e.g. being an insulating substrate with or without metallisation
- 2224/16157 . . . . . the bump connector connecting to a bond pad of the item
- 2224/1616 . . . . . the bump connector connecting to a pin of the item
- 2224/16163 . . . . . the bump connector connecting to a potential ring of the item
- 2224/16165 . . . . . the bump connector connecting to a via metallisation of the item
- 2224/16167 . . . . . the bump connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/16168 . . . . . the bump connector connecting to a bonding area protruding from the surface of the item
- 2224/16175 . . . . . the item being metallic
- 2224/16183 . . . . . the bump connector connecting to a potential ring of the item
- 2224/16187 . . . . . the bump connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/16188 . . . . . the bump connector connecting to a bonding area protruding from the surface of the item
- 2224/16195 . . . . . the item being a discrete passive component
- 2224/16197 . . . . . the bump connector connecting to a bonding area disposed in a recess of the surface of the item

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2224/16198	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17055	. . . . .	of their bonding interfaces
2224/16221	. . . . .	the body and the item being stacked	2224/171	. . . . .	Disposition
2224/16225	. . . . .	the item being non-metallic, e.g. insulating substrate with or without metallisation	2224/17104	. . . . .	relative to the bonding areas, e.g. bond pads
2224/16227	. . . . .	the bump connector connecting to a bond pad of the item	2224/17106	. . . . .	the bump connectors being bonded to at least one common bonding area
2224/1623	. . . . .	the bump connector connecting to a pin of the item	2224/17107	. . . . .	the bump connectors connecting two common bonding areas
2224/16233	. . . . .	the bump connector connecting to a potential ring of the item	2224/1712	. . . . .	Layout ( <a href="#">layout of bump connectors prior to the connecting process H01L 2224/1412</a> )
2224/16235	. . . . .	the bump connector connecting to a via metallisation of the item	2224/1713	. . . . .	Square or rectangular array
2224/16237	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/17132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array
2224/16238	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17133	. . . . .	with a staggered arrangement, e.g. depopulated array
2224/1624	. . . . .	the bump connector connecting between the body and an opposite side of the item with respect to the body	2224/17134	. . . . .	covering only portions of the surface to be connected
2224/16245	. . . . .	the item being metallic	2224/17135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16253	. . . . .	the bump connector connecting to a potential ring of the item	2224/17136	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/16257	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/1714	. . . . .	Circular array, i.e. array with radial symmetry
2224/16258	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array
2224/1626	. . . . .	the bump connector connecting between the body and an opposite side of the item with respect to the body	2224/17143	. . . . .	with a staggered arrangement
2224/16265	. . . . .	the item being a discrete passive component	2224/17144	. . . . .	covering only portions of the surface to be connected
2224/16267	. . . . .	the bump connector connecting to a bonding area disposed in a recess of the surface of the item	2224/17145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16268	. . . . .	the bump connector connecting to a bonding area protruding from the surface of the item	2224/17146	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/165	. . . . .	Material	2224/1715	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry
2224/16501	. . . . .	at the bonding interface	2224/17151	. . . . .	being uniform, i.e. having a uniform pitch across the array
2224/16502	. . . . .	comprising an eutectic alloy	2224/17152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array
2224/16503	. . . . .	comprising an intermetallic compound	2224/17153	. . . . .	with a staggered arrangement, e.g. depopulated array
2224/16505	. . . . .	outside the bonding interface, e.g. in the bulk of the bump connector	2224/17154	. . . . .	covering only portions of the surface to be connected
2224/16506	. . . . .	comprising an eutectic alloy	2224/17155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/16507	. . . . .	comprising an intermetallic compound	2224/17156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/17	. . . . .	of a plurality of bump connectors	2224/1716	. . . . .	Random layout, i.e. layout with no symmetry
2224/1701	. . . . .	Structure	2224/17163	. . . . .	with a staggered arrangement
2224/1703	. . . . .	Bump connectors having different sizes, e.g. different diameters, heights or widths	2224/17164	. . . . .	covering only portions of the surface to be connected
2224/1705	. . . . .	Shape	2224/17165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/17051	. . . . .	Bump connectors having different shapes			

- 2224/17166 . . . . . Covering only the central area of the surface to be connected, i.e. central arrangements
- 2224/17177 . . . . . Combinations of arrays with different layouts
- 2224/17179 . . . . . Corner adaptations, i.e. disposition of the bump connectors at the corners of the semiconductor or solid-state body
- 2224/1718 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/17181 . . . . . On opposite sides of the body
- 2224/17183 . . . . . On contiguous sides of the body
- 2224/175 . . . . . Material
- 2224/17505 . . . . . Bump connectors having different materials
- 2224/1751 . . . . . Function
- 2224/17515 . . . . . Bump connectors having different functions
- 2224/17517 . . . . . including bump connectors providing primarily mechanical support
- 2224/17519 . . . . . including bump connectors providing primarily thermal dissipation
- 2224/18 . . . High density interconnect [HDI] connectors; Manufacturing methods related thereto
- 2224/19 . . . Manufacturing methods of high density interconnect preforms
- 2224/20 . . . Structure, shape, material or disposition of high density interconnect preforms
- 2224/21 . . . . of an individual HDI interconnect
- 2224/2101 . . . . . Structure
- 2224/2105 . . . . . Shape
- 2224/211 . . . . . Disposition
- 2224/214 . . . . . Connecting portions
- 2224/215 . . . . . Material
- 2224/22 . . . . of a plurality of HDI interconnects
- 2224/2201 . . . . . Structure
- 2224/2205 . . . . . Shape
- 2224/221 . . . . . Disposition
- 2224/224 . . . . . Connecting portions
- 2224/225 . . . . . Material
- 2224/22505 . . . . . HDI interconnects having different materials
- 2224/23 . . . Structure, shape, material or disposition of the high density interconnect connectors after the connecting process
- 2224/24 . . . . of an individual high density interconnect connector
- 2224/2401 . . . . . Structure
- 2224/24011 . . . . . Deposited, e.g. MCM-D type
- 2224/2402 . . . . . Laminated, e.g. MCM-L type
- 2224/2405 . . . . . Shape
- 2224/24051 . . . . . Conformal with the semiconductor or solid-state device
- 2224/241 . . . . . Disposition
- 2224/24101 . . . . . Connecting bonding areas at the same height
- 2224/24105 . . . . . Connecting bonding areas at different heights
- 2224/2413 . . . . . Connecting within a semiconductor or solid-state body
- 2224/24135 . . . . . Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
- 2224/24137 . . . . . the bodies being arranged next to each other, e.g. on a common substrate
- 2224/24141 . . . . . the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
- 2224/24145 . . . . . the bodies being stacked
- 2224/24146 . . . . . the HDI interconnect connecting to the same level of the lower semiconductor or solid-state body at which the upper semiconductor or solid-state body is mounted
- 2224/24147 . . . . . the HDI interconnect not connecting to the same level of the lower semiconductor or solid-state body at which the upper semiconductor or solid-state body is mounted, e.g. the upper semiconductor or solid-state body being mounted in a cavity or on a protrusion of the lower semiconductor or solid-state body
- 2224/24151 . . . . . Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
- 2224/24153 . . . . . the body and the item being arranged next to each other, e.g. on a common substrate
- 2224/24155 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/24175 . . . . . the item being metallic
- 2224/24195 . . . . . the item being a discrete passive component
- 2224/24221 . . . . . the body and the item being stacked
- 2224/24225 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/24226 . . . . . the HDI interconnect connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the item being planar
- 2224/24227 . . . . . the HDI interconnect not connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the semiconductor or solid-state body being mounted in a cavity or on a protrusion of the item
- 2224/24245 . . . . . the item being metallic
- 2224/24246 . . . . . the HDI interconnect connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the item being planar
- 2224/24247 . . . . . the HDI interconnect not connecting to the same level of the item at which the semiconductor or solid-state body is mounted, e.g. the semiconductor or solid-state body being mounted in a cavity or on a protrusion of the item

- 2224/24265 . . . . . the item being a discrete passive component
- 2224/244 . . . . . Connecting portions
- 2224/245 . . . . . Material
- 2224/2499 . . . . . Auxiliary members for HDI interconnects, e.g. spacers, alignment aids
- 2224/24991 . . . . . being formed on the semiconductor or solid-state body to be connected
- 2224/24992 . . . . . Flow barrier
- 2224/24996 . . . . . being formed on an item to be connected not being a semiconductor or solid-state body
- 2224/24997 . . . . . Flow barrier
- 2224/24998 . . . . . Reinforcing structures, e.g. ramp-like support
- 2224/25 . . . . . of a plurality of high density interconnect connectors
- 2224/2501 . . . . . Structure
- 2224/2505 . . . . . Shape
- 2224/251 . . . . . Disposition
- 2224/25105 . . . . . Connecting at different heights
- 2224/2511 . . . . . the connectors being bonded to at least one common bonding area
- 2224/25111 . . . . . the connectors connecting two common bonding areas
- 2224/25112 . . . . . the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body
- 2224/25113 . . . . . the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body
- 2224/2512 . . . . . Layout
- 2224/25171 . . . . . Fan-out arrangements
- 2224/25174 . . . . . Stacked arrangements
- 2224/25175 . . . . . Parallel arrangements
- 2224/25177 . . . . . Combinations of a plurality of arrangements
- 2224/2518 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/254 . . . . . Connecting portions
- 2224/2541 . . . . . the connecting portions being stacked
- 2224/2543 . . . . . the connecting portions being staggered
- 2224/255 . . . . . Material
- 2224/26 . . . . . Layer connectors, e.g. plate connectors, solder or adhesive layers; Manufacturing methods related thereto
- 2224/2612 . . . . . Auxiliary members for layer connectors, e.g. spacers
- 2224/26122 . . . . . being formed on the semiconductor or solid-state body to be connected
- 2224/26125 . . . . . Reinforcing structures
- 2224/26135 . . . . . Alignment aids
- 2224/26145 . . . . . Flow barriers
- 2224/26152 . . . . . being formed on an item to be connected not being a semiconductor or solid-state body
- 2224/26155 . . . . . Reinforcing structures
- 2224/26165 . . . . . Alignment aids
- 2224/26175 . . . . . Flow barriers
- 2224/27 . . . . . Manufacturing methods
- 2224/27001 . . . . . Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/27002 . . . . . for supporting the semiconductor or solid-state body
- 2224/27003 . . . . . for holding or transferring the layer preform
- 2224/27005 . . . . . for aligning the layer connector, e.g. marks, spacers
- 2224/27009 . . . . . for protecting parts during manufacture
- 2224/27011 . . . . . Involving a permanent auxiliary member, i.e. a member which is left at least partly in the finished device, e.g. coating, dummy feature
- 2224/27013 . . . . . for holding or confining the layer connector, e.g. solder flow barrier
- 2224/27015 . . . . . for aligning the layer connector, e.g. marks, spacers
- 2224/27019 . . . . . for protecting parts during the process
- 2224/271 . . . . . Manufacture and pre-treatment of the layer connector preform
- 2224/2711 . . . . . Shaping
- 2224/2712 . . . . . Applying permanent coating
- 2224/273 . . . . . by local deposition of the material of the layer connector
- 2224/2731 . . . . . in liquid form
- 2224/27312 . . . . . Continuous flow, e.g. using a microsyringe, a pump, a nozzle or extrusion
- 2224/27318 . . . . . by dispensing droplets
- 2224/2732 . . . . . Screen printing, i.e. using a stencil
- 2224/2733 . . . . . in solid form
- 2224/27332 . . . . . using a powder
- 2224/27334 . . . . . using preformed layer
- 2224/274 . . . . . by blanket deposition of the material of the layer connector
- 2224/2741 . . . . . in liquid form
- 2224/27416 . . . . . Spin coating
- 2224/27418 . . . . . Spray coating
- 2224/2742 . . . . . Curtain coating
- 2224/27422 . . . . . by dipping, e.g. in a solder bath ([hot-dipping C23C 2/00](#))
- 2224/27424 . . . . . Immersion coating, e.g. in a solder bath ([immersion processes C23C 2/00](#))
- 2224/27426 . . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
- 2224/27428 . . . . . Wave coating
- 2224/2743 . . . . . in solid form
- 2224/27436 . . . . . Lamination of a preform, e.g. foil, sheet or layer
- 2224/27438 . . . . . the preform being at least partly pre-patterned
- 2224/2744 . . . . . by transfer printing
- 2224/27442 . . . . . using a powder
- 2224/27444 . . . . . in gaseous form
- 2224/2745 . . . . . Physical vapour deposition [PVD], e.g. evaporation, or sputtering
- 2224/27452 . . . . . Chemical vapour deposition [CVD], e.g. laser CVD
- 2224/2746 . . . . . Plating
- 2224/27462 . . . . . Electroplating
- 2224/27464 . . . . . Electroless plating

- 2224/27466 . . . . . Conformal deposition, i.e. blanket deposition of a conformal layer on a patterned surface
- 2224/2747 . . . . . using a lift-off mask
- 2224/27472 . . . . . Profile of the lift-off mask
- 2224/27474 . . . . . Multilayer masks
- 2224/2748 . . . . . Permanent masks, i.e. masks left in the finished device, e.g. passivation layers
- 2224/275 . . . . . by chemical or physical modification of a pre-existing or pre-deposited material
- 2224/27502 . . . . . Pre-existing or pre-deposited material
- 2224/27505 . . . . . Sintering
- 2224/2751 . . . . . Anodisation
- 2224/27515 . . . . . Curing and solidification, e.g. of a photosensitive layer material
- 2224/2752 . . . . . Self-assembly, e.g. self-agglomeration of the layer material in a fluid
- 2224/27522 . . . . . Auxiliary means therefor, e.g. for self-assembly activation
- 2224/27524 . . . . . with special adaptation of the surface or of an auxiliary substrate, e.g. surface shape specially adapted for the self-assembly process
- 2224/27526 . . . . . involving the material of the bonding area, e.g. bonding pad
- 2224/2755 . . . . . Selective modification
- 2224/27552 . . . . . using a laser or a focussed ion beam [FIB]
- 2224/27554 . . . . . Stereolithography, i.e. solidification of a pattern defined by a laser trace in a photosensitive resin
- 2224/276 . . . . . by patterning a pre-deposited material (treatment of parts prior to assembly of the devices [H01L 21/48](#))
- 2224/27602 . . . . . Mechanical treatment, e.g. polishing, grinding
- 2224/2761 . . . . . Physical or chemical etching
- 2224/27612 . . . . . by physical means only
- 2224/27614 . . . . . by chemical means only
- 2224/27616 . . . . . Chemical mechanical polishing [CMP]
- 2224/27618 . . . . . with selective exposure, development and removal of a photosensitive layer material, e.g. of a photosensitive conductive resin
- 2224/2762 . . . . . using masks
- 2224/27622 . . . . . Photolithography
- 2224/2763 . . . . . using a laser or a focused ion beam [FIB]
- 2224/27632 . . . . . Ablation by means of a laser or focused ion beam [FIB]
- 2224/277 . . . . . involving monitoring, e.g. feedback loop
- 2224/278 . . . . . Post-treatment of the layer connector
- 2224/2781 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/2782 . . . . . Applying permanent coating, e.g. in-situ coating
- 2224/27821 . . . . . Spray coating
- 2224/27822 . . . . . by dipping, e.g. in a solder bath
- 2224/27823 . . . . . Immersion coating, e.g. in a solder bath
- 2224/27824 . . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
- 2224/27825 . . . . . Plating, e.g. electroplating, electroless plating
- 2224/27826 . . . . . Physical vapour deposition [PVD], e.g. evaporation, or sputtering
- 2224/27827 . . . . . Chemical vapour deposition [CVD], e.g. laser CVD
- 2224/2783 . . . . . Reworking, e.g. shaping ([reflowing H01L 2224/27849](#))
- 2224/27831 . . . . . involving a chemical process, e.g. etching the layer connector
- 2224/2784 . . . . . involving a mechanical process, e.g. planarising the layer connector
- 2224/27845 . . . . . Chemical mechanical polishing [CMP]
- 2224/27848 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/27849 . . . . . Reflowing
- 2224/279 . . . . . Methods of manufacturing layer connectors involving a specific sequence of method steps
- 2224/27901 . . . . . with repetition of the same manufacturing step
- 2224/27902 . . . . . Multiple masking steps
- 2224/27903 . . . . . using different masks
- 2224/27906 . . . . . with modification of the same mask
- 2224/2791 . . . . . Forming a passivation layer after forming the layer connector
- 2224/27912 . . . . . the layer being used as a mask for patterning other parts
- 2224/27916 . . . . . a passivation layer being used as a mask for patterning other parts
- 2224/28 . . . . . Structure, shape, material or disposition of the layer connectors prior to the connecting process
- 2224/28105 . . . . . Layer connectors formed on an encapsulation of the semiconductor or solid-state body, e.g. layer connectors on chip-scale packages
- 2224/29 . . . . . of an individual layer connector
- 2224/29001 . . . . . Core members of the layer connector
- 2224/29005 . . . . . Structure
- 2224/29006 . . . . . Layer connector larger than the underlying bonding area
- 2224/29007 . . . . . Layer connector smaller than the underlying bonding area
- 2224/29008 . . . . . Layer connector integrally formed with a redistribution layer on the semiconductor or solid-state body
- 2224/29009 . . . . . Layer connector integrally formed with a via connection of the semiconductor or solid-state body
- 2224/2901 . . . . . Shape
- 2224/29011 . . . . . comprising apertures or cavities
- 2224/29012 . . . . . in top view
- 2224/29013 . . . . . being rectangular or square
- 2224/29014 . . . . . being circular or elliptic
- 2224/29015 . . . . . comprising protrusions or indentations
- 2224/29016 . . . . . in side view
- 2224/29017 . . . . . being non uniform along the layer connector
- 2224/29018 . . . . . comprising protrusions or indentations
- 2224/29019 . . . . . at the bonding interface of the layer connector, i.e. on the surface of the layer connector
- 2224/2902 . . . . . Disposition
- 2224/29021 . . . . . the layer connector being disposed in a recess of the surface ([embedded layer connector H01L 2224/29022](#))

2224/29022	. . . . .	the layer connector being at least partially embedded in the surface	2224/29138	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/29023	. . . . .	the whole layer connector protruding from the surface	2224/29139	. . . . .	Silver [Ag] as principal constituent
2224/29024	. . . . .	the layer connector being disposed on a redistribution layer on the semiconductor or solid-state body	2224/29144	. . . . .	Gold [Au] as principal constituent
2224/29025	. . . . .	the layer connector being disposed on a via connection of the semiconductor or solid-state body	2224/29147	. . . . .	Copper [Cu] as principal constituent
2224/29026	. . . . .	relative to the bonding area, e.g. bond pad, of the semiconductor or solid-state body	2224/29149	. . . . .	Manganese [Mn] as principal constituent
2224/29027	. . . . .	the layer connector being offset with respect to the bonding area, e.g. bond pad	2224/29155	. . . . .	Nickel [Ni] as principal constituent
2224/29028	. . . . .	the layer connector being disposed on at least two separate bonding areas, e.g. bond pads	2224/29157	. . . . .	Cobalt [Co] as principal constituent
2224/29034	. . . . .	the layer connector covering only portions of the surface to be connected	2224/2916	. . . . .	Iron [Fe] as principal constituent
2224/29035	. . . . .	covering only the peripheral area of the surface to be connected	2224/29163	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/29036	. . . . .	covering only the central area of the surface to be connected	2224/29164	. . . . .	Palladium [Pd] as principal constituent
2224/29075	. . . . .	Plural core members	2224/29166	. . . . .	Titanium [Ti] as principal constituent
2224/29076	. . . . .	being mutually engaged together, e.g. through inserts	2224/29169	. . . . .	Platinum [Pt] as principal constituent
2224/29078	. . . . .	being disposed next to each other, e.g. side-to-side arrangements	2224/2917	. . . . .	Zirconium [Zr] as principal constituent
2224/2908	. . . . .	being stacked	2224/29171	. . . . .	Chromium [Cr] as principal constituent
2224/29082	. . . . .	Two-layer arrangements	2224/29172	. . . . .	Vanadium [V] as principal constituent
2224/29083	. . . . .	Three-layer arrangements	2224/29173	. . . . .	Rhodium [Rh] as principal constituent
2224/29084	. . . . .	Four-layer arrangements	2224/29176	. . . . .	Ruthenium [Ru] as principal constituent
2224/29099	. . . . .	Material	2224/29178	. . . . .	Iridium [Ir] as principal constituent
2224/291	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29179	. . . . .	Niobium [Nb] as principal constituent
2224/29101	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/2918	. . . . .	Molybdenum [Mo] as principal constituent
2224/29105	. . . . .	Gallium [Ga] as principal constituent	2224/29181	. . . . .	Tantalum [Ta] as principal constituent
2224/29109	. . . . .	Indium [In] as principal constituent	2224/29183	. . . . .	Rhenium [Re] as principal constituent
2224/29111	. . . . .	Tin [Sn] as principal constituent	2224/29184	. . . . .	Tungsten [W] as principal constituent
2224/29113	. . . . .	Bismuth [Bi] as principal constituent	2224/29186	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29114	. . . . .	Thallium [Tl] as principal constituent	2224/29187	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/29188</a> )
2224/29116	. . . . .	Lead [Pb] as principal constituent	2224/29188	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29117	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/2919	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29118	. . . . .	Zinc [Zn] as principal constituent	2224/29191	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/2912	. . . . .	Antimony [Sb] as principal constituent			
2224/29123	. . . . .	Magnesium [Mg] as principal constituent			
2224/29124	. . . . .	Aluminium [Al] as principal constituent			

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2224/29193	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/291</a> - <a href="#">H01L 2224/29191</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/29249	Manganese [Mn] as principal constituent
2224/29194	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/291</a> - <a href="#">H01L 2224/29191</a>	2224/29255	Nickel [Ni] as principal constituent
2224/29195	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/291</a> - <a href="#">H01L 2224/29191</a>	2224/29257	Cobalt [Co] as principal constituent
2224/29198	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/2926	Iron [Fe] as principal constituent
2224/29199	Material of the matrix	2224/29263	the principal constituent melting at a temperature of greater than 1550°C
2224/292	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29264	Palladium [Pd] as principal constituent
2224/29201	the principal constituent melting at a temperature of less than 400°C	2224/29266	Titanium [Ti] as principal constituent
2224/29205	Gallium [Ga] as principal constituent	2224/29269	Platinum [Pt] as principal constituent
2224/29209	Indium [In] as principal constituent	2224/2927	Zirconium [Zr] as principal constituent
2224/29211	Tin [Sn] as principal constituent	2224/29271	Chromium [Cr] as principal constituent
2224/29213	Bismuth [Bi] as principal constituent	2224/29272	Vanadium [V] as principal constituent
2224/29214	Thallium [Tl] as principal constituent	2224/29273	Rhodium [Rh] as principal constituent
2224/29216	Lead [Pb] as principal constituent	2224/29276	Ruthenium [Ru] as principal constituent
2224/29217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29278	Iridium [Ir] as principal constituent
2224/29218	Zinc [Zn] as principal constituent	2224/29279	Niobium [Nb] as principal constituent
2224/2922	Antimony [Sb] as principal constituent	2224/2928	Molybdenum [Mo] as principal constituent
2224/29223	Magnesium [Mg] as principal constituent	2224/29281	Tantalum [Ta] as principal constituent
2224/29224	Aluminium [Al] as principal constituent	2224/29283	Rhenium [Re] as principal constituent
2224/29238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29284	Tungsten [W] as principal constituent
2224/29239	Silver [Ag] as principal constituent	2224/29286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29244	Gold [Au] as principal constituent	2224/29287	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/29288</a> )
2224/29247	Copper [Cu] as principal constituent	2224/29288	Glasses, e.g. amorphous oxides, nitrides or fluorides
		2224/2929	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
		2224/29291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
		2224/29293	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/292</a> - <a href="#">H01L 2224/29291</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond



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2224/29294	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/292</a> - <a href="#">H01L 2224/29291</a>	2224/29364	Palladium [Pd] as principal constituent
2224/29295	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/292</a> - <a href="#">H01L 2224/29291</a>	2224/29366	Titanium [Ti] as principal constituent
2224/29298	Fillers	2224/29369	Platinum [Pt] as principal constituent
2224/29299	Base material	2224/2937	Zirconium [Zr] as principal constituent
2224/293	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29371	Chromium [Cr] as principal constituent
2224/29301	the principal constituent melting at a temperature of less than 400°C	2224/29372	Vanadium [V] as principal constituent
2224/29305	Gallium [Ga] as principal constituent	2224/29373	Rhodium [Rh] as principal constituent
2224/29309	Indium [In] as principal constituent	2224/29376	Ruthenium [Ru] as principal constituent
2224/29311	Tin [Sn] as principal constituent	2224/29378	Iridium [Ir] as principal constituent
2224/29313	Bismuth [Bi] as principal constituent	2224/29379	Niobium [Nb] as principal constituent
2224/29314	Thallium [Tl] as principal constituent	2224/2938	Molybdenum [Mo] as principal constituent
2224/29316	Lead [Pb] as principal constituent	2224/29381	Tantalum [Ta] as principal constituent
2224/29317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29383	Rhenium [Re] as principal constituent
2224/29318	Zinc [Zn] as principal constituent	2224/29384	Tungsten [W] as principal constituent
2224/2932	Antimony [Sb] as principal constituent	2224/29386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29323	Magnesium [Mg] as principal constituent	2224/29387	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/29388</a> )
2224/29324	Aluminium [Al] as principal constituent	2224/29388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/2939	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29339	Silver [Ag] as principal constituent	2224/29391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29344	Gold [Au] as principal constituent	2224/29393	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/293</a> - <a href="#">H01L 2224/29391</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29347	Copper [Cu] as principal constituent	2224/29394	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/293</a> - <a href="#">H01L 2224/29391</a>
2224/29349	Manganese [Mn] as principal constituent	2224/29395	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/293</a> - <a href="#">H01L 2224/29391</a>
2224/29355	Nickel [Ni] as principal constituent		
2224/29357	Cobalt [Co] as principal constituent		
2224/2936	Iron [Fe] as principal constituent		
2224/29363	the principal constituent melting at a temperature of greater than 1550°C		

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2224/29398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/29466	Titanium [Ti] as principal constituent
2224/29399	Coating material	2224/29469	Platinum [Pt] as principal constituent
2224/294	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/2947	Zirconium [Zr] as principal constituent
2224/29401	the principal constituent melting at a temperature of less than 400°C	2224/29471	Chromium [Cr] as principal constituent
2224/29405	Gallium [Ga] as principal constituent	2224/29472	Vanadium [V] as principal constituent
2224/29409	Indium [In] as principal constituent	2224/29473	Rhodium [Rh] as principal constituent
2224/29411	Tin [Sn] as principal constituent	2224/29476	Ruthenium [Ru] as principal constituent
2224/29413	Bismuth [Bi] as principal constituent	2224/29478	Iridium [Ir] as principal constituent
2224/29414	Thallium [Tl] as principal constituent	2224/29479	Niobium [Nb] as principal constituent
2224/29416	Lead [Pb] as principal constituent	2224/2948	Molybdenum [Mo] as principal constituent
2224/29417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29481	Tantalum [Ta] as principal constituent
2224/29418	Zinc [Zn] as principal constituent	2224/29483	Rhenium [Re] as principal constituent
2224/2942	Antimony [Sb] as principal constituent	2224/29484	Tungsten [W] as principal constituent
2224/29423	Magnesium [Mg] as principal constituent	2224/29486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29424	Aluminium [Al] as principal constituent	2224/29487	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/29488</a> )
2224/29438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29439	Silver [Ag] as principal constituent	2224/2949	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29444	Gold [Au] as principal constituent	2224/29491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29447	Copper [Cu] as principal constituent	2224/29493	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/294</a> - <a href="#">H01L 2224/29491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29449	Manganese [Mn] as principal constituent	2224/29494	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/294</a> - <a href="#">H01L 2224/29491</a>
2224/29455	Nickel [Ni] as principal constituent	2224/29495	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/294</a> - <a href="#">H01L 2224/29491</a>
2224/29457	Cobalt [Co] as principal constituent	2224/29498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/2946	Iron [Fe] as principal constituent		
2224/29463	the principal constituent melting at a temperature of greater than 1550°C		
2224/29464	Palladium [Pd] as principal constituent		

2224/29499	Shape or distribution of the fillers	2224/29638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/2954	Coating	2224/29639	Silver [Ag] as principal constituent
2224/29541	Structure	2224/29644	Gold [Au] as principal constituent
2224/2955	Shape	2224/29647	Copper [Cu] as principal constituent
2224/29551	being non uniform	2224/29649	Manganese [Mn] as principal constituent
2224/29552	comprising protrusions or indentations	2224/29655	Nickel [Ni] as principal constituent
2224/29553	at the bonding interface of the layer connector, i.e. on the surface of the layer connector	2224/29657	Cobalt [Co] as principal constituent
2224/2956	Disposition	2224/2966	Iron [Fe] as principal constituent
2224/29561	On the entire surface of the core, i.e. integral coating	2224/29663	the principal constituent melting at a temperature of greater than 1550°C
2224/29562	On the entire exposed surface of the core	2224/29664	Palladium [Pd] as principal constituent
2224/29563	Only on parts of the surface of the core, i.e. partial coating	2224/29666	Titanium [Ti] as principal constituent
2224/29564	Only on the bonding interface of the layer connector	2224/29669	Platinum [Pt] as principal constituent
2224/29565	Only outside the bonding interface of the layer connector	2224/2967	Zirconium [Zr] as principal constituent
2224/29566	Both on and outside the bonding interface of the layer connector	2224/29671	Chromium [Cr] as principal constituent
2224/2957	Single coating layer	2224/29672	Vanadium [V] as principal constituent
2224/29575	Plural coating layers	2224/29673	Rhodium [Rh] as principal constituent
2224/29576	being mutually engaged together, e.g. through inserts	2224/29676	Ruthenium [Ru] as principal constituent
2224/29578	being disposed next to each other, e.g. side-to-side arrangements	2224/29678	Iridium [Ir] as principal constituent
2224/2958	being stacked	2224/29679	Niobium [Nb] as principal constituent
2224/29582	Two-layer coating	2224/2968	Molybdenum [Mo] as principal constituent
2224/29583	Three-layer coating	2224/29681	Tantalum [Ta] as principal constituent
2224/29584	Four-layer coating	2224/29683	Rhenium [Re] as principal constituent
2224/29599	Material	2224/29684	Tungsten [W] as principal constituent
2224/296	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29601	the principal constituent melting at a temperature of less than 400°C	2224/29687	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/29688</a> )
2224/29605	Gallium [Ga] as principal constituent	2224/29688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29609	Indium [In] as principal constituent	2224/2969	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29611	Tin [Sn] as principal constituent	2224/29691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29613	Bismuth [Bi] as principal constituent		
2224/29614	Thallium [Tl] as principal constituent		
2224/29616	Lead [Pb] as principal constituent		
2224/29617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C		
2224/29618	Zinc [Zn] as principal constituent		
2224/2962	Antimony [Sb] as principal constituent		
2224/29623	Magnesium [Mg] as principal constituent		
2224/29624	Aluminium [Al] as principal constituent		

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2224/29693	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/296</a> - <a href="#">H01L 2224/29691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/29749	Manganese [Mn] as principal constituent
2224/29694	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/296</a> - <a href="#">H01L 2224/29691</a>	2224/29755	Nickel [Ni] as principal constituent
2224/29695	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/296</a> - <a href="#">H01L 2224/29691</a>	2224/29757	Cobalt [Co] as principal constituent
2224/29698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/2976	Iron [Fe] as principal constituent
2224/29699	Material of the matrix	2224/29763	the principal constituent melting at a temperature of greater than 1550°C
2224/297	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29764	Palladium [Pd] as principal constituent
2224/29701	the principal constituent melting at a temperature of less than 400°C	2224/29766	Titanium [Ti] as principal constituent
2224/29705	Gallium [Ga] as principal constituent	2224/29769	Platinum [Pt] as principal constituent
2224/29709	Indium [In] as principal constituent	2224/2977	Zirconium [Zr] as principal constituent
2224/29711	Tin [Sn] as principal constituent	2224/29771	Chromium [Cr] as principal constituent
2224/29713	Bismuth [Bi] as principal constituent	2224/29772	Vanadium [V] as principal constituent
2224/29714	Thallium [Tl] as principal constituent	2224/29773	Rhodium [Rh] as principal constituent
2224/29716	Lead [Pb] as principal constituent	2224/29776	Ruthenium [Ru] as principal constituent
2224/29717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29778	Iridium [Ir] as principal constituent
2224/29718	Zinc [Zn] as principal constituent	2224/29779	Niobium [Nb] as principal constituent
2224/2972	Antimony [Sb] as principal constituent	2224/2978	Molybdenum [Mo] as principal constituent
2224/29723	Magnesium [Mg] as principal constituent	2224/29781	Tantalum [Ta] as principal constituent
2224/29724	Aluminium [Al] as principal constituent	2224/29783	Rhenium [Re] as principal constituent
2224/29738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29784	Tungsten [W] as principal constituent
2224/29739	Silver [Ag] as principal constituent	2224/29786	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29744	Gold [Au] as principal constituent	2224/29787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/29788</a> )
2224/29747	Copper [Cu] as principal constituent	2224/29788	Glasses, e.g. amorphous oxides, nitrides or fluorides
		2224/2979	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
		2224/29791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
		2224/29793	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/297</a> - <a href="#">H01L 2224/29791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond

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2224/29794	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/297</a> - <a href="#">H01L 2224/29791</a>	2224/29864	Palladium [Pd] as principal constituent
2224/29795	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/297</a> - <a href="#">H01L 2224/29791</a>	2224/29866	Titanium [Ti] as principal constituent
2224/29798	Fillers	2224/29869	Platinum [Pt] as principal constituent
2224/29799	Base material	2224/2987	Zirconium [Zr] as principal constituent
2224/298	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/29871	Chromium [Cr] as principal constituent
2224/29801	the principal constituent melting at a temperature of less than 400°C	2224/29872	Vanadium [V] as principal constituent
2224/29805	Gallium [Ga] as principal constituent	2224/29873	Rhodium [Rh] as principal constituent
2224/29809	Indium [In] as principal constituent	2224/29876	Ruthenium [Ru] as principal constituent
2224/29811	Tin [Sn] as principal constituent	2224/29878	Iridium [Ir] as principal constituent
2224/29813	Bismuth [Bi] as principal constituent	2224/29879	Niobium [Nb] as principal constituent
2224/29814	Thallium [Tl] as principal constituent	2224/2988	Molybdenum [Mo] as principal constituent
2224/29816	Lead [Pb] as principal constituent	2224/29881	Tantalum [Ta] as principal constituent
2224/29817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29883	Rhenium [Re] as principal constituent
2224/29818	Zinc [Zn] as principal constituent	2224/29884	Tungsten [W] as principal constituent
2224/2982	Antimony [Sb] as principal constituent	2224/29886	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29823	Magnesium [Mg] as principal constituent	2224/29887	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/29888</a> )
2224/29824	Aluminium [Al] as principal constituent	2224/29888	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/2989	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29839	Silver [Ag] as principal constituent	2224/29891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29844	Gold [Au] as principal constituent	2224/29893	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/298</a> - <a href="#">H01L 2224/29891</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29847	Copper [Cu] as principal constituent	2224/29894	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/298</a> - <a href="#">H01L 2224/29891</a>
2224/29849	Manganese [Mn] as principal constituent	2224/29895	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/298</a> - <a href="#">H01L 2224/29891</a>
2224/29855	Nickel [Ni] as principal constituent		
2224/29857	Cobalt [Co] as principal constituent		
2224/2986	Iron [Fe] as principal constituent		
2224/29863	the principal constituent melting at a temperature of greater than 1550°C		

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2224/29898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/29966	Titanium [Ti] as principal constituent
2224/29899	Coating material	2224/29969	Platinum [Pt] as principal constituent
2224/299	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/2997	Zirconium [Zr] as principal constituent
2224/29901	the principal constituent melting at a temperature of less than 400°C	2224/29971	Chromium [Cr] as principal constituent
2224/29905	Gallium [Ga] as principal constituent	2224/29972	Vanadium [V] as principal constituent
2224/29909	Indium [In] as principal constituent	2224/29973	Rhodium [Rh] as principal constituent
2224/29911	Tin [Sn] as principal constituent	2224/29976	Ruthenium [Ru] as principal constituent
2224/29913	Bismuth [Bi] as principal constituent	2224/29978	Iridium [Ir] as principal constituent
2224/29914	Thallium [Tl] as principal constituent	2224/29979	Niobium [Nb] as principal constituent
2224/29916	Lead [Pb] as principal constituent	2224/2998	Molybdenum [Mo] as principal constituent
2224/29917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/29981	Tantalum [Ta] as principal constituent
2224/29918	Zinc [Zn] as principal constituent	2224/29983	Rhenium [Re] as principal constituent
2224/2992	Antimony [Sb] as principal constituent	2224/29984	Tungsten [W] as principal constituent
2224/29923	Magnesium [Mg] as principal constituent	2224/29986	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/29924	Aluminium [Al] as principal constituent	2224/29987	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/29988</a> )
2224/29938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/29988	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/29939	Silver [Ag] as principal constituent	2224/2999	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/29944	Gold [Au] as principal constituent	2224/29991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/29947	Copper [Cu] as principal constituent	2224/29993	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/299</a> - <a href="#">H01L 2224/29991</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/29949	Manganese [Mn] as principal constituent	2224/29994	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/299</a> - <a href="#">H01L 2224/29991</a>
2224/29955	Nickel [Ni] as principal constituent	2224/29995	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/299</a> - <a href="#">H01L 2224/29991</a>
2224/29957	Cobalt [Co] as principal constituent	2224/29998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/2996	Iron [Fe] as principal constituent		
2224/29963	the principal constituent melting at a temperature of greater than 1550°C		
2224/29964	Palladium [Pd] as principal constituent		

2224/29999	. . . . .	Shape or distribution of the fillers	2224/30164	. . . . .	covering only portions of the surface to be connected
2224/30	. . . . .	of a plurality of layer connectors	2224/30165	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements
2224/3001	. . . . .	Structure	2224/30166	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements
2224/3003	. . . . .	Layer connectors having different sizes, e.g. different heights or widths	2224/30177	. . . . .	Combinations of arrays with different layouts
2224/3005	. . . . .	Shape	2224/30179	. . . . .	Corner adaptations, i.e. disposition of the layer connectors at the corners of the semiconductor or solid-state body
2224/30051	. . . . .	Layer connectors having different shapes	2224/3018	. . . . .	being disposed on at least two different sides of the body, e.g. dual array
2224/301	. . . . .	Disposition	2224/30181	. . . . .	On opposite sides of the body
2224/30104	. . . . .	relative to the bonding areas, e.g. bond pads, of the semiconductor or solid-state body	2224/30183	. . . . .	On contiguous sides of the body
2224/3011	. . . . .	the layer connectors being bonded to at least one common bonding area	2224/305	. . . . .	Material
2224/3012	. . . . .	Layout	2224/30505	. . . . .	Layer connectors having different materials
2224/3013	. . . . .	Square or rectangular array	2224/3051	. . . . .	Function
2224/30131	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/30515	. . . . .	Layer connectors having different functions
2224/30132	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/30517	. . . . .	including layer connectors providing primarily mechanical bonding
2224/30133	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/30519	. . . . .	including layer connectors providing primarily thermal dissipation
2224/30134	. . . . .	covering only portions of the surface to be connected	2224/31	. . . . .	Structure, shape, material or disposition of the layer connectors after the connecting process
2224/30135	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/32	. . . . .	of an individual layer connector
2224/30136	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/3201	. . . . .	Structure
2224/3014	. . . . .	Circular array, i.e. array with radial symmetry	2224/32012	. . . . .	relative to the bonding area, e.g. bond pad
2224/30141	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/32013	. . . . .	the layer connector being larger than the bonding area, e.g. bond pad
2224/30142	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/32014	. . . . .	the layer connector being smaller than the bonding area, e.g. bond pad
2224/30143	. . . . .	covering only portions of the surface to be connected	2224/3205	. . . . .	Shape
2224/30145	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/32052	. . . . .	in top view
2224/30146	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/32053	. . . . .	being non uniform along the layer connector
2224/3015	. . . . .	Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/32054	. . . . .	being rectangular or square
2224/30151	. . . . .	being uniform, i.e. having a uniform pitch across the array	2224/32055	. . . . .	being circular or elliptic
2224/30152	. . . . .	being non uniform, i.e. having a non uniform pitch across the array	2224/32056	. . . . .	comprising protrusions or indentations
2224/30153	. . . . .	with a staggered arrangement, e.g. depopulated array	2224/32057	. . . . .	in side view
2224/30154	. . . . .	covering only portions of the surface to be connected	2224/32058	. . . . .	being non uniform along the layer connector
2224/30155	. . . . .	Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/32059	. . . . .	comprising protrusions or indentations
2224/30156	. . . . .	Covering only the central area of the surface to be connected, i.e. central arrangements	2224/3207	. . . . .	of bonding interfaces, e.g. interlocking features
2224/3016	. . . . .	Random layout, i.e. layout with no symmetry	2224/321	. . . . .	Disposition
2224/30163	. . . . .	with a staggered arrangement	2224/32104	. . . . .	relative to the bonding area, e.g. bond pad
			2224/32105	. . . . .	the layer connector connecting bonding areas being not aligned with respect to each other
			2224/32106	. . . . .	the layer connector connecting one bonding area to at least two respective bonding areas
			2224/32111	. . . . .	the layer connector being disposed in a recess of the surface

- 2224/32112 . . . . . the layer connector being at least partially embedded in the surface
- 2224/32113 . . . . . the whole layer connector protruding from the surface
- 2224/3213 . . . . . the layer connector connecting within a semiconductor or solid-state body, i.e. connecting two bonding areas on the same semiconductor or solid-state body
- 2224/32135 . . . . . the layer connector connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
- 2224/32137 . . . . . the bodies being arranged next to each other, e.g. on a common substrate
- 2224/32141 . . . . . the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
- 2224/32145 . . . . . the bodies being stacked
- 2224/32146 . . . . . the layer connector connecting to a via connection in the semiconductor or solid-state body
- 2224/32147 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface
- 2224/32148 . . . . . the layer connector connecting to a bonding area protruding from the surface
- 2224/32151 . . . . . the layer connector connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
- 2224/32153 . . . . . the body and the item being arranged next to each other, e.g. on a common substrate
- 2224/32155 . . . . . the item being non-metallic, e.g. being an insulating substrate with or without metallisation
- 2224/32157 . . . . . the layer connector connecting to a bond pad of the item
- 2224/3216 . . . . . the layer connector connecting to a pin of the item
- 2224/32163 . . . . . the layer connector connecting to a potential ring of the item
- 2224/32165 . . . . . the layer connector connecting to a via metallisation of the item
- 2224/32167 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32168 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/32175 . . . . . the item being metallic
- 2224/32183 . . . . . the layer connector connecting to a potential ring of the item
- 2224/32187 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32188 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/32195 . . . . . the item being a discrete passive component
- 2224/32197 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32198 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/32221 . . . . . the body and the item being stacked
- 2224/32225 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/32227 . . . . . the layer connector connecting to a bond pad of the item
- 2224/3223 . . . . . the layer connector connecting to a pin of the item
- 2224/32233 . . . . . the layer connector connecting to a potential ring of the item
- 2224/32235 . . . . . the layer connector connecting to a via metallisation of the item
- 2224/32237 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32238 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/3224 . . . . . the layer connector connecting between the body and an opposite side of the item with respect to the body
- 2224/32245 . . . . . the item being metallic
- 2224/32253 . . . . . the layer connector connecting to a potential ring of the item
- 2224/32257 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32258 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/3226 . . . . . the layer connector connecting between the body and an opposite side of the item with respect to the body
- 2224/32265 . . . . . the item being a discrete passive component
- 2224/32267 . . . . . the layer connector connecting to a bonding area disposed in a recess of the surface of the item
- 2224/32268 . . . . . the layer connector connecting to a bonding area protruding from the surface of the item
- 2224/325 . . . . . Material
- 2224/32501 . . . . . at the bonding interface
- 2224/32502 . . . . . comprising an eutectic alloy
- 2224/32503 . . . . . comprising an intermetallic compound
- 2224/32505 . . . . . outside the bonding interface, e.g. in the bulk of the layer connector
- 2224/32506 . . . . . comprising an eutectic alloy
- 2224/32507 . . . . . comprising an intermetallic compound
- 2224/33 . . . . . of a plurality of layer connectors
- 2224/3301 . . . . . Structure
- 2224/3303 . . . . . Layer connectors having different sizes, e.g. different heights or widths
- 2224/3305 . . . . . Shape
- 2224/33051 . . . . . Layer connectors having different shapes
- 2224/33055 . . . . . of their bonding interfaces



2224/331	. . . . . Disposition	2224/335	. . . . . Material
2224/33104	. . . . . relative to the bonding areas, e.g. bond pads	2224/33505	. . . . . Layer connectors having different materials
2224/33106	. . . . . the layer connectors being bonded to at least one common bonding area	2224/3351	. . . . . Function
2224/33107	. . . . . the layer connectors connecting two common bonding areas	2224/33515	. . . . . Layer connectors having different functions
2224/3312	. . . . . Layout ( <a href="#">layout of layer connectors prior to the connecting process H01L 2224/3012</a> )	2224/33517	. . . . . including layer connectors providing primarily mechanical support
2224/3313	. . . . . Square or rectangular array	2224/33519	. . . . . including layer connectors providing primarily thermal dissipation
2224/33132	. . . . . being non uniform, i.e. having a non uniform pitch across the array	2224/34	. . . Strap connectors, e.g. copper straps for grounding power devices; Manufacturing methods related thereto
2224/33133	. . . . . with a staggered arrangement, e.g. depopulated array	2224/35	. . . Manufacturing methods
2224/33134	. . . . . covering only portions of the surface to be connected	2224/35001	. . . . . Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
2224/33135	. . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/351	. . . . . Pre-treatment of the preform connector
2224/3314	. . . . . Circular array, i.e. array with radial symmetry	2224/3512	. . . . . Applying permanent coating, e.g. in-situ coating
2224/33142	. . . . . being non uniform, i.e. having a non uniform pitch across the array	2224/35125	. . . . . Plating, e.g. electroplating, electroless plating
2224/33143	. . . . . with a staggered arrangement	2224/352	. . . . . Mechanical processes
2224/33144	. . . . . covering only portions of the surface to be connected	2224/3521	. . . . . Pulling
2224/33145	. . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/355	. . . . . Modification of a pre-existing material
2224/3315	. . . . . Mirror array, i.e. array having only a reflection symmetry, i.e. bilateral symmetry	2224/3551	. . . . . Sintering
2224/33151	. . . . . being uniform, i.e. having a uniform pitch across the array	2224/3552	. . . . . Anodisation
2224/33152	. . . . . being non uniform, i.e. having a non uniform pitch across the array	2224/357	. . . . . Involving monitoring, e.g. feedback loop
2224/33153	. . . . . with a staggered arrangement, e.g. depopulated array	2224/358	. . . . . Post-treatment of the connector
2224/33154	. . . . . covering only portions of the surface to be connected	2224/3581	. . . . . Cleaning, e.g. oxide removal step, desmearing
2224/33155	. . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/3582	. . . . . Applying permanent coating, e.g. in-situ coating
2224/33156	. . . . . Covering only the central area of the surface to be connected, i.e. central arrangements	2224/35821	. . . . . Spray coating
2224/3316	. . . . . Random layout, i.e. layout with no symmetry	2224/35822	. . . . . Dip coating
2224/33163	. . . . . with a staggered arrangement	2224/35823	. . . . . Immersion coating, e.g. solder bath
2224/33164	. . . . . covering only portions of the surface to be connected	2224/35824	. . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
2224/33165	. . . . . Covering only the peripheral area of the surface to be connected, i.e. peripheral arrangements	2224/35825	. . . . . Plating, e.g. electroplating, electroless plating
2224/33177	. . . . . Combinations of arrays with different layouts	2224/35826	. . . . . Physical vapour deposition [PVD], e.g. evaporation, sputtering
2224/33179	. . . . . Corner adaptations, i.e. disposition of the layer connectors at the corners of the semiconductor or solid-state body	2224/35827	. . . . . Chemical vapour deposition [CVD], e.g. laser CVD
2224/3318	. . . . . being disposed on at least two different sides of the body, e.g. dual array	2224/3583	. . . . . Reworking
2224/33181	. . . . . On opposite sides of the body	2224/35831	. . . . . with a chemical process, e.g. with etching of the connector
2224/33183	. . . . . On contiguous sides of the body	2224/35847	. . . . . with a mechanical process, e.g. with flattening of the connector
		2224/35848	. . . . . Thermal treatments, e.g. annealing, controlled cooling
		2224/35985	. . . . . Methods of manufacturing strap connectors involving a specific sequence of method steps
		2224/35986	. . . . . with repetition of the same manufacturing step
		2224/36	. . . . . Structure, shape, material or disposition of the strap connectors prior to the connecting process
		2224/37	. . . . . of an individual strap connector
		2224/37001	. . . . . Core members of the connector
		2224/37005	. . . . . Structure
		2224/3701	. . . . . Shape

2224/37011	. . . . .	comprising apertures or cavities	2224/37166	. . . . .	Titanium [Ti] as principal constituent
2224/37012	. . . . .	Cross-sectional shape	2224/37169	. . . . .	Platinum [Pt] as principal constituent
2224/37013	. . . . .	being non uniform along the connector	2224/3717	. . . . .	Zirconium [Zr] as principal constituent
2224/3702	. . . . .	Disposition	2224/37171	. . . . .	Chromium [Cr] as principal constituent
2224/37025	. . . . .	Plural core members	2224/37172	. . . . .	Vanadium [V] as principal constituent
2224/37026	. . . . .	being mutually engaged together, e.g. through inserts	2224/37173	. . . . .	Rhodium [Rh] as principal constituent
2224/37028	. . . . .	Side-to-side arrangements	2224/37176	. . . . .	Ruthenium [Ru] as principal constituent
2224/3703	. . . . .	Stacked arrangements	2224/37178	. . . . .	Iridium [Ir] as principal constituent
2224/37032	. . . . .	Two-layer arrangements	2224/37179	. . . . .	Niobium [Nb] as principal constituent
2224/37033	. . . . .	Three-layer arrangements	2224/3718	. . . . .	Molybdenum [Mo] as principal constituent
2224/37034	. . . . .	Four-layer arrangements	2224/37181	. . . . .	Tantalum [Ta] as principal constituent
2224/37099	. . . . .	Material	2224/37183	. . . . .	Rhenium [Re] as principal constituent
2224/371	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/37184	. . . . .	Tungsten [W] as principal constituent
2224/37101	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/37186	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37105	. . . . .	Gallium [Ga] as principal constituent	2224/37187	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37188</a> )
2224/37109	. . . . .	Indium [In] as principal constituent	2224/37188	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37111	. . . . .	Tin [Sn] as principal constituent	2224/3719	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37113	. . . . .	Bismuth [Bi] as principal constituent	2224/37191	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37114	. . . . .	Thallium [Tl] as principal constituent	2224/37193	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/371</a> - <a href="#">H01L 2224/37191</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37116	. . . . .	Lead [Pb] as principal constituent	2224/37194	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/371</a> - <a href="#">H01L 2224/37191</a>
2224/37117	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37195	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/371</a> - <a href="#">H01L 2224/37191</a>
2224/37118	. . . . .	Zinc [Zn] as principal constituent	2224/37198	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/3712	. . . . .	Antimony [Sb] as principal constituent	2224/37199	. . . . .	Material of the matrix
2224/37123	. . . . .	Magnesium [Mg] as principal constituent			
2224/37124	. . . . .	Aluminium [Al] as principal constituent			
2224/37138	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C			
2224/37139	. . . . .	Silver [Ag] as principal constituent			
2224/37144	. . . . .	Gold [Au] as principal constituent			
2224/37147	. . . . .	Copper [Cu] as principal constituent			
2224/37149	. . . . .	Manganese [Mn] as principal constituent			
2224/37155	. . . . .	Nickel [Ni] as principal constituent			
2224/37157	. . . . .	Cobalt [Co] as principal constituent			
2224/3716	. . . . .	Iron [Fe] as principal constituent			
2224/37163	. . . . .	the principal constituent melting at a temperature of greater than 1550°C			
2224/37164	. . . . .	Palladium [Pd] as principal constituent			

2224/372	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/37271	Chromium [Cr] as principal constituent
2224/37201	the principal constituent melting at a temperature of less than 400°C	2224/37272	Vanadium [V] as principal constituent
2224/37205	Gallium [Ga] as principal constituent	2224/37273	Rhodium [Rh] as principal constituent
2224/37209	Indium [In] as principal constituent	2224/37276	Ruthenium [Ru] as principal constituent
2224/37211	Tin [Sn] as principal constituent	2224/37278	Iridium [Ir] as principal constituent
2224/37213	Bismuth [Bi] as principal constituent	2224/37279	Niobium [Nb] as principal constituent
2224/37214	Thallium [Tl] as principal constituent	2224/3728	Molybdenum [Mo] as principal constituent
2224/37216	Lead [Pb] as principal constituent	2224/37281	Tantalum [Ta] as principal constituent
2224/37217	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37283	Rhenium [Re] as principal constituent
2224/37218	Zinc [Zn] as principal constituent	2224/37284	Tungsten [W] as principal constituent
2224/3722	Antimony [Sb] as principal constituent	2224/37286	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37223	Magnesium [Mg] as principal constituent	2224/37287	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37288</a> )
2224/37224	Aluminium [Al] as principal constituent	2224/37288	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37238	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/3729	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37239	Silver [Ag] as principal constituent	2224/37291	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37244	Gold [Au] as principal constituent	2224/37293	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/372</a> - <a href="#">H01L 2224/37291</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37247	Copper [Cu] as principal constituent	2224/37294	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/372</a> - <a href="#">H01L 2224/37291</a>
2224/37249	Manganese [Mn] as principal constituent	2224/37295	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/372</a> - <a href="#">H01L 2224/37291</a>
2224/37255	Nickel [Ni] as principal constituent	2224/37298	Fillers
2224/37257	Cobalt [Co] as principal constituent	2224/37299	Base material
2224/3726	Iron [Fe] as principal constituent	2224/373	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37263	the principal constituent melting at a temperature of greater than 1550°C	2224/37301	the principal constituent melting at a temperature of less than 400°C
2224/37264	Palladium [Pd] as principal constituent	2224/37305	Gallium [Ga] as principal constituent
2224/37266	Titanium [Ti] as principal constituent		
2224/37269	Platinum [Pt] as principal constituent		
2224/3727	Zirconium [Zr] as principal constituent		

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2224/37309	Indium [In] as principal constituent	2224/3738	Molybdenum [Mo] as principal constituent
2224/37311	Tin [Sn] as principal constituent	2224/37381	Tantalum [Ta] as principal constituent
2224/37313	Bismuth [Bi] as principal constituent	2224/37383	Rhenium [Re] as principal constituent
2224/37314	Thallium [Tl] as principal constituent	2224/37384	Tungsten [W] as principal constituent
2224/37316	Lead [Pb] as principal constituent	2224/37386	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37317	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37387	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37388</a> )
2224/37318	Zinc [Zn] as principal constituent	2224/37388	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3732	Antimony [Sb] as principal constituent	2224/3739	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37323	Magnesium [Mg] as principal constituent	2224/37391	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37324	Aluminium [Al] as principal constituent	2224/37393	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/373</a> - <a href="#">H01L 2224/37391</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37338	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37394	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/373</a> - <a href="#">H01L 2224/37391</a>
2224/37339	Silver [Ag] as principal constituent	2224/37395	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/373</a> - <a href="#">H01L 2224/37391</a>
2224/37344	Gold [Au] as principal constituent	2224/37398	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37347	Copper [Cu] as principal constituent	2224/37399	Coating material
2224/37349	Manganese [Mn] as principal constituent	2224/374	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37355	Nickel [Ni] as principal constituent	2224/37401	the principal constituent melting at a temperature of less than 400°C
2224/37357	Cobalt [Co] as principal constituent	2224/37405	Gallium [Ga] as principal constituent
2224/3736	Iron [Fe] as principal constituent	2224/37409	Indium [In] as principal constituent
2224/37363	the principal constituent melting at a temperature of greater than 1550°C	2224/37411	Tin [Sn] as principal constituent
2224/37364	Palladium [Pd] as principal constituent		
2224/37366	Titanium [Ti] as principal constituent		
2224/37369	Platinum [Pt] as principal constituent		
2224/3737	Zirconium [Zr] as principal constituent		
2224/37371	Chromium [Cr] as principal constituent		
2224/37372	Vanadium [V] as principal constituent		
2224/37373	Rhodium [Rh] as principal constituent		
2224/37376	Ruthenium [Ru] as principal constituent		
2224/37378	Iridium [Ir] as principal constituent		
2224/37379	Niobium [Nb] as principal constituent		

2224/37413	Bismuth [Bi] as principal constituent	2224/37483	Rhenium [Re] as principal constituent
2224/37414	Thallium [Tl] as principal constituent	2224/37484	Tungsten [W] as principal constituent
2224/37416	Lead [Pb] as principal constituent	2224/37486	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37417	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37487	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37488</a> )
2224/37418	Zinc [Zn] as principal constituent	2224/37488	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3742	Antimony [Sb] as principal constituent	2224/3749	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37423	Magnesium [Mg] as principal constituent	2224/37491	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37424	Aluminium [Al] as principal constituent	2224/37493	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/374</a> - <a href="#">H01L 2224/37491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37438	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37494	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/374</a> - <a href="#">H01L 2224/37491</a>
2224/37439	Silver [Ag] as principal constituent	2224/37495	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/374</a> - <a href="#">H01L 2224/37491</a>
2224/37444	Gold [Au] as principal constituent	2224/37498	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37447	Copper [Cu] as principal constituent	2224/37499	Shape or distribution of the fillers
2224/37449	Manganese [Mn] as principal constituent	2224/3754	Coating
2224/37455	Nickel [Ni] as principal constituent	2224/37541	Structure
2224/37457	Cobalt [Co] as principal constituent	2224/3755	Shape
2224/3746	Iron [Fe] as principal constituent	2224/3756	Disposition, e.g. coating on a part of the core
2224/37463	the principal constituent melting at a temperature of greater than 1550°C	2224/37565	Single coating layer
2224/37464	Palladium [Pd] as principal constituent	2224/3757	Plural coating layers
2224/37466	Titanium [Ti] as principal constituent	2224/37572	Two-layer stack coating
2224/37469	Platinum [Pt] as principal constituent	2224/37573	Three-layer stack coating
2224/3747	Zirconium [Zr] as principal constituent	2224/37574	Four-layer stack coating
2224/37471	Chromium [Cr] as principal constituent	2224/37576	being mutually engaged together, e.g. through inserts
2224/37472	Vanadium [V] as principal constituent	2224/37578	being disposed next to each other, e.g. side-to-side arrangements
2224/37473	Rhodium [Rh] as principal constituent	2224/37599	Material
2224/37476	Ruthenium [Ru] as principal constituent	2224/376	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37478	Iridium [Ir] as principal constituent		
2224/37479	Niobium [Nb] as principal constituent		
2224/3748	Molybdenum [Mo] as principal constituent		
2224/37481	Tantalum [Ta] as principal constituent		

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2224/37601	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/37681	. . . . .	Tantalum [Ta] as principal constituent
2224/37605	. . . . .	Gallium [Ga] as principal constituent	2224/37683	. . . . .	Rhenium [Re] as principal constituent
2224/37609	. . . . .	Indium [In] as principal constituent	2224/37684	. . . . .	Tungsten [W] as principal constituent
2224/37611	. . . . .	Tin [Sn] as principal constituent	2224/37686	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/37613	. . . . .	Bismuth [Bi] as principal constituent	2224/37687	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37688</a> )
2224/37614	. . . . .	Thallium [Tl] as principal constituent	2224/37688	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/37616	. . . . .	Lead [Pb] as principal constituent	2224/3769	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37617	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37691	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37618	. . . . .	Zinc [Zn] as principal constituent	2224/37693	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/376</a> - <a href="#">H01L 2224/37691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/3762	. . . . .	Antimony [Sb] as principal constituent	2224/37694	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/376</a> - <a href="#">H01L 2224/37691</a>
2224/37623	. . . . .	Magnesium [Mg] as principal constituent	2224/37695	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/376</a> - <a href="#">H01L 2224/37691</a>
2224/37624	. . . . .	Aluminium [Al] as principal constituent	2224/37698	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37638	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37699	. . . . .	Material of the matrix
2224/37639	. . . . .	Silver [Ag] as principal constituent	2224/377	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37644	. . . . .	Gold [Au] as principal constituent	2224/37701	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/37647	. . . . .	Copper [Cu] as principal constituent	2224/37705	. . . . .	Gallium [Ga] as principal constituent
2224/37649	. . . . .	Manganese [Mn] as principal constituent	2224/37709	. . . . .	Indium [In] as principal constituent
2224/37655	. . . . .	Nickel [Ni] as principal constituent	2224/37711	. . . . .	Tin [Sn] as principal constituent
2224/37657	. . . . .	Cobalt [Co] as principal constituent	2224/37713	. . . . .	Bismuth [Bi] as principal constituent
2224/3766	. . . . .	Iron [Fe] as principal constituent	2224/37714	. . . . .	Thallium [Tl] as principal constituent
2224/37663	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/37716	. . . . .	Lead [Pb] as principal constituent
2224/37664	. . . . .	Palladium [Pd] as principal constituent			
2224/37666	. . . . .	Titanium [Ti] as principal constituent			
2224/37669	. . . . .	Platinum [Pt] as principal constituent			
2224/3767	. . . . .	Zirconium [Zr] as principal constituent			
2224/37671	. . . . .	Chromium [Cr] as principal constituent			
2224/37672	. . . . .	Vanadium [V] as principal constituent			
2224/37673	. . . . .	Rhodium [Rh] as principal constituent			
2224/37676	. . . . .	Ruthenium [Ru] as principal constituent			
2224/37678	. . . . .	Iridium [Ir] as principal constituent			
2224/37679	. . . . .	Niobium [Nb] as principal constituent			
2224/3768	. . . . .	Molybdenum [Mo] as principal constituent			

2224/37717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/37787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/37788</a> )
2224/37718	Zinc [Zn] as principal constituent	2224/37788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/3772	Antimony [Sb] as principal constituent	2224/3779	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/37723	Magnesium [Mg] as principal constituent	2224/37791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37724	Aluminium [Al] as principal constituent	2224/37793	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/377</a> - <a href="#">H01L 2224/37791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37794	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/377</a> - <a href="#">H01L 2224/37791</a>
2224/37739	Silver [Ag] as principal constituent	2224/37795	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/377</a> - <a href="#">H01L 2224/37791</a>
2224/37744	Gold [Au] as principal constituent	2224/37798	Fillers
2224/37747	Copper [Cu] as principal constituent	2224/37799	Base material
2224/37749	Manganese [Mn] as principal constituent	2224/378	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/37755	Nickel [Ni] as principal constituent	2224/37801	the principal constituent melting at a temperature of less than 400°C
2224/37757	Cobalt [Co] as principal constituent	2224/37805	Gallium [Ga] as principal constituent
2224/3776	Iron [Fe] as principal constituent	2224/37809	Indium [In] as principal constituent
2224/37763	the principal constituent melting at a temperature of greater than 1550°C	2224/37811	Tin [Sn] as principal constituent
2224/37764	Palladium [Pd] as principal constituent	2224/37813	Bismuth [Bi] as principal constituent
2224/37766	Titanium [Ti] as principal constituent	2224/37814	Thallium [Tl] as principal constituent
2224/37769	Platinum [Pt] as principal constituent	2224/37816	Lead [Pb] as principal constituent
2224/3777	Zirconium [Zr] as principal constituent	2224/37817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/37771	Chromium [Cr] as principal constituent	2224/37818	Zinc [Zn] as principal constituent
2224/37772	Vanadium [V] as principal constituent	2224/3782	Antimony [Sb] as principal constituent
2224/37773	Rhodium [Rh] as principal constituent	2224/37823	Magnesium [Mg] as principal constituent
2224/37776	Ruthenium [Ru] as principal constituent	2224/37824	Aluminium [Al] as principal constituent
2224/37778	Iridium [Ir] as principal constituent		
2224/37779	Niobium [Nb] as principal constituent		
2224/3778	Molybdenum [Mo] as principal constituent		
2224/37781	Tantalum [Ta] as principal constituent		
2224/37783	Rhenium [Re] as principal constituent		
2224/37784	Tungsten [W] as principal constituent		
2224/37786	with a principal constituent of the material being a non metallic, non metalloid inorganic material		

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2224/37838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/37891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/37839	Silver [Ag] as principal constituent	2224/37893	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/378</a> - <a href="#">H01L 2224/37891</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37844	Gold [Au] as principal constituent	2224/37894	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/378</a> - <a href="#">H01L 2224/37891</a>
2224/37847	Copper [Cu] as principal constituent	2224/37895	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/378</a> - <a href="#">H01L 2224/37891</a>
2224/37849	Manganese [Mn] as principal constituent	2224/37898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37855	Nickel [Ni] as principal constituent	2224/37899	Coating material
2224/37857	Cobalt [Co] as principal constituent	2224/379	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/3786	Iron [Fe] as principal constituent	2224/37901	the principal constituent melting at a temperature of less than 400°C
2224/37863	the principal constituent melting at a temperature of greater than 1550°C	2224/37905	Gallium [Ga] as principal constituent
2224/37864	Palladium [Pd] as principal constituent	2224/37909	Indium [In] as principal constituent
2224/37866	Titanium [Ti] as principal constituent	2224/37911	Tin [Sn] as principal constituent
2224/37869	Platinum [Pt] as principal constituent	2224/37913	Bismuth [Bi] as principal constituent
2224/3787	Zirconium [Zr] as principal constituent	2224/37914	Thallium [Tl] as principal constituent
2224/37871	Chromium [Cr] as principal constituent	2224/37916	Lead [Pb] as principal constituent
2224/37872	Vanadium [V] as principal constituent	2224/37917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/37873	Rhodium [Rh] as principal constituent	2224/37918	Zinc [Zn] as principal constituent
2224/37876	Ruthenium [Ru] as principal constituent	2224/3792	Antimony [Sb] as principal constituent
2224/37878	Iridium [Ir] as principal constituent	2224/37923	Magnesium [Mg] as principal constituent
2224/37879	Niobium [Nb] as principal constituent	2224/37924	Aluminium [Al] as principal constituent
2224/3788	Molybdenum [Mo] as principal constituent	2224/37938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/37881	Tantalum [Ta] as principal constituent		
2224/37883	Rhenium [Re] as principal constituent		
2224/37884	Tungsten [W] as principal constituent		
2224/37886	with a principal constituent of the material being a non metallic, non metalloid inorganic material		
2224/37887	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/37888</a> )		
2224/37888	Glasses, e.g. amorphous oxides, nitrides or fluorides		
2224/3789	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy		



2224/37939	...	Silver [Ag] as principal constituent	2224/37993	...	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/379</a> - <a href="#">H01L 2224/37991</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/37944	...	Gold [Au] as principal constituent	2224/37994	...	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/379</a> - <a href="#">H01L 2224/37991</a>
2224/37947	...	Copper [Cu] as principal constituent	2224/37995	...	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/379</a> - <a href="#">H01L 2224/37991</a>
2224/37949	...	Manganese [Mn] as principal constituent	2224/37998	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/37955	...	Nickel [Ni] as principal constituent	2224/37999	...	Shape or distribution of the fillers
2224/37957	...	Cobalt [Co] as principal constituent	2224/38	...	of a plurality of strap connectors
2224/3796	...	Iron [Fe] as principal constituent	2224/39	...	Structure, shape, material or disposition of the strap connectors after the connecting process
2224/37963	...	the principal constituent melting at a temperature of greater than 1550°C	2224/40	...	of an individual strap connector
2224/37964	...	Palladium [Pd] as principal constituent	2224/4001	...	Structure
2224/37966	...	Titanium [Ti] as principal constituent	2224/4005	...	Shape
2224/37969	...	Platinum [Pt] as principal constituent	2224/4007	...	of bonding interfaces, e.g. interlocking features
2224/3797	...	Zirconium [Zr] as principal constituent	2224/4009	...	Loop shape
2224/37971	...	Chromium [Cr] as principal constituent	2224/40091	...	Arched
2224/37972	...	Vanadium [V] as principal constituent	2224/40095	...	Kinked
2224/37973	...	Rhodium [Rh] as principal constituent	2224/401	...	Disposition
2224/37976	...	Ruthenium [Ru] as principal constituent	2224/40101	...	Connecting bonding areas at the same height, e.g. horizontal bond
2224/37978	...	Iridium [Ir] as principal constituent	2224/40105	...	Connecting bonding areas at different heights
2224/37979	...	Niobium [Nb] as principal constituent	2224/40106	...	the connector being orthogonal to a side surface of the semiconductor or solid-state body, e.g. parallel layout
2224/3798	...	Molybdenum [Mo] as principal constituent	2224/40108	...	the connector not being orthogonal to a side surface of the semiconductor or solid-state body, e.g. fanned-out connectors, radial layout
2224/37981	...	Tantalum [Ta] as principal constituent	2224/40111	...	the strap connector extending above another semiconductor or solid-state body
2224/37983	...	Rhenium [Re] as principal constituent	2224/4013	...	Connecting within a semiconductor or solid-state body, i.e. fly strap, bridge strap
2224/37984	...	Tungsten [W] as principal constituent	2224/40132	...	with an intermediate bond, e.g. continuous strap daisy chain
2224/37986	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/40135	...	Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
2224/37987	...	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/37988</a> )	2224/40137	...	the bodies being arranged next to each other, e.g. on a common substrate
2224/37988	...	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/40139	...	with an intermediate bond, e.g. continuous strap daisy chain
2224/3799	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/40141	...	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
2224/37991	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene			

- 2224/40145 . . . . . the bodies being stacked
- 2224/40147 . . . . . with an intermediate bond, e.g. continuous strap daisy chain
- 2224/40151 . . . . . Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
- 2224/40153 . . . . . the body and the item being arranged next to each other, e.g. on a common substrate
- 2224/40155 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/40157 . . . . . Connecting the strap to a bond pad of the item
- 2224/40158 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/40159 . . . . . the bond pad protruding from the surface of the item
- 2224/4016 . . . . . Connecting the strap to a pin of the item
- 2224/40163 . . . . . Connecting the strap to a potential ring of the item
- 2224/40165 . . . . . Connecting the strap to a via metallisation of the item
- 2224/40175 . . . . . the item being metallic
- 2224/40177 . . . . . Connecting the strap to a bond pad of the item
- 2224/40178 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/40179 . . . . . the bond pad protruding from the surface of the item
- 2224/40183 . . . . . Connecting the strap to a potential ring of the item
- 2224/40195 . . . . . the item being a discrete passive component
- 2224/40221 . . . . . the body and the item being stacked
- 2224/40225 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/40227 . . . . . Connecting the strap to a bond pad of the item
- 2224/40228 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/40229 . . . . . the bond pad protruding from the surface of the item
- 2224/4023 . . . . . Connecting the strap to a pin of the item
- 2224/40233 . . . . . Connecting the strap to a potential ring of the item
- 2224/40235 . . . . . Connecting the strap to a via metallisation of the item
- 2224/40237 . . . . . Connecting the strap to a die pad of the item
- 2224/4024 . . . . . Connecting between the body and an opposite side of the item with respect to the body
- 2224/40245 . . . . . the item being metallic
- 2224/40247 . . . . . Connecting the strap to a bond pad of the item
- 2224/40248 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/40249 . . . . . the bond pad protruding from the surface of the item
- 2224/40253 . . . . . Connecting the strap to a potential ring of the item
- 2224/40257 . . . . . Connecting the strap to a die pad of the item
- 2224/4026 . . . . . Connecting between the body and an opposite side of the item with respect to the body
- 2224/40265 . . . . . the item being a discrete passive component
- 2224/404 . . . . . Connecting portions
- 2224/4046 . . . . . with multiple bonds on the same bonding area
- 2224/40475 . . . . . connected to auxiliary connecting means on the bonding areas
- 2224/40477 . . . . . being a pre-ball (i.e. a ball formed by capillary bonding)
- 2224/40479 . . . . . on the semiconductor or solid-state body
- 2224/4048 . . . . . outside the semiconductor or solid-state body
- 2224/40484 . . . . . being a plurality of pre-balls disposed side-to-side
- 2224/40486 . . . . . on the semiconductor or solid-state body
- 2224/40487 . . . . . outside the semiconductor or solid-state body
- 2224/40491 . . . . . being an additional member attached to the bonding area through an adhesive or solder, e.g. buffer pad
- 2224/40496 . . . . . not being interposed between the connector and the bonding area
- 2224/40499 . . . . . Material of the auxiliary connecting means
- 2224/405 . . . . . Material
- 2224/40505 . . . . . at the bonding interface
- 2224/40506 . . . . . comprising an eutectic alloy
- 2224/40507 . . . . . comprising an intermetallic compound
- 2224/4051 . . . . . Morphology of the connecting portion, e.g. grain size distribution
- 2224/4052 . . . . . Bonding interface between the connecting portion and the bonding area
- 2224/4099 . . . . . Auxiliary members for strap connectors, e.g. flow-barriers, spacers
- 2224/40991 . . . . . being formed on the semiconductor or solid-state body to be connected
- 2224/40992 . . . . . Reinforcing structures
- 2224/40993 . . . . . Alignment aids
- 2224/40996 . . . . . being formed on an item to be connected not being a semiconductor or solid-state body
- 2224/40997 . . . . . Reinforcing structures
- 2224/40998 . . . . . Alignment aids
- 2224/41 . . . . . of a plurality of strap connectors
- 2224/4101 . . . . . Structure
- 2224/4103 . . . . . Connectors having different sizes
- 2224/4105 . . . . . Shape
- 2224/41051 . . . . . Connectors having different shapes

- 2224/41052 . . . . . Different loop heights
- 2224/411 . . . . . Disposition
- 2224/41105 . . . . . Connecting at different heights
- 2224/41107 . . . . . on the semiconductor or solid-state body being
- 2224/41109 . . . . . outside the semiconductor or solid-state body
- 2224/4111 . . . . . the connectors being bonded to at least one common bonding area, e.g. daisy chain
- 2224/41111 . . . . . the connectors connecting two common bonding areas
- 2224/41112 . . . . . the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body, e.g. diverging straps
- 2224/41113 . . . . . the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body, e.g. converging straps
- 2224/4112 . . . . . Layout
- 2224/4117 . . . . . Crossed straps
- 2224/41171 . . . . . Fan-out arrangements
- 2224/41173 . . . . . Radial fan-out arrangements
- 2224/41174 . . . . . Stacked arrangements
- 2224/41175 . . . . . Parallel arrangements
- 2224/41176 . . . . . Strap connectors having the same loop shape and height
- 2224/41177 . . . . . Combinations of different arrangements
- 2224/41179 . . . . . Corner adaptations, i.e. disposition of the strap connectors at the corners of the semiconductor or solid-state body
- 2224/4118 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/414 . . . . . Connecting portions
- 2224/4141 . . . . . the connecting portions being stacked
- 2224/41421 . . . . . on the semiconductor or solid-state body
- 2224/41422 . . . . . outside the semiconductor or solid-state body
- 2224/4143 . . . . . the connecting portions being staggered
- 2224/415 . . . . . Material
- 2224/41505 . . . . . Connectors having different materials
- 2224/42 . . . . . Wire connectors; Manufacturing methods related thereto
- 2224/43 . . . . . Manufacturing methods
- 2224/43001 . . . . . Involving a temporary auxiliary member not forming part of the manufacturing apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/431 . . . . . Pre-treatment of the preform connector
- 2224/4312 . . . . . Applying permanent coating, e.g. in-situ coating
- 2224/43125 . . . . . Plating, e.g. electroplating, electroless plating
- 2224/432 . . . . . Mechanical processes
- 2224/4321 . . . . . Pulling
- 2224/435 . . . . . Modification of a pre-existing material
- 2224/4351 . . . . . Sintering
- 2224/4352 . . . . . Anodisation
- 2224/437 . . . . . Involving monitoring, e.g. feedback loop
- 2224/438 . . . . . Post-treatment of the connector
- 2224/4381 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/4382 . . . . . Applying permanent coating, e.g. in-situ coating
- 2224/43821 . . . . . Spray coating
- 2224/43822 . . . . . Dip coating
- 2224/43823 . . . . . Immersion coating, e.g. solder bath
- 2224/43824 . . . . . Chemical solution deposition [CSD], i.e. using a liquid precursor
- 2224/43825 . . . . . Plating, e.g. electroplating, electroless plating
- 2224/43826 . . . . . Physical vapour deposition [PVD], e.g. evaporation, sputtering
- 2224/43827 . . . . . Chemical vapour deposition [CVD], e.g. laser CVD
- 2224/4383 . . . . . Reworking
- 2224/43831 . . . . . with a chemical process, e.g. with etching of the connector
- 2224/43847 . . . . . with a mechanical process, e.g. with flattening of the connector
- 2224/43848 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/43985 . . . . . Methods of manufacturing wire connectors involving a specific sequence of method steps
- 2224/43986 . . . . . with repetition of the same manufacturing step
- 2224/44 . . . . . Structure, shape, material or disposition of the wire connectors prior to the connecting process
- 2224/45 . . . . . of an individual wire connector
- 2224/45001 . . . . . Core members of the connector
- 2224/45005 . . . . . Structure
- 2224/4501 . . . . . Shape
- 2224/45012 . . . . . Cross-sectional shape
- 2224/45013 . . . . . being non uniform along the connector
- 2224/45014 . . . . . Ribbon connectors, e.g. rectangular cross-section
- 2224/45015 . . . . . being circular
- 2224/45016 . . . . . being elliptic
- 2224/4502 . . . . . Disposition
- 2224/45025 . . . . . Plural core members
- 2224/45026 . . . . . being mutually engaged together, e.g. through inserts
- 2224/45028 . . . . . Side-to-side arrangements
- 2224/4503 . . . . . Stacked arrangements
- 2224/45032 . . . . . Two-layer arrangements
- 2224/45033 . . . . . Three-layer arrangements
- 2224/45034 . . . . . Four-layer arrangements
- 2224/45099 . . . . . Material
- 2224/451 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
- 2224/45101 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/45105 . . . . . Gallium (Ga) as principal constituent

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2224/45109 . . . . .	Indium (In) as principal constituent	2224/45184 . . . . .	Tungsten (W) as principal constituent
2224/45111 . . . . .	Tin (Sn) as principal constituent	2224/45186 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/45113 . . . . .	Bismuth (Bi) as principal constituent	2224/45187 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45188</a> )
2224/45114 . . . . .	Thallium (Tl) as principal constituent	2224/45188 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/45116 . . . . .	Lead (Pb) as principal constituent	2224/4519 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/45117 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/45191 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/45118 . . . . .	Zinc (Zn) as principal constituent	2224/45193 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/451</a> - <a href="#">H01L 2224/45191</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/4512 . . . . .	Antimony (Sb) as principal constituent	2224/45194 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/451</a> - <a href="#">H01L 2224/45191</a>
2224/45123 . . . . .	Magnesium (Mg) as principal constituent	2224/45195 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/451</a> - <a href="#">H01L 2224/45191</a>
2224/45124 . . . . .	Aluminium (Al) as principal constituent	2224/45198 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45138 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/45199 . . . . .	Material of the matrix
2224/45139 . . . . .	Silver (Ag) as principal constituent	2224/452 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45144 . . . . .	Gold (Au) as principal constituent	2224/45201 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/45147 . . . . .	Copper (Cu) as principal constituent	2224/45205 . . . . .	Gallium (Ga) as principal constituent
2224/45149 . . . . .	Manganese (Mn) as principal constituent	2224/45209 . . . . .	Indium (In) as principal constituent
2224/45155 . . . . .	Nickel (Ni) as principal constituent	2224/45211 . . . . .	Tin (Sn) as principal constituent
2224/45157 . . . . .	Cobalt (Co) as principal constituent	2224/45213 . . . . .	Bismuth (Bi) as principal constituent
2224/4516 . . . . .	Iron (Fe) as principal constituent	2224/45214 . . . . .	Thallium (Tl) as principal constituent
2224/45163 . . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/45216 . . . . .	Lead (Pb) as principal constituent
2224/45164 . . . . .	Palladium (Pd) as principal constituent	2224/45217 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45166 . . . . .	Titanium (Ti) as principal constituent		
2224/45169 . . . . .	Platinum (Pt) as principal constituent		
2224/4517 . . . . .	Zirconium (Zr) as principal constituent		
2224/45171 . . . . .	Chromium (Cr) as principal constituent		
2224/45172 . . . . .	Vanadium (V) as principal constituent		
2224/45173 . . . . .	Rhodium (Rh) as principal constituent		
2224/45176 . . . . .	Ruthenium (Ru) as principal constituent		
2224/45178 . . . . .	Iridium (Ir) as principal constituent		
2224/45179 . . . . .	Niobium (Nb) as principal constituent		
2224/4518 . . . . .	Molybdenum (Mo) as principal constituent		
2224/45181 . . . . .	Tantalum (Ta) as principal constituent		
2224/45183 . . . . .	Rhenium (Re) as principal constituent		

2224/45218	. . . . .	Zinc (Zn) as principal constituent	2224/45288	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/4522	. . . . .	Antimony (Sb) as principal constituent	2224/4529	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/45223	. . . . .	Magnesium (Mg) as principal constituent	2224/45291	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/45224	. . . . .	Aluminium (Al) as principal constituent	2224/45293	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/452</a> - <a href="#">H01L 2224/45291</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45238	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/45294	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/452</a> - <a href="#">H01L 2224/45291</a>
2224/45239	. . . . .	Silver (Ag) as principal constituent	2224/45295	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/452</a> - <a href="#">H01L 2224/45291</a>
2224/45244	. . . . .	Gold (Au) as principal constituent	2224/45298	. . . . .	Fillers
2224/45247	. . . . .	Copper (Cu) as principal constituent	2224/45299	. . . . .	Base material
2224/45249	. . . . .	Manganese (Mn) as principal constituent	2224/453	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45255	. . . . .	Nickel (Ni) as principal constituent	2224/45301	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/45257	. . . . .	Cobalt (Co) as principal constituent	2224/45305	. . . . .	Gallium (Ga) as principal constituent
2224/4526	. . . . .	Iron (Fe) as principal constituent	2224/45309	. . . . .	Indium (In) as principal constituent
2224/45263	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/45311	. . . . .	Tin (Sn) as principal constituent
2224/45264	. . . . .	Palladium (Pd) as principal constituent	2224/45313	. . . . .	Bismuth (Bi) as principal constituent
2224/45266	. . . . .	Titanium (Ti) as principal constituent	2224/45314	. . . . .	Thallium (Tl) as principal constituent
2224/45269	. . . . .	Platinum (Pt) as principal constituent	2224/45316	. . . . .	Lead (Pb) as principal constituent
2224/4527	. . . . .	Zirconium (Zr) as principal constituent	2224/45317	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45271	. . . . .	Chromium (Cr) as principal constituent	2224/45318	. . . . .	Zinc (Zn) as principal constituent
2224/45272	. . . . .	Vanadium (V) as principal constituent	2224/4532	. . . . .	Antimony (Sb) as principal constituent
2224/45273	. . . . .	Rhodium (Rh) as principal constituent	2224/45323	. . . . .	Magnesium (Mg) as principal constituent
2224/45276	. . . . .	Ruthenium (Ru) as principal constituent	2224/45324	. . . . .	Aluminium (Al) as principal constituent
2224/45278	. . . . .	Iridium (Ir) as principal constituent	2224/45338	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45279	. . . . .	Niobium (Nb) as principal constituent			
2224/4528	. . . . .	Molybdenum (Mo) as principal constituent			
2224/45281	. . . . .	Tantalum (Ta) as principal constituent			
2224/45283	. . . . .	Rhenium (Re) as principal constituent			
2224/45284	. . . . .	Tungsten (W) as principal constituent			
2224/45286	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material			
2224/45287	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/45288</a> )			

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2224/45339	...	Silver (Ag) as principal constituent	2224/45393	...	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/453</a> - <a href="#">H01L 2224/45391</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45344	...	Gold (Au) as principal constituent	2224/45394	...	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/453</a> - <a href="#">H01L 2224/45391</a>
2224/45347	...	Copper (Cu) as principal constituent	2224/45395	...	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/453</a> - <a href="#">H01L 2224/45391</a>
2224/45349	...	Manganese (Mn) as principal constituent	2224/45398	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45355	...	Nickel (Ni) as principal constituent	2224/45399	...	Coating material
2224/45357	...	Cobalt (Co) as principal constituent	2224/454	...	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/4536	...	Iron (Fe) as principal constituent	2224/45401	...	the principal constituent melting at a temperature of less than 400°C
2224/45363	...	the principal constituent melting at a temperature of greater than 1550°C	2224/45405	...	Gallium (Ga) as principal constituent
2224/45364	...	Palladium (Pd) as principal constituent	2224/45409	...	Indium (In) as principal constituent
2224/45366	...	Titanium (Ti) as principal constituent	2224/45411	...	Tin (Sn) as principal constituent
2224/45369	...	Platinum (Pt) as principal constituent	2224/45413	...	Bismuth (Bi) as principal constituent
2224/4537	...	Zirconium (Zr) as principal constituent	2224/45414	...	Thallium (Tl) as principal constituent
2224/45371	...	Chromium (Cr) as principal constituent	2224/45416	...	Lead (Pb) as principal constituent
2224/45372	...	Vanadium (V) as principal constituent	2224/45417	...	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45373	...	Rhodium (Rh) as principal constituent	2224/45418	...	Zinc (Zn) as principal constituent
2224/45376	...	Ruthenium (Ru) as principal constituent	2224/4542	...	Antimony (Sb) as principal constituent
2224/45378	...	Iridium (Ir) as principal constituent	2224/45423	...	Magnesium (Mg) as principal constituent
2224/45379	...	Niobium (Nb) as principal constituent	2224/45424	...	Aluminium (Al) as principal constituent
2224/4538	...	Molybdenum (Mo) as principal constituent	2224/45438	...	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45381	...	Tantalum (Ta) as principal constituent	2224/45439	...	Silver (Ag) as principal constituent
2224/45383	...	Rhenium (Re) as principal constituent	2224/45444	...	Gold (Au) as principal constituent
2224/45384	...	Tungsten (W) as principal constituent			
2224/45386	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material			
2224/45387	...	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/45388</a> )			
2224/45388	...	Glasses, e.g. amorphous oxides, nitrides or fluorides			
2224/4539	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy			
2224/45391	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene			

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2224/45447	...	Copper (Cu) as principal constituent	2224/45494	...	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/454</a> - <a href="#">H01L 2224/45491</a>
2224/45449	...	Manganese (Mn) as principal constituent	2224/45495	...	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/454</a> - <a href="#">H01L 2224/45491</a>
2224/45455	...	Nickel (Ni) as principal constituent	2224/45498	...	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45457	...	Cobalt (Co) as principal constituent	2224/45499	...	Shape or distribution of the fillers
2224/4546	...	Iron (Fe) as principal constituent	2224/4554	...	Coating
2224/45463	...	the principal constituent melting at a temperature of greater than 1550°C	2224/45541	...	Structure
2224/45464	...	Palladium (Pd) as principal constituent	2224/4555	...	Shape
2224/45466	...	Titanium (Ti) as principal constituent	2224/4556	...	Disposition, e.g. coating on a part of the core
2224/45469	...	Platinum (Pt) as principal constituent	2224/45565	...	Single coating layer
2224/4547	...	Zirconium (Zr) as principal constituent	2224/4557	...	Plural coating layers
2224/45471	...	Chromium (Cr) as principal constituent	2224/45572	...	Two-layer stack coating
2224/45472	...	Vanadium (V) as principal constituent	2224/45573	...	Three-layer stack coating
2224/45473	...	Rhodium (Rh) as principal constituent	2224/45574	...	Four-layer stack coating
2224/45476	...	Ruthenium (Ru) as principal constituent	2224/45576	...	being mutually engaged together, e.g. through inserts
2224/45478	...	Iridium (Ir) as principal constituent	2224/45578	...	being disposed next to each other, e.g. side-to-side arrangements
2224/45479	...	Niobium (Nb) as principal constituent	2224/45599	...	Material
2224/4548	...	Molybdenum (Mo) as principal constituent	2224/456	...	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45481	...	Tantalum (Ta) as principal constituent	2224/45601	...	the principal constituent melting at a temperature of less than 400°C
2224/45483	...	Rhenium (Re) as principal constituent	2224/45605	...	Gallium (Ga) as principal constituent
2224/45484	...	Tungsten (W) as principal constituent	2224/45609	...	Indium (In) as principal constituent
2224/45486	...	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45611	...	Tin (Sn) as principal constituent
2224/45487	...	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45488</a> )	2224/45613	...	Bismuth (Bi) as principal constituent
2224/45488	...	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45614	...	Thallium (Tl) as principal constituent
2224/4549	...	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45616	...	Lead (Pb) as principal constituent
2224/45491	...	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45617	...	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45493	...	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/454</a> - <a href="#">H01L 2224/45491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/45618	...	Zinc (Zn) as principal constituent
			2224/4562	...	Antimony (Sb) as principal constituent
			2224/45623	...	Magnesium (Mg) as principal constituent
			2224/45624	...	Aluminium (Al) as principal constituent
			2224/45638	...	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C

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2224/45639 . . . . .	Silver (Ag) as principal constituent	2224/45693 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/456</a> - <a href="#">H01L 2224/45691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/45644 . . . . .	Gold (Au) as principal constituent	2224/45694 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/456</a> - <a href="#">H01L 2224/45691</a>
2224/45647 . . . . .	Copper (Cu) as principal constituent	2224/45695 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/456</a> - <a href="#">H01L 2224/45691</a>
2224/45649 . . . . .	Manganese (Mn) as principal constituent	2224/45698 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45655 . . . . .	Nickel (Ni) as principal constituent	2224/45699 . . . . .	Material of the matrix
2224/45657 . . . . .	Cobalt (Co) as principal constituent	2224/457 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45666 . . . . .	Iron (Fe) as principal constituent	2224/45701 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/45663 . . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/45705 . . . . .	Gallium (Ga) as principal constituent
2224/45664 . . . . .	Palladium (Pd) as principal constituent	2224/45709 . . . . .	Indium (In) as principal constituent
2224/45666 . . . . .	Titanium (Ti) as principal constituent	2224/45711 . . . . .	Tin (Sn) as principal constituent
2224/45669 . . . . .	Platinum (Pt) as principal constituent	2224/45713 . . . . .	Bismuth (Bi) as principal constituent
2224/4567 . . . . .	Zirconium (Zr) as principal constituent	2224/45714 . . . . .	Thallium (Tl) as principal constituent
2224/45671 . . . . .	Chromium (Cr) as principal constituent	2224/45716 . . . . .	Lead (Pb) as principal constituent
2224/45672 . . . . .	Vanadium (V) as principal constituent	2224/45717 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45673 . . . . .	Rhodium (Rh) as principal constituent	2224/45718 . . . . .	Zinc (Zn) as principal constituent
2224/45676 . . . . .	Ruthenium (Ru) as principal constituent	2224/4572 . . . . .	Antimony (Sb) as principal constituent
2224/45678 . . . . .	Iridium (Ir) as principal constituent	2224/45723 . . . . .	Magnesium (Mg) as principal constituent
2224/45679 . . . . .	Niobium (Nb) as principal constituent	2224/45724 . . . . .	Aluminium (Al) as principal constituent
2224/4568 . . . . .	Molybdenum (Mo) as principal constituent	2224/45738 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45681 . . . . .	Tantalum (Ta) as principal constituent	2224/45739 . . . . .	Silver (Ag) as principal constituent
2224/45683 . . . . .	Rhenium (Re) as principal constituent	2224/45744 . . . . .	Gold (Au) as principal constituent
2224/45684 . . . . .	Tungsten (W) as principal constituent	2224/45747 . . . . .	Copper (Cu) as principal constituent
2224/45686 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material		
2224/45687 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45688</a> )		
2224/45688 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides		
2224/4569 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy		
2224/45691 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene		



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2224/45749	Manganese (Mn) as principal constituent	2224/45794	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/457</a> - <a href="#">H01L 2224/45791</a>
2224/45755	Nickel (Ni) as principal constituent	2224/45795	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/457</a> - <a href="#">H01L 2224/45791</a>
2224/45757	Cobalt (Co) as principal constituent	2224/45798	Fillers
2224/4576	Iron (Fe) as principal constituent	2224/45799	Base material
2224/45763	the principal constituent melting at a temperature of greater than 1550°C	2224/458	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/45764	Palladium (Pd) as principal constituent	2224/45801	the principal constituent melting at a temperature of less than 400°C
2224/45766	Titanium (Ti) as principal constituent	2224/45805	Gallium (Ga) as principal constituent
2224/45769	Platinum (Pt) as principal constituent	2224/45809	Indium (In) as principal constituent
2224/4577	Zirconium (Zr) as principal constituent	2224/45811	Tin (Sn) as principal constituent
2224/45771	Chromium (Cr) as principal constituent	2224/45813	Bismuth (Bi) as principal constituent
2224/45772	Vanadium (V) as principal constituent	2224/45814	Thallium (Tl) as principal constituent
2224/45773	Rhodium (Rh) as principal constituent	2224/45816	Lead (Pb) as principal constituent
2224/45776	Ruthenium (Ru) as principal constituent	2224/45817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45778	Iridium (Ir) as principal constituent	2224/45818	Zinc (Zn) as principal constituent
2224/45779	Niobium (Nb) as principal constituent	2224/4582	Antimony (Sb) as principal constituent
2224/4578	Molybdenum (Mo) as principal constituent	2224/45823	Magnesium (Mg) as principal constituent
2224/45781	Tantalum (Ta) as principal constituent	2224/45824	Aluminium (Al) as principal constituent
2224/45783	Rhenium (Re) as principal constituent	2224/45838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45784	Tungsten (W) as principal constituent	2224/45839	Silver (Ag) as principal constituent
2224/45786	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45844	Gold (Au) as principal constituent
2224/45787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45788</a> )	2224/45847	Copper (Cu) as principal constituent
2224/45788	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45849	Manganese (Mn) as principal constituent
2224/4579	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45855	Nickel (Ni) as principal constituent
2224/45791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45857	Cobalt (Co) as principal constituent
2224/45793	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/457</a> - <a href="#">H01L 2224/45791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/4586	Iron (Fe) as principal constituent
		2224/45863	the principal constituent melting at a temperature of greater than 1550°C

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2224/45864	Palladium (Pd) as principal constituent	2224/45898	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/45866	Titanium (Ti) as principal constituent	2224/45899	Coating material
2224/45869	Platinum (Pt) as principal constituent	2224/459	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/4587	Zirconium (Zr) as principal constituent	2224/45901	the principal constituent melting at a temperature of less than 400°C
2224/45871	Chromium (Cr) as principal constituent	2224/45905	Gallium (Ga) as principal constituent
2224/45872	Vanadium (V) as principal constituent	2224/45909	Indium (In) as principal constituent
2224/45873	Rhodium (Rh) as principal constituent	2224/45911	Tin (Sn) as principal constituent
2224/45876	Ruthenium (Ru) as principal constituent	2224/45913	Bismuth (Bi) as principal constituent
2224/45878	Iridium (Ir) as principal constituent	2224/45914	Thallium (Tl) as principal constituent
2224/45879	Niobium (Nb) as principal constituent	2224/45916	Lead (Pb) as principal constituent
2224/4588	Molybdenum (Mo) as principal constituent	2224/45917	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/45881	Tantalum (Ta) as principal constituent	2224/45918	Zinc (Zn) as principal constituent
2224/45883	Rhenium (Re) as principal constituent	2224/4592	Antimony (Sb) as principal constituent
2224/45884	Tungsten (W) as principal constituent	2224/45923	Magnesium (Mg) as principal constituent
2224/45886	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/45924	Aluminium (Al) as principal constituent
2224/45887	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45888</a> )	2224/45938	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/45888	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/45939	Silver (Ag) as principal constituent
2224/4589	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/45944	Gold (Au) as principal constituent
2224/45891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/45947	Copper (Cu) as principal constituent
2224/45893	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/458</a> - <a href="#">H01L 2224/45891</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/45949	Manganese (Mn) as principal constituent
2224/45894	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/458</a> - <a href="#">H01L 2224/45891</a>	2224/45955	Nickel (Ni) as principal constituent
2224/45895	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/458</a> - <a href="#">H01L 2224/45891</a>	2224/45957	Cobalt (Co) as principal constituent
		2224/4596	Iron (Fe) as principal constituent
		2224/45963	the principal constituent melting at a temperature of greater than 1550°C
		2224/45964	Palladium (Pd) as principal constituent

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2224/45966	Titanium (Ti) as principal constituent	2224/45999	Shape or distribution of the fillers
2224/45969	Platinum (Pt) as principal constituent	2224/46	of a plurality of wire connectors
2224/4597	Zirconium (Zr) as principal constituent	2224/47	Structure, shape, material or disposition of the wire connectors after the connecting process
2224/45971	Chromium (Cr) as principal constituent	2224/48	of an individual wire connector
2224/45972	Vanadium (V) as principal constituent	2224/4801	Structure
2224/45973	Rhodium (Rh) as principal constituent	2224/48011	Length
2224/45976	Ruthenium (Ru) as principal constituent	2224/4805	Shape
2224/45978	Iridium (Ir) as principal constituent	2224/4807	of bonding interfaces, e.g. interlocking features
2224/45979	Niobium (Nb) as principal constituent	2224/4809	Loop shape
2224/4598	Molybdenum (Mo) as principal constituent	2224/48091	Arched
2224/45981	Tantalum (Ta) as principal constituent	2224/48092	Helix
2224/45983	Rhenium (Re) as principal constituent	2224/48095	Kinked
2224/45984	Tungsten (W) as principal constituent	2224/48096	the kinked part being in proximity to the bonding area on the semiconductor or solid-state body
2224/45986	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/48097	the kinked part being in proximity to the bonding area outside the semiconductor or solid-state body
2224/45987	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/45988</a> )	2224/481	Disposition
2224/45988	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/48101	Connecting bonding areas at the same height, e.g. horizontal bond
2224/4599	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/48105	Connecting bonding areas at different heights
2224/45991	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/48106	the connector being orthogonal to a side surface of the semiconductor or solid-state body, e.g. parallel layout
2224/45993	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/459</a> - <a href="#">H01L 2224/45991</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48108	the connector not being orthogonal to a side surface of the semiconductor or solid-state body, e.g. fanned-out connectors, radial layout
2224/45994	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/459</a> - <a href="#">H01L 2224/45991</a>	2224/4811	Connecting to a bonding area of the semiconductor or solid-state body located at the far end of the body with respect to the bonding area outside the semiconductor or solid-state body
2224/45995	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/459</a> - <a href="#">H01L 2224/45991</a>	2224/48111	the wire connector extending above another semiconductor or solid-state body
2224/45998	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/4813	Connecting within a semiconductor or solid-state body, i.e. fly wire, bridge wire
		2224/48132	with an intermediate bond, e.g. continuous wire daisy chain
		2224/48135	Connecting between different semiconductor or solid-state bodies, i.e. chip-to-chip
		2224/48137	the bodies being arranged next to each other, e.g. on a common substrate
		2224/48138	the wire connector connecting to a bonding area disposed in a recess of the surface
		2224/48139	with an intermediate bond, e.g. continuous wire daisy chain
		2224/4814	the wire connector connecting to a bonding area protruding from the surface
		2224/48141	the bodies being arranged on opposite sides of a substrate, e.g. mirror arrangements
		2224/48145	the bodies being stacked
		2224/48147	with an intermediate bond, e.g. continuous wire daisy chain

- 2224/48148 . . . . . the wire connector connecting to a bonding area disposed in a recess of the surface
- 2224/48149 . . . . . the wire connector connecting to a bonding area protruding from the surface
- 2224/48151 . . . . . Connecting between a semiconductor or solid-state body and an item not being a semiconductor or solid-state body, e.g. chip-to-substrate, chip-to-passive
- 2224/48153 . . . . . the body and the item being arranged next to each other, e.g. on a common substrate
- 2224/48155 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/48157 . . . . . connecting the wire to a bond pad of the item
- 2224/48158 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/48159 . . . . . the bond pad protruding from the surface of the item
- 2224/4816 . . . . . connecting the wire to a pin of the item
- 2224/48163 . . . . . connecting the wire to a potential ring of the item
- 2224/48165 . . . . . connecting the wire to a via metallisation of the item
- 2224/48175 . . . . . the item being metallic
- 2224/48177 . . . . . connecting the wire to a bond pad of the item
- 2224/48178 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/48179 . . . . . the bond pad protruding from the surface of the item
- 2224/48183 . . . . . connecting the wire to a potential ring of the item
- 2224/48195 . . . . . the item being a discrete passive component
- 2224/48221 . . . . . the body and the item being stacked
- 2224/48225 . . . . . the item being non-metallic, e.g. insulating substrate with or without metallisation
- 2224/48227 . . . . . connecting the wire to a bond pad of the item
- 2224/48228 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/48229 . . . . . the bond pad protruding from the surface of the item
- 2224/4823 . . . . . connecting the wire to a pin of the item
- 2224/48233 . . . . . connecting the wire to a potential ring of the item
- 2224/48235 . . . . . connecting the wire to a via metallisation of the item
- 2224/48237 . . . . . connecting the wire to a die pad of the item
- 2224/4824 . . . . . Connecting between the body and an opposite side of the item with respect to the body
- 2224/48245 . . . . . the item being metallic
- 2224/48247 . . . . . connecting the wire to a bond pad of the item
- 2224/48248 . . . . . the bond pad being disposed in a recess of the surface of the item
- 2224/48249 . . . . . the bond pad protruding from the surface of the item
- 2224/48253 . . . . . connecting the wire to a potential ring of the item
- 2224/48257 . . . . . connecting the wire to a die pad of the item
- 2224/4826 . . . . . Connecting between the body and an opposite side of the item with respect to the body
- 2224/48265 . . . . . the item being a discrete passive component
- 2224/484 . . . . . Connecting portions
- 2224/4845 . . . . . Details of ball bonds
- 2224/48451 . . . . . Shape
- 2224/48453 . . . . . of the interface with the bonding area
- 2224/48455 . . . . . Details of wedge bonds
- 2224/48456 . . . . . Shape
- 2224/48458 . . . . . of the interface with the bonding area
- 2224/4846 . . . . . with multiple bonds on the same bonding area
- 2224/48463 . . . . . the connecting portion on the bonding area of the semiconductor or solid-state body being a ball bond
- 2224/48464 . . . . . the other connecting portion not on the bonding area also being a ball bond, i.e. ball-to-ball
- 2224/48465 . . . . . the other connecting portion not on the bonding area being a wedge bond, i.e. ball-to-wedge, regular stitch
- 2224/4847 . . . . . the connecting portion on the bonding area of the semiconductor or solid-state body being a wedge bond
- 2224/48471 . . . . . the other connecting portion not on the bonding area being a ball bond, i.e. wedge-to-ball, reverse stitch
- 2224/48472 . . . . . the other connecting portion not on the bonding area also being a wedge bond, i.e. wedge-to-wedge
- 2224/48475 . . . . . connected to auxiliary connecting means on the bonding areas, e.g. pre-ball, wedge-on-ball, ball-on-ball
- 2224/48476 . . . . . between the wire connector and the bonding area
- 2224/48477 . . . . . being a pre-ball (i.e. a ball formed by capillary bonding)
- 2224/48478 . . . . . the connecting portion being a wedge bond, i.e. wedge on pre-ball
- 2224/48479 . . . . . on the semiconductor or solid-state body
- 2224/4848 . . . . . outside the semiconductor or solid-state body
- 2224/48481 . . . . . the connecting portion being a ball bond, i.e. ball on pre-ball
- 2224/48482 . . . . . on the semiconductor or solid-state body

2224/48483	outside the semiconductor or solid-state body	2224/48618	Zinc (Zn) as principal constituent
2224/48484	being a plurality of pre-balls disposed side-to-side	2224/4862	Antimony (Sb) as principal constituent
2224/48485	the connecting portion being a wedge bond, i.e. wedge on pre-ball	2224/48623	Magnesium (Mg) as principal constituent
2224/48486	on the semiconductor or solid-state body	2224/48624	Aluminium (Al) as principal constituent
2224/48487	outside the semiconductor or solid-state body	2224/48638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/48488	the connecting portion being a ball bond, i.e. ball on pre-ball	2224/48639	Silver (Ag) as principal constituent
2224/48489	on the semiconductor or solid-state body	2224/48644	Gold (Au) as principal constituent
2224/4849	outside the semiconductor or solid-state body	2224/48647	Copper (Cu) as principal constituent
2224/48491	being an additional member attached to the bonding area through an adhesive or solder, e.g. buffer pad	2224/48649	Manganese (Mn) as principal constituent
2224/48496	not being interposed between the wire connector and the bonding area	2224/48655	Nickel (Ni) as principal constituent
2224/48499	Material of the auxiliary connecting means	2224/48657	Cobalt (Co) as principal constituent
2224/485	Material	2224/4866	Iron (Fe) as principal constituent
2224/48505	at the bonding interface	2224/48663	the principal constituent melting at a temperature of greater than 1550°C
2224/48506	comprising an eutectic alloy	2224/48664	Palladium (Pd) as principal constituent
2224/48507	comprising an intermetallic compound	2224/48666	Titanium (Ti) as principal constituent
2224/4851	Morphology of the connecting portion, e.g. grain size distribution	2224/48669	Platinum (Pt) as principal constituent
2224/48511	Heat affected zone [HAZ]	2224/4867	Zirconium (Zr) as principal constituent
2224/4852	Bonding interface between the connecting portion and the bonding area	2224/48671	Chromium (Cr) as principal constituent
2224/48599	Principal constituent of the connecting portion of the wire connector being Gold (Au)	2224/48672	Vanadium (V) as principal constituent
2224/486	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/48673	Rhodium (Rh) as principal constituent
2224/48601	the principal constituent melting at a temperature of less than 400°C	2224/48678	Iridium (Ir) as principal constituent
2224/48605	Gallium (Ga) as principal constituent	2224/48679	Niobium (Nb) as principal constituent
2224/48609	Indium (In) as principal constituent	2224/4868	Molybdenum (Mo) as principal constituent
2224/48611	Tin (Sn) as principal constituent	2224/48681	Tantalum (Ta) as principal constituent
2224/48613	Bismuth (Bi) as principal constituent	2224/48683	Rhenium (Re) as principal constituent
2224/48614	Thallium (Tl) as principal constituent	2224/48684	Tungsten (W) as principal constituent
2224/48616	Lead (Pb) as principal constituent	2224/48686	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
2224/48617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48687	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/48688</a> )
		2224/48688	Glasses, e.g. amorphous oxides, nitrides or fluorides

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2224/4869	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/48739	Silver (Ag) as principal constituent
2224/48691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/48744	Gold (Au) as principal constituent
2224/48693	with a principal constituent of the bonding area being a solid not provided for in groups <a href="#">H01L 2224/486</a> - <a href="#">H01L 2224/4869</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48747	Copper (Cu) as principal constituent
2224/48694	with a principal constituent of the bonding area being a liquid not provided for in groups <a href="#">H01L 2224/486</a> - <a href="#">H01L 2224/4869</a>	2224/48749	Manganese (Mn) as principal constituent
2224/48698	with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns	2224/48755	Nickel (Ni) as principal constituent
2224/48699	Principal constituent of the connecting portion of the wire connector being Aluminium (Al)	2224/48757	Cobalt (Co) as principal constituent
2224/487	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/4876	Iron (Fe) as principal constituent
2224/48701	the principal constituent melting at a temperature of less than 400°C	2224/48763	the principal constituent melting at a temperature of greater than 1550°C
2224/48705	Gallium (Ga) as principal constituent	2224/48764	Palladium (Pd) as principal constituent
2224/48709	Indium (In) as principal constituent	2224/48766	Titanium (Ti) as principal constituent
2224/48711	Tin (Sn) as principal constituent	2224/48769	Platinum (Pt) as principal constituent
2224/48713	Bismuth (Bi) as principal constituent	2224/4877	Zirconium (Zr) as principal constituent
2224/48714	Thallium (Tl) as principal constituent	2224/48771	Chromium (Cr) as principal constituent
2224/48716	Lead (Pb) as principal constituent	2224/48772	Vanadium (V) as principal constituent
2224/48717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48773	Rhodium (Rh) as principal constituent
2224/48718	Zinc (Zn) as principal constituent	2224/48778	Iridium (Ir) as principal constituent
2224/4872	Antimony (Sb) as principal constituent	2224/48779	Niobium (Nb) as principal constituent
2224/48723	Magnesium (Mg) as principal constituent	2224/4878	Molybdenum (Mo) as principal constituent
2224/48724	Aluminium (Al) as principal constituent	2224/48781	Tantalum (Ta) as principal constituent
2224/48738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/48783	Rhenium (Re) as principal constituent
		2224/48784	Tungsten (W) as principal constituent
		2224/48786	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
		2224/48787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics</a> <a href="#">H01L 2224/48788</a> )
		2224/48788	Glasses, e.g. amorphous oxides, nitrides or fluorides
		2224/4879	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy
		2224/48791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene

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2224/48793	with a principal constituent of the bonding area being a solid not provided for in groups <a href="#">H01L 2224/487</a> - <a href="#">H01L 2224/4879</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/48855	Nickel (Ni) as principal constituent
2224/48794	with a principal constituent of the bonding area being a liquid not provided for in groups <a href="#">H01L 2224/487</a> - <a href="#">H01L 2224/4879</a>	2224/48857	Cobalt (Co) as principal constituent
2224/48798	with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns	2224/4886	Iron (Fe) as principal constituent
2224/48799	Principal constituent of the connecting portion of the wire connector being Copper (Cu)	2224/48863	the principal constituent melting at a temperature of greater than 1550°C
2224/488	with a principal constituent of the bonding area being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/48864	Palladium (Pd) as principal constituent
2224/48801	the principal constituent melting at a temperature of less than 400°C	2224/48866	Titanium (Ti) as principal constituent
2224/48805	Gallium (Ga) as principal constituent	2224/48869	Platinum (Pt) as principal constituent
2224/48809	Indium (In) as principal constituent	2224/4887	Zirconium (Zr) as principal constituent
2224/48811	Tin (Sn) as principal constituent	2224/48871	Chromium (Cr) as principal constituent
2224/48813	Bismuth (Bi) as principal constituent	2224/48872	Vanadium (V) as principal constituent
2224/48814	Thallium (Tl) as principal constituent	2224/48873	Rhodium (Rh) as principal constituent
2224/48816	Lead (Pb) as principal constituent	2224/48878	Iridium (Ir) as principal constituent
2224/48817	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950 °C	2224/48879	Niobium (Nb) as principal constituent
2224/48818	Zinc (Zn) as principal constituent	2224/4888	Molybdenum (Mo) as principal constituent
2224/4882	Antimony (Sb) as principal constituent	2224/48881	Tantalum (Ta) as principal constituent
2224/48823	Magnesium (Mg) as principal constituent	2224/48883	Rhenium (Re) as principal constituent
2224/48824	Aluminium (Al) as principal constituent	2224/48884	Tungsten (W) as principal constituent
2224/48838	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/48886	with a principal constituent of the bonding area being a non metallic, non metalloid inorganic material
2224/48839	Silver (Ag) as principal constituent	2224/48887	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/48888</a> )
2224/48844	Gold (Au) as principal constituent	2224/48888	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/48847	Copper (Cu) as principal constituent	2224/4889	with a principal constituent of the bonding area being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/48849	Manganese (Mn) as principal constituent	2224/48891	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
		2224/48893	with a principal constituent of the bonding area being a solid not provided for in groups <a href="#">H01L 2224/488</a> - <a href="#">H01L 2224/4889</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
		2224/48894	with a principal constituent of the bonding area being a liquid not provided for in groups <a href="#">H01L 2224/488</a> - <a href="#">H01L 2224/4889</a>

- 2224/48898 . . . . . with a principal constituent of the bonding area being a combination of two or more material regions, i.e. being a hybrid material, e.g. segmented structures, island patterns
- 2224/4899 . . . . . Auxiliary members for wire connectors, e.g. flow-barriers, reinforcing structures, spacers, alignment aids
- 2224/48991 . . . . . being formed on the semiconductor or solid-state body to be connected
- 2224/48992 . . . . . Reinforcing structures
- 2224/48993 . . . . . Alignment aids
- 2224/48996 . . . . . being formed on an item to be connected not being a semiconductor or solid-state body
- 2224/48997 . . . . . Reinforcing structures
- 2224/48998 . . . . . Alignment aids
- 2224/49 . . . . . of a plurality of wire connectors
- 2224/4901 . . . . . Structure
- 2224/4903 . . . . . Connectors having different sizes, e.g. different diameters
- 2224/4905 . . . . . Shape
- 2224/49051 . . . . . Connectors having different shapes
- 2224/49052 . . . . . Different loop heights
- 2224/4909 . . . . . Loop shape arrangement
- 2224/49095 . . . . . parallel in plane
- 2224/49096 . . . . . horizontal
- 2224/49097 . . . . . vertical
- 2224/491 . . . . . Disposition
- 2224/49105 . . . . . Connecting at different heights
- 2224/49107 . . . . . on the semiconductor or solid-state body
- 2224/49109 . . . . . outside the semiconductor or solid-state body
- 2224/4911 . . . . . the connectors being bonded to at least one common bonding area, e.g. daisy chain
- 2224/49111 . . . . . the connectors connecting two common bonding areas, e.g. Litz or braid wires
- 2224/49112 . . . . . the connectors connecting a common bonding area on the semiconductor or solid-state body to different bonding areas outside the body, e.g. diverging wires
- 2224/49113 . . . . . the connectors connecting different bonding areas on the semiconductor or solid-state body to a common bonding area outside the body, e.g. converging wires
- 2224/4912 . . . . . Layout
- 2224/4917 . . . . . Crossed wires
- 2224/49171 . . . . . Fan-out arrangements
- 2224/49173 . . . . . Radial fan-out arrangements
- 2224/49174 . . . . . Stacked arrangements
- 2224/49175 . . . . . Parallel arrangements
- 2224/49176 . . . . . Wire connectors having the same loop shape and height
- 2224/49177 . . . . . Combinations of different arrangements
- 2224/49179 . . . . . Corner adaptations, i.e. disposition of the wire connectors at the corners of the semiconductor or solid-state body
- 2224/4918 . . . . . being disposed on at least two different sides of the body, e.g. dual array
- 2224/494 . . . . . Connecting portions
- 2224/4941 . . . . . the connecting portions being stacked
- 2224/4942 . . . . . Ball bonds
- 2224/49421 . . . . . on the semiconductor or solid-state body
- 2224/49422 . . . . . outside the semiconductor or solid-state body
- 2224/49425 . . . . . Wedge bonds
- 2224/49426 . . . . . on the semiconductor or solid-state body
- 2224/49427 . . . . . outside the semiconductor or solid-state body
- 2224/49429 . . . . . Wedge and ball bonds
- 2224/4943 . . . . . the connecting portions being staggered
- 2224/49431 . . . . . on the semiconductor or solid-state body
- 2224/49433 . . . . . outside the semiconductor or solid-state body
- 2224/4945 . . . . . Wire connectors having connecting portions of different types on the semiconductor or solid-state body, e.g. regular and reverse stitches
- 2224/495 . . . . . Material
- 2224/49505 . . . . . Connectors having different materials
- 2224/50 . . . . . Tape automated bonding [TAB] connectors, i.e. film carriers; Manufacturing methods related thereto
- 2224/63 . . . . . Connectors not provided for in any of the groups [H01L 2224/10](#) - [H01L 2224/50](#) and subgroups; Manufacturing methods related thereto
- 2224/64 . . . . . Manufacturing methods
- 2224/65 . . . . . Structure, shape, material or disposition of the connectors prior to the connecting process
- 2224/66 . . . . . of an individual connector
- 2224/67 . . . . . of a plurality of connectors
- 2224/68 . . . . . Structure, shape, material or disposition of the connectors after the connecting process
- 2224/69 . . . . . of an individual connector
- 2224/70 . . . . . of a plurality of connectors
- 2224/71 . . . . . Means for bonding not being attached to, or not being formed on, the surface to be connected
- 2224/72 . . . . . Detachable connecting means consisting of mechanical auxiliary parts connecting the device, e.g. pressure contacts using springs or clips
- 2224/73 . . . . . Means for bonding being of different types provided for in two or more of groups [H01L 2224/10](#), [H01L 2224/18](#), [H01L 2224/26](#), [H01L 2224/34](#), [H01L 2224/42](#), [H01L 2224/50](#), [H01L 2224/63](#), [H01L 2224/71](#)
- 2224/731 . . . . . Location prior to the connecting process
- 2224/73101 . . . . . on the same surface
- 2224/73103 . . . . . Bump and layer connectors
- 2224/73104 . . . . . the bump connector being embedded into the layer connector
- 2224/73151 . . . . . on different surfaces
- 2224/73153 . . . . . Bump and layer connectors
- 2224/732 . . . . . Location after the connecting process
- 2224/73201 . . . . . on the same surface



2224/73203	. . . .	Bump and layer connectors	2224/75161	. . . .	Means for screen printing, e.g. roller, squeegee, screen stencil
2224/73204	. . . .	the bump connector being embedded into the layer connector	2224/7517	. . . .	Means for applying a preform, e.g. laminator
2224/73205	. . . .	Bump and strap connectors	2224/75171	. . . .	including a vacuum-bag
2224/73207	. . . .	Bump and wire connectors	2224/7518	. . . .	Means for blanket deposition
2224/73209	. . . .	Bump and HDI connectors	2224/75181	. . . .	for spin coating, i.e. spin coater
2224/73211	. . . .	Bump and TAB connectors	2224/75182	. . . .	for curtain coating
2224/73213	. . . .	Layer and strap connectors	2224/75183	. . . .	for immersion coating, i.e. bath
2224/73215	. . . .	Layer and wire connectors	2224/75184	. . . .	for spray coating, i.e. nozzle
2224/73217	. . . .	Layer and HDI connectors	2224/75185	. . . .	Means for physical vapour deposition [PVD], e.g. evaporation, sputtering
2224/73219	. . . .	Layer and TAB connectors	2224/75186	. . . .	Means for sputtering, e.g. target
2224/73221	. . . .	Strap and wire connectors	2224/75187	. . . .	Means for evaporation
2224/73223	. . . .	Strap and HDI connectors	2224/75188	. . . .	Means for chemical vapour deposition [CVD], e.g. for laser CVD
2224/73225	. . . .	Strap and TAB connectors	2224/75189	. . . .	Means for plating, e.g. for electroplating, electroless plating
2224/73227	. . . .	Wire and HDI connectors	2224/752	. . . .	Protection means against electrical discharge
2224/73229	. . . .	Wire and TAB connectors	2224/7525	. . . .	Means for applying energy, e.g. heating means
2224/73231	. . . .	HDI and TAB connectors	2224/75251	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73251	. . . .	on different surfaces	2224/75252	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73253	. . . .	Bump and layer connectors	2224/75253	. . . .	adapted for localised heating
2224/73255	. . . .	Bump and strap connectors	2224/7526	. . . .	Polychromatic heating lamp
2224/73257	. . . .	Bump and wire connectors	2224/75261	. . . .	Laser
2224/73259	. . . .	Bump and HDI connectors	2224/75262	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73261	. . . .	Bump and TAB connectors	2224/75263	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73263	. . . .	Layer and strap connectors	2224/75264	. . . .	by induction heating, i.e. coils
2224/73265	. . . .	Layer and wire connectors	2224/75265	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/73267	. . . .	Layer and HDI connectors	2224/75266	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/73269	. . . .	Layer and TAB connectors	2224/75267	. . . .	Flame torch, e.g. hydrogen torch
2224/73271	. . . .	Strap and wire connectors	2224/75268	. . . .	Discharge electrode
2224/73273	. . . .	Strap and HDI connectors	2224/75269	. . . .	Shape of the discharge electrode
2224/73275	. . . .	Strap and TAB connectors	2224/7527	. . . .	Material of the discharge electrode
2224/73277	. . . .	Wire and HDI connectors	2224/75271	. . . .	Circuitry of the discharge electrode
2224/73279	. . . .	Wire and TAB connectors	2224/75272	. . . .	Oven
2224/73281	. . . .	HDI and TAB connectors	2224/7528	. . . .	Resistance welding electrodes, i.e. for ohmic heating
2224/74	. . . .	Apparatus for manufacturing arrangements for connecting or disconnecting semiconductor or solid-state bodies and for methods related thereto	2224/75281	. . . .	in the lower part of the bonding apparatus, e.g. in the apparatus chuck
2224/741	. . . .	Apparatus for manufacturing means for bonding, e.g. connectors	2224/75282	. . . .	in the upper part of the bonding apparatus, e.g. in the bonding head
2224/742	. . . .	Apparatus for manufacturing bump connectors	2224/75283	. . . .	by infrared heating, e.g. infrared heating lamp
2224/743	. . . .	Apparatus for manufacturing layer connectors	2224/753	. . . .	by means of pressure
2224/744	. . . .	Apparatus for manufacturing strap connectors	2224/75301	. . . .	Bonding head
2224/745	. . . .	Apparatus for manufacturing wire connectors	2224/75302	. . . .	Shape
2224/749	. . . .	Tools for reworking, e.g. for shaping	2224/75303	. . . .	of the pressing surface
2224/75	. . . .	Apparatus for connecting with bump connectors or layer connectors	2224/75304	. . . .	being curved
2224/75001	. . . .	Calibration means	2224/75305	. . . .	comprising protrusions
2224/7501	. . . .	Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma	2224/7531	. . . .	of other parts
2224/751	. . . .	Means for controlling the bonding environment, e.g. valves, vacuum pumps	2224/75312	. . . .	Material
2224/75101	. . . .	Chamber	2224/75313	. . . .	Removable bonding head
2224/75102	. . . .	Vacuum chamber	2224/75314	. . . .	Auxiliary members on the pressing surface
2224/7511	. . . .	High pressure chamber	2224/75315	. . . .	Elastomer inlay
2224/7515	. . . .	Means for applying permanent coating, e.g. in-situ coating	2224/75316	. . . .	with retaining mechanisms
2224/75151	. . . .	Means for direct writing	2224/75317	. . . .	Removable auxiliary member
2224/75152	. . . .	Syringe			
2224/75153	. . . .	integrated into the bonding head			
2224/75155	. . . .	Jetting means, e.g. ink jet			
2224/75158	. . . .	including a laser			

- 2224/75318 . . . . . Shape of the auxiliary member
- 2224/7532 . . . . . Material of the auxiliary member
- 2224/75343 . . . . . by ultrasonic vibrations
- 2224/75344 . . . . . Eccentric cams
- 2224/75345 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75346 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75347 . . . . . Piezoelectric transducers
- 2224/75348 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75349 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/7535 . . . . . Stable and mobile yokes
- 2224/75351 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75352 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75353 . . . . . Ultrasonic horns
- 2224/75354 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75355 . . . . . Design, e.g. of the wave guide
- 2224/755 . . . . . Cooling means
- 2224/75501 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75502 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/7555 . . . . . Mechanical means, e.g. for planarising, pressing, stamping
- 2224/756 . . . . . Means for supplying the connector to be connected in the bonding apparatus
- 2224/75601 . . . . . Storing means
- 2224/75611 . . . . . Feeding means
- 2224/75621 . . . . . Holding means
- 2224/7565 . . . . . Means for transporting the components to be connected
- 2224/75651 . . . . . Belt conveyor
- 2224/75652 . . . . . Chain conveyor
- 2224/75653 . . . . . Vibrating conveyor
- 2224/75654 . . . . . Pneumatic conveyor
- 2224/75655 . . . . . in a fluid
- 2224/757 . . . . . Means for aligning
- 2224/75701 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75702 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75703 . . . . . Mechanical holding means
- 2224/75704 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75705 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75723 . . . . . Electrostatic holding means
- 2224/75724 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75725 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75733 . . . . . Magnetic holding means
- 2224/75734 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75735 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75743 . . . . . Suction holding means
- 2224/75744 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75745 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/75753 . . . . . Means for optical alignment, e.g. sensors
- 2224/75754 . . . . . Guiding structures
- 2224/75755 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/75756 . . . . . in the upper part of the bonding apparatus, e.g. in the bonding head
- 2224/758 . . . . . Means for moving parts
- 2224/75801 . . . . . Lower part of the bonding apparatus, e.g. XY table
- 2224/75802 . . . . . Rotational mechanism
- 2224/75803 . . . . . Pivoting mechanism
- 2224/75804 . . . . . Translational mechanism
- 2224/75821 . . . . . Upper part of the bonding apparatus, i.e. bonding head
- 2224/75822 . . . . . Rotational mechanism
- 2224/75823 . . . . . Pivoting mechanism
- 2224/75824 . . . . . Translational mechanism
- 2224/75841 . . . . . of the bonding head
- 2224/75842 . . . . . Rotational mechanism
- 2224/75843 . . . . . Pivoting mechanism
- 2224/759 . . . . . Means for monitoring the connection process
- 2224/75901 . . . . . using a computer, e.g. fully- or semi-automatic bonding
- 2224/7592 . . . . . Load or pressure adjusting means, e.g. sensors
- 2224/75925 . . . . . Vibration adjusting means, e.g. sensors
- 2224/7595 . . . . . Means for forming additional members
- 2224/7598 . . . . . specially adapted for batch processes
- 2224/75981 . . . . . Apparatus chuck
- 2224/75982 . . . . . Shape
- 2224/75983 . . . . . of the mounting surface
- 2224/75984 . . . . . of other portions
- 2224/75985 . . . . . Material
- 2224/75986 . . . . . Auxiliary members on the pressing surface
- 2224/75987 . . . . . Shape of the auxiliary member
- 2224/75988 . . . . . Material of the auxiliary member
- 2224/76 . . . . . Apparatus for connecting with build-up interconnects
- 2224/76001 . . . . . Calibration means
- 2224/7601 . . . . . Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
- 2224/761 . . . . . Means for controlling the bonding environment, e.g. valves, vacuum pumps
- 2224/76101 . . . . . Chamber
- 2224/76102 . . . . . Vacuum chamber
- 2224/7611 . . . . . High pressure chamber
- 2224/7615 . . . . . Means for depositing
- 2224/76151 . . . . . Means for direct writing
- 2224/76152 . . . . . Syringe
- 2224/76155 . . . . . Jetting means, e.g. ink jet
- 2224/76158 . . . . . including a laser
- 2224/76161 . . . . . Means for screen printing, e.g. roller, squeegee, screen stencil
- 2224/7617 . . . . . Means for applying a preform, e.g. laminator
- 2224/76171 . . . . . including a vacuum-bag
- 2224/7618 . . . . . Means for blanket deposition

- 2224/76181 . . . . . for spin coating, i.e. spin coater
- 2224/76182 . . . . . for curtain coating
- 2224/76183 . . . . . for immersion coating, i.e. bath
- 2224/76184 . . . . . for spray coating, i.e. nozzle
- 2224/76185 . . . . . Means for physical vapour deposition [PVD]
- 2224/76186 . . . . . Means for sputtering, e.g. target
- 2224/76187 . . . . . Means for evaporation
- 2224/76188 . . . . . Means for chemical vapour deposition [CVD], e.g. for laser CVD
- 2224/76189 . . . . . Means for plating, e.g. for electroplating, electroless plating
- 2224/762 . . . . . Protection means against electrical discharge
- 2224/7625 . . . . . Means for applying energy, e.g. heating means
- 2224/76251 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76252 . . . . . in the upper part of the bonding apparatus
- 2224/76253 . . . . . adapted for localised heating
- 2224/7626 . . . . . Polychromatic heating lamp
- 2224/76261 . . . . . Laser
- 2224/76262 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76263 . . . . . in the upper part of the bonding apparatus
- 2224/76264 . . . . . by induction heating, i.e. coils
- 2224/76265 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76266 . . . . . in the upper part of the bonding apparatus
- 2224/76267 . . . . . Flame torch, e.g. hydrogen torch
- 2224/76268 . . . . . Discharge electrode
- 2224/76269 . . . . . Shape of the discharge electrode
- 2224/7627 . . . . . Material of the discharge electrode
- 2224/76271 . . . . . Circuitry of the discharge electrode
- 2224/76272 . . . . . Oven
- 2224/7628 . . . . . Resistance welding electrodes, i.e. for ohmic heating
- 2224/76281 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76282 . . . . . in the upper part of the bonding apparatus
- 2224/76283 . . . . . by infrared heating, e.g. infrared heating lamp
- 2224/763 . . . . . by means of pressure
- 2224/76301 . . . . . Pressing head
- 2224/76302 . . . . . Shape
- 2224/76303 . . . . . of the pressing surface
- 2224/76304 . . . . . being curved
- 2224/76305 . . . . . comprising protrusions
- 2224/7631 . . . . . of other parts
- 2224/76312 . . . . . Material
- 2224/76313 . . . . . Removable pressing head
- 2224/76314 . . . . . Auxiliary members on the pressing surface
- 2224/76315 . . . . . Elastomer inlay
- 2224/76316 . . . . . with retaining mechanisms
- 2224/76317 . . . . . Removable auxiliary member
- 2224/76318 . . . . . Shape of the auxiliary member
- 2224/7632 . . . . . Material of the auxiliary member
- 2224/76343 . . . . . by ultrasonic vibrations
- 2224/76344 . . . . . Eccentric cams
- 2224/76345 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76346 . . . . . in the upper part of the bonding apparatus
- 2224/76347 . . . . . Piezoelectric transducers
- 2224/76348 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76349 . . . . . in the upper part of the bonding apparatus
- 2224/7635 . . . . . Stable and mobile yokes
- 2224/76351 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76352 . . . . . in the upper part of the bonding apparatus
- 2224/76353 . . . . . Ultrasonic horns
- 2224/76354 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76355 . . . . . Design, e.g. of the wave guide
- 2224/765 . . . . . Cooling means
- 2224/76501 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76502 . . . . . in the upper part of the bonding apparatus
- 2224/7655 . . . . . Mechanical means, e.g. for planarising, pressing, stamping
- 2224/76552 . . . . . for drilling
- 2224/76554 . . . . . for abrasive blasting, e.g. sand blasting, wet blasting, hydro-blasting, dry ice blasting
- 2224/766 . . . . . Means for supplying the material of the interconnect
- 2224/76601 . . . . . Storing means
- 2224/76611 . . . . . Feeding means
- 2224/76621 . . . . . Holding means
- 2224/7665 . . . . . Means for transporting the components to be connected
- 2224/76651 . . . . . Belt conveyor
- 2224/76652 . . . . . Chain conveyor
- 2224/76653 . . . . . Vibrating conveyor
- 2224/76654 . . . . . Pneumatic conveyor
- 2224/76655 . . . . . in a fluid
- 2224/767 . . . . . Means for aligning
- 2224/76701 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76702 . . . . . in the upper part of the bonding apparatus
- 2224/76703 . . . . . Mechanical holding means
- 2224/76704 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76705 . . . . . in the upper part of the bonding apparatus
- 2224/76723 . . . . . Electrostatic holding means
- 2224/76724 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76725 . . . . . in the upper part of the bonding apparatus
- 2224/76733 . . . . . Magnetic holding means
- 2224/76734 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76735 . . . . . in the upper part of the bonding apparatus
- 2224/76743 . . . . . Suction holding means
- 2224/76744 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76745 . . . . . in the upper part of the bonding apparatus
- 2224/76753 . . . . . Means for optical alignment, e.g. sensors
- 2224/76754 . . . . . Guiding structures
- 2224/76755 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/76756 . . . . . in the upper part of the bonding apparatus
- 2224/768 . . . . . Means for moving parts
- 2224/76801 . . . . . Lower part of the bonding apparatus, e.g. XY table

- 2224/76802 . . . . . Rotational mechanism
- 2224/76803 . . . . . Pivoting mechanism
- 2224/76804 . . . . . Translational mechanism
- 2224/76821 . . . . . Upper part of the bonding apparatus, i.e. bonding head
- 2224/76822 . . . . . Rotational mechanism
- 2224/76823 . . . . . Pivoting mechanism
- 2224/76824 . . . . . Translational mechanism
- 2224/76841 . . . . . of the bonding head
- 2224/76842 . . . . . Rotational mechanism
- 2224/76843 . . . . . Pivoting mechanism
- 2224/769 . . . . . Means for monitoring the connection process
- 2224/76901 . . . . . using a computer, e.g. fully- or semi-automatic bonding
- 2224/7692 . . . . . Load or pressure adjusting means, e.g. sensors
- 2224/76925 . . . . . Vibration adjusting means, e.g. sensors
- 2224/7695 . . . . . Means for forming additional members
- 2224/7698 . . . . . specially adapted for batch processes
- 2224/76981 . . . . . Apparatus chuck
- 2224/76982 . . . . . Shape
- 2224/76983 . . . . . of the mounting surface
- 2224/76984 . . . . . of other portions
- 2224/76985 . . . . . Material
- 2224/76986 . . . . . Auxiliary members on the pressing surface
- 2224/76987 . . . . . Shape of the auxiliary member
- 2224/76988 . . . . . Material of the auxiliary member
- 2224/77 . . . . . Apparatus for connecting with strap connectors
- 2224/77001 . . . . . Calibration means
- 2224/7701 . . . . . Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
- 2224/771 . . . . . Means for controlling the bonding environment, e.g. valves, vacuum pumps
- 2224/77101 . . . . . Chamber
- 2224/77102 . . . . . Vacuum chamber
- 2224/7711 . . . . . High pressure chamber
- 2224/7715 . . . . . Means for applying permanent coating, e.g. in-situ coating
- 2224/77151 . . . . . Means for direct writing
- 2224/77152 . . . . . Syringe
- 2224/77153 . . . . . integrated into the capillary or wedge
- 2224/77155 . . . . . Jetting means, e.g. ink jet
- 2224/77158 . . . . . including a laser
- 2224/77161 . . . . . Means for screen printing, e.g. roller, squeegee, screen stencil
- 2224/7717 . . . . . Means for applying a preform, e.g. laminator
- 2224/77171 . . . . . including a vacuum-bag
- 2224/7718 . . . . . Means for blanket deposition
- 2224/77181 . . . . . for spin coating, i.e. spin coater
- 2224/77182 . . . . . for curtain coating
- 2224/77183 . . . . . for immersion coating, i.e. bath
- 2224/77184 . . . . . for spray coating, i.e. nozzle
- 2224/77185 . . . . . Means for physical vapour deposition [PVD], e.g. evaporation, sputtering
- 2224/77186 . . . . . Means for sputtering, e.g. target
- 2224/77187 . . . . . Means for evaporation
- 2224/77188 . . . . . Means for chemical vapour deposition [CVD], e.g. for laser CVD
- 2224/77189 . . . . . Means for plating, e.g. for electroplating, electroless plating
- 2224/772 . . . . . Protection means against electrical discharge
- 2224/7725 . . . . . Means for applying energy, e.g. heating means
- 2224/77251 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77252 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77253 . . . . . adapted for localised heating
- 2224/7726 . . . . . Polychromatic heating lamp
- 2224/77261 . . . . . Laser
- 2224/77262 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77263 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77264 . . . . . by induction heating, i.e. coils
- 2224/77265 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77266 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77267 . . . . . Flame torch, e.g. hydrogen torch
- 2224/77268 . . . . . Discharge electrode
- 2224/77269 . . . . . Shape of the discharge electrode
- 2224/7727 . . . . . Material of the discharge electrode
- 2224/77271 . . . . . Circuitry of the discharge electrode
- 2224/77272 . . . . . Oven
- 2224/7728 . . . . . Resistance welding electrodes, i.e. for ohmic heating
- 2224/77281 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77282 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77283 . . . . . by infrared heating, e.g. infrared heating lamp
- 2224/773 . . . . . by means of pressure
- 2224/77313 . . . . . Wedge
- 2224/77314 . . . . . Shape
- 2224/77315 . . . . . of the pressing surface, e.g. tip or head
- 2224/77316 . . . . . comprising protrusions
- 2224/77317 . . . . . of other portions
- 2224/77318 . . . . . inside the capillary
- 2224/77319 . . . . . outside the capillary
- 2224/7732 . . . . . Removable wedge
- 2224/77321 . . . . . Material
- 2224/77325 . . . . . Auxiliary members on the pressing surface
- 2224/77326 . . . . . Removable auxiliary member
- 2224/77327 . . . . . Shape of the auxiliary member
- 2224/77328 . . . . . Material of the auxiliary member
- 2224/77343 . . . . . by ultrasonic vibrations
- 2224/77344 . . . . . Eccentric cams
- 2224/77345 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77346 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77347 . . . . . Piezoelectric transducers
- 2224/77348 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77349 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/7735 . . . . . Stable and mobile yokes
- 2224/77351 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck

- 2224/77352 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77353 . . . . . Ultrasonic horns
- 2224/77354 . . . . . in the lower part of the bonding apparatus, e.g. in the mounting chuck
- 2224/77355 . . . . . Design, e.g. of the wave guide
- 2224/775 . . . . . Cooling means
- 2224/77501 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77502 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/7755 . . . . . Mechanical means, e.g. for severing, pressing, stamping
- 2224/776 . . . . . Means for supplying the connector to be connected in the bonding apparatus
- 2224/77601 . . . . . Storing means
- 2224/77611 . . . . . Feeding means
- 2224/77621 . . . . . Holding means, e.g. wire claspers
- 2224/77631 . . . . . Means for wire tension adjustments
- 2224/7765 . . . . . Means for transporting the components to be connected
- 2224/77651 . . . . . Belt conveyor
- 2224/77652 . . . . . Chain conveyor
- 2224/77653 . . . . . Vibrating conveyor
- 2224/77654 . . . . . Pneumatic conveyor
- 2224/77655 . . . . . in a fluid
- 2224/777 . . . . . Means for aligning
- 2224/77701 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77702 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77703 . . . . . Mechanical holding means
- 2224/77704 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77705 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77723 . . . . . Electrostatic holding means
- 2224/77724 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77725 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77733 . . . . . Magnetic holding means
- 2224/77734 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77735 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77743 . . . . . Suction holding means
- 2224/77744 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77745 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/77753 . . . . . Means for optical alignment, e.g. sensors
- 2224/77754 . . . . . Guiding structures
- 2224/77755 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/77756 . . . . . in the upper part of the bonding apparatus, e.g. in the wedge
- 2224/778 . . . . . Means for moving parts
- 2224/77801 . . . . . Lower part of the bonding apparatus, e.g. XY table
- 2224/77802 . . . . . Rotational mechanism
- 2224/77803 . . . . . Pivoting mechanism
- 2224/77804 . . . . . Translational mechanism
- 2224/77821 . . . . . Upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
- 2224/77822 . . . . . Rotational mechanism
- 2224/77823 . . . . . Pivoting mechanism
- 2224/77824 . . . . . Translational mechanism
- 2224/77841 . . . . . of the pressing portion, e.g. tip or head
- 2224/77842 . . . . . Rotational mechanism
- 2224/77843 . . . . . Pivoting mechanism
- 2224/779 . . . . . Means for monitoring the connection process
- 2224/77901 . . . . . using a computer, e.g. fully- or semi-automatic bonding
- 2224/7792 . . . . . Load or pressure adjusting means, e.g. sensors
- 2224/77925 . . . . . Vibration adjusting means, e.g. sensors
- 2224/7795 . . . . . Means for forming additional members
- 2224/7798 . . . . . specially adapted for batch processes
- 2224/77981 . . . . . Apparatus chuck
- 2224/77982 . . . . . Shape
- 2224/77983 . . . . . of the mounting surface
- 2224/77984 . . . . . of other portions
- 2224/77985 . . . . . Material
- 2224/77986 . . . . . Auxiliary members on the pressing surface
- 2224/77987 . . . . . Shape of the auxiliary member
- 2224/77988 . . . . . Material of the auxiliary member
- 2224/78 . . . . . Apparatus for connecting with wire connectors
- 2224/78001 . . . . . Calibration means
- 2224/7801 . . . . . Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
- 2224/781 . . . . . Means for controlling the bonding environment, e.g. valves, vacuum pumps
- 2224/78101 . . . . . Chamber
- 2224/78102 . . . . . Vacuum chamber
- 2224/7811 . . . . . High pressure chamber
- 2224/7815 . . . . . Means for applying permanent coating, e.g. in-situ coating
- 2224/782 . . . . . Protection means against electrical discharge
- 2224/7825 . . . . . Means for applying energy, e.g. heating means
- 2224/78251 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78252 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78253 . . . . . adapted for localised heating
- 2224/7826 . . . . . Polychromatic heating lamp
- 2224/78261 . . . . . Laser
- 2224/78262 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78263 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78264 . . . . . by induction heating, i.e. coils
- 2224/78265 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78266 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78267 . . . . . Flame torch, e.g. hydrogen torch
- 2224/78268 . . . . . Discharge electrode
- 2224/78269 . . . . . Shape of the discharge electrode
- 2224/7827 . . . . . Material of the discharge electrode
- 2224/78271 . . . . . Circuitry of the discharge electrode
- 2224/78272 . . . . . Oven
- 2224/7828 . . . . . Resistance welding electrodes, i.e. for ohmic heating

- 2224/78281 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78282 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78283 . . . . . by infrared heating, e.g. infrared heating lamp
- 2224/783 . . . . . by means of pressure
- 2224/78301 . . . . . Capillary
- 2224/78302 . . . . . Shape
- 2224/78303 . . . . . of the pressing surface, e.g. tip or head
- 2224/78304 . . . . . comprising protrusions
- 2224/78305 . . . . . of other portions
- 2224/78306 . . . . . inside the capillary
- 2224/78307 . . . . . outside the capillary
- 2224/78308 . . . . . Removable capillary
- 2224/78309 . . . . . Material
- 2224/7831 . . . . . Auxiliary members on the pressing surface
- 2224/78311 . . . . . Removable auxiliary member
- 2224/78312 . . . . . Shape of the auxiliary member
- 2224/78313 . . . . . Wedge
- 2224/78314 . . . . . Shape
- 2224/78315 . . . . . of the pressing surface, e.g. tip or head
- 2224/78316 . . . . . comprising protrusions
- 2224/78317 . . . . . of other portions
- 2224/78318 . . . . . inside the capillary
- 2224/78319 . . . . . outside the capillary
- 2224/7832 . . . . . Removable wedge
- 2224/78321 . . . . . Material
- 2224/78325 . . . . . Auxiliary members on the pressing surface
- 2224/78326 . . . . . Removable auxiliary member
- 2224/78327 . . . . . Shape of the auxiliary member
- 2224/78328 . . . . . Material of the auxiliary member
- 2224/78343 . . . . . by ultrasonic vibrations
- 2224/78344 . . . . . Eccentric cams
- 2224/78345 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78346 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78347 . . . . . Piezoelectric transducers
- 2224/78348 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78349 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/7835 . . . . . Stable and mobile yokes
- 2224/78351 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78352 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78353 . . . . . Ultrasonic horns
- 2224/78354 . . . . . in the lower part of the bonding apparatus, e.g. in the mounting chuck
- 2224/78355 . . . . . Design, e.g. of the wave guide
- 2224/785 . . . . . Cooling means
- 2224/78501 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78502 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/7855 . . . . . Mechanical means, e.g. for severing, pressing, stamping
- 2224/786 . . . . . Means for supplying the connector to be connected in the bonding apparatus
- 2224/78601 . . . . . Storing means
- 2224/78611 . . . . . Feeding means
- 2224/78621 . . . . . Holding means, e.g. wire clampers
- 2224/78631 . . . . . Means for wire tension adjustments
- 2224/7865 . . . . . Means for transporting the components to be connected
- 2224/78651 . . . . . Belt conveyor
- 2224/78652 . . . . . Chain conveyor
- 2224/78653 . . . . . Vibrating conveyor
- 2224/78654 . . . . . Pneumatic conveyor
- 2224/78655 . . . . . in a fluid
- 2224/787 . . . . . Means for aligning
- 2224/78701 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78702 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78703 . . . . . Mechanical holding means
- 2224/78704 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78705 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78723 . . . . . Electrostatic holding means
- 2224/78724 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78725 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78733 . . . . . Magnetic holding means
- 2224/78734 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78735 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78743 . . . . . Suction holding means
- 2224/78744 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78745 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/78753 . . . . . Means for optical alignment, e.g. sensors
- 2224/78754 . . . . . Guiding structures
- 2224/78755 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/78756 . . . . . in the upper part of the bonding apparatus, e.g. in the capillary or wedge
- 2224/788 . . . . . Means for moving parts
- 2224/78801 . . . . . Lower part of the bonding apparatus, e.g. XY table
- 2224/78802 . . . . . Rotational mechanism
- 2224/78803 . . . . . Pivoting mechanism
- 2224/78804 . . . . . Translational mechanism
- 2224/78821 . . . . . Upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
- 2224/78822 . . . . . Rotational mechanism
- 2224/78823 . . . . . Pivoting mechanism
- 2224/78824 . . . . . Translational mechanism
- 2224/78841 . . . . . of the pressing portion, e.g. tip or head
- 2224/78842 . . . . . Rotational mechanism
- 2224/78843 . . . . . Pivoting mechanism
- 2224/789 . . . . . Means for monitoring the connection process

- 2224/78901 . . . . using a computer, e.g. fully- or semi-automatic bonding
- 2224/7892 . . . . Load or pressure adjusting means, e.g. sensors
- 2224/78925 . . . . Vibration adjusting means, e.g. sensors
- 2224/7895 . . . . Means for forming additional members
- 2224/7898 . . . . specially adapted for batch processes
- 2224/78981 . . . . Apparatus chuck
- 2224/78982 . . . . Shape
- 2224/78983 . . . . . of the mounting surface
- 2224/78984 . . . . . of other portions
- 2224/78985 . . . . Material
- 2224/78986 . . . . Auxiliary members on the pressing surface
- 2224/78987 . . . . . Shape of the auxiliary member
- 2224/78988 . . . . . Material of the auxiliary member
- 2224/79 . . . Apparatus for Tape Automated Bonding [TAB]
- 2224/79001 . . . Calibration means
- 2224/7901 . . . Means for cleaning, e.g. brushes, for hydro blasting, for ultrasonic cleaning, for dry ice blasting, using gas-flow, by etching, by applying flux or plasma
- 2224/791 . . . Means for controlling the bonding environment, e.g. valves, vacuum pumps
- 2224/79101 . . . . Chamber
- 2224/79102 . . . . . Vacuum chamber
- 2224/7911 . . . . . High pressure chamber
- 2224/7915 . . . Means for applying permanent coating
- 2224/79151 . . . . Means for direct writing
- 2224/79152 . . . . . Syringe
- 2224/79153 . . . . . integrated into the pressing head
- 2224/79155 . . . . . Jetting means, e.g. ink jet
- 2224/79158 . . . . . including a laser
- 2224/79161 . . . . Means for screen printing, e.g. roller, squeegee, screen stencil
- 2224/7917 . . . . Means for applying a preform, e.g. laminator
- 2224/79171 . . . . . including a vacuum-bag
- 2224/7918 . . . . Means for blanket deposition
- 2224/79181 . . . . . for spin coating, i.e. spin coater
- 2224/79182 . . . . . for curtain coating
- 2224/79183 . . . . . for immersion coating, i.e. bath
- 2224/79184 . . . . . for spray coating, i.e. nozzle
- 2224/79185 . . . . . Means for physical vapour deposition [PVD], e.g. evaporation, sputtering
- 2224/79186 . . . . . Means for sputtering, e.g. target
- 2224/79187 . . . . . Means for evaporation
- 2224/79188 . . . . . Means for chemical vapour deposition [CVD], e.g. for laser CVD
- 2224/79189 . . . . . Means for plating, e.g. for electroplating, electroless plating
- 2224/792 . . . Protection means against electrical discharge
- 2224/7925 . . . Means for applying energy, e.g. heating means
- 2224/79251 . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79252 . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79253 . . . . adapted for localised heating
- 2224/7926 . . . . Polychromatic heating lamp
- 2224/79261 . . . . Laser
- 2224/79262 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79263 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79264 . . . . . by induction heating, i.e. coils
- 2224/79265 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79266 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79267 . . . . Flame torch, e.g. hydrogen torch
- 2224/79268 . . . . Discharge electrode
- 2224/79269 . . . . . Shape of the discharge electrode
- 2224/7927 . . . . . Material of the discharge electrode
- 2224/79271 . . . . . Circuitry of the discharge electrode
- 2224/79272 . . . . Oven
- 2224/7928 . . . . Resistance welding electrodes, i.e. for ohmic heating
- 2224/79281 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79282 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79283 . . . . . by infrared heating, e.g. infrared heating lamp
- 2224/793 . . . . . by means of pressure
- 2224/79301 . . . . . Pressing head
- 2224/79302 . . . . . Shape
- 2224/79303 . . . . . . of the pressing surface
- 2224/79304 . . . . . . . being curved
- 2224/79305 . . . . . . . comprising protrusions
- 2224/7931 . . . . . . of other parts
- 2224/79312 . . . . . . Material
- 2224/79313 . . . . . . Removable pressing head
- 2224/79314 . . . . . . Auxiliary members on the pressing surface
- 2224/79315 . . . . . . . Elastomer inlay
- 2224/79316 . . . . . . . with retaining mechanisms
- 2224/79317 . . . . . . . Removable auxiliary member
- 2224/79318 . . . . . . . Shape of the auxiliary member
- 2224/7932 . . . . . . . Material of the auxiliary member
- 2224/79343 . . . . . . . by ultrasonic vibrations
- 2224/79344 . . . . . . . Eccentric cams
- 2224/79345 . . . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79346 . . . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79347 . . . . . . . Piezoelectric transducers
- 2224/79348 . . . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79349 . . . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/7935 . . . . . . . Stable and mobile yokes
- 2224/79351 . . . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79352 . . . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79353 . . . . . . . Ultrasonic horns
- 2224/79354 . . . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79355 . . . . . . . Design, e.g. of the wave guide
- 2224/795 . . . . Cooling means
- 2224/79501 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79502 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/7955 . . . . Mechanical means, e.g. for pressing, stamping
- 2224/796 . . . . Means for supplying the connector to be connected in the bonding apparatus

- 2224/79601 . . . . Storing means
- 2224/79611 . . . . Feeding means
- 2224/79621 . . . . Holding means
- 2224/7965 . . . Means for transporting the components to be connected
- 2224/79651 . . . . Belt conveyor
- 2224/79652 . . . . Chain conveyor
- 2224/79653 . . . . Vibrating conveyor
- 2224/79654 . . . . Pneumatic conveyor
- 2224/79655 . . . . in a fluid
- 2224/797 . . . Means for aligning
- 2224/79701 . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79702 . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79703 . . . . Mechanical holding means
- 2224/79704 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79705 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79723 . . . . Electrostatic holding means
- 2224/79724 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79725 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79733 . . . . Magnetic holding means
- 2224/79734 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79735 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79743 . . . . Suction holding means
- 2224/79744 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79745 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/79753 . . . . Means for optical alignment, e.g. sensors
- 2224/79754 . . . . Guiding structures
- 2224/79755 . . . . . in the lower part of the bonding apparatus, e.g. in the apparatus chuck
- 2224/79756 . . . . . in the upper part of the bonding apparatus, e.g. in the pressing head
- 2224/798 . . . Means for moving parts
- 2224/79801 . . . . Lower part of the bonding apparatus, e.g. XY table
- 2224/79802 . . . . . Rotational mechanism
- 2224/79803 . . . . . Pivoting mechanism
- 2224/79804 . . . . . Translational mechanism
- 2224/79821 . . . . Upper part of the bonding apparatus, i.e. pressing head
- 2224/79822 . . . . . Rotational mechanism
- 2224/79823 . . . . . Pivoting mechanism
- 2224/79824 . . . . . Translational mechanism
- 2224/79841 . . . . of the pressing head
- 2224/79842 . . . . . Rotational mechanism
- 2224/79843 . . . . . Pivoting mechanism
- 2224/799 . . . Means for monitoring the connection process
- 2224/79901 . . . . using a computer, e.g. fully- or semi-automatic bonding
- 2224/7992 . . . . Load or pressure adjusting means, e.g. sensors
- 2224/79925 . . . . Vibration adjusting means, e.g. sensors
- 2224/7995 . . . Means for forming additional members
- 2224/7998 . . . specially adapted for batch processes
- 2224/79981 . . . Apparatus chuck
- 2224/79982 . . . . Shape
- 2224/79983 . . . . . of the mounting surface
- 2224/79984 . . . . . of other portions
- 2224/79985 . . . . Material
- 2224/79986 . . . . Auxiliary members on the pressing surface
- 2224/79987 . . . . . Shape of the auxiliary member
- 2224/79988 . . . . . Material of the auxiliary member
- 2224/7999 . . . for disconnecting
- 2224/80 . . . Methods for connecting semiconductor or other solid state bodies using means for bonding being attached to, or being formed on, the surface to be connected
- 2224/80001 . . . by connecting a bonding area directly to another bonding area, i.e. connectorless bonding, e.g. bumpless bonding
- 2224/80003 . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/80004 . . . . being a removable or sacrificial coating
- 2224/80006 . . . . being a temporary or sacrificial substrate
- 2224/80007 . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for protecting the bonding area during or after the bonding process
- 2224/80009 . . . Pre-treatment of the bonding area
- 2224/8001 . . . . Cleaning the bonding area, e.g. oxide removal step, desmearing
- 2224/80011 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/80012 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/80013 . . . . . Plasma cleaning
- 2224/80014 . . . . . Thermal cleaning, e.g. decomposition, sublimation
- 2224/80019 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8001](#) - [H01L 2224/80014](#)
- 2224/8002 . . . . Applying permanent coating to the bonding area in the bonding apparatus, e.g. in-situ coating
- 2224/80024 . . . . Applying flux to the bonding area in the bonding apparatus
- 2224/8003 . . . . Reshaping the bonding area in the bonding apparatus, e.g. flattening the bonding area
- 2224/80031 . . . . . by chemical means, e.g. etching, anodisation
- 2224/80035 . . . . . by heating means
- 2224/80037 . . . . . using a polychromatic heating lamp
- 2224/80039 . . . . . using a laser
- 2224/80041 . . . . . Induction heating, i.e. eddy currents
- 2224/80047 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/80048 . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/80051 . . . . Forming additional members
- 2224/80052 . . . Detaching bonding areas, e.g. after testing ([unsoldering in general B23K 1/018](#))
- 2224/80053 . . . Bonding environment
- 2224/80054 . . . . Composition of the atmosphere
- 2224/80055 . . . . . being oxidating
- 2224/80065 . . . . . being reducing
- 2224/80075 . . . . . being inert



- 2224/80085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/8009 . . . . . Vacuum
- 2224/80091 . . . . . Under pressure
- 2224/80092 . . . . . Atmospheric pressure
- 2224/80093 . . . . . Transient conditions, e.g. gas-flow
- 2224/80095 . . . . . Temperature settings
- 2224/80096 . . . . . Transient conditions
- 2224/80097 . . . . . Heating
- 2224/80098 . . . . . Cooling
- 2224/80099 . . . . . Ambient temperature
- 2224/8011 . . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8012 . . . . . Aligning
- 2224/80121 . . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/80122 . . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/80123 . . . . . Shape or position of the body
- 2224/80125 . . . . . Bonding areas on the body
- 2224/80127 . . . . . Bonding areas outside the body
- 2224/80129 . . . . . Shape or position of the other item
- 2224/8013 . . . . . using marks formed on the semiconductor or solid-state body
- 2224/80132 . . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/80136 . . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/80138 . . . . . the guiding structures being at least partially left in the finished device
- 2224/80139 . . . . . Guiding structures on the body
- 2224/8014 . . . . . Guiding structures outside the body
- 2224/80141 . . . . . Guiding structures both on and outside the body
- 2224/80143 . . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/80148 . . . . . involving movement of a part of the bonding apparatus
- 2224/80149 . . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8015 . . . . . Rotational movements
- 2224/8016 . . . . . Translational movements
- 2224/80169 . . . . . being the upper part of the bonding apparatus, i.e. bonding head
- 2224/8017 . . . . . Rotational movements
- 2224/8018 . . . . . Translational movements
- 2224/8019 . . . . . Arrangement of the bonding areas prior to mounting
- 2224/80194 . . . . . Lateral distribution of the bonding areas
- 2224/802 . . . . . Applying energy for connecting
- 2224/80201 . . . . . Compression bonding
- 2224/80203 . . . . . Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding
- 2224/80204 . . . . . with a graded temperature profile
- 2224/80205 . . . . . Ultrasonic bonding
- 2224/80206 . . . . . Direction of oscillation
- 2224/80207 . . . . . Thermosonic bonding
- 2224/80209 . . . . . applying unidirectional static pressure
- 2224/80211 . . . . . applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid
- 2224/80213 . . . . . using a reflow oven
- 2224/80215 . . . . . with a graded temperature profile
- 2224/8022 . . . . . with energy being in the form of electromagnetic radiation
- 2224/80222 . . . . . Induction heating, i.e. eddy currents
- 2224/80224 . . . . . using a laser
- 2224/8023 . . . . . Polychromatic or infrared lamp heating
- 2224/80232 . . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/80234 . . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/80236 . . . . . using electro-static corona discharge
- 2224/80237 . . . . . using an electron beam ([electron beam welding in general B23K 15/00](#))
- 2224/80238 . . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8034 . . . . . Bonding interfaces of the bonding area
- 2224/80345 . . . . . Shape, e.g. interlocking features
- 2224/80355 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/80357 . . . . . being flush with the surface
- 2224/80359 . . . . . Material
- 2224/8036 . . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/80365 . . . . . Shape, e.g. interlocking features
- 2224/80375 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/80379 . . . . . Material ([material of the bonding area prior to the connecting process H01L 2224/05099 and H01L 2224/05599](#))
- 2224/8038 . . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/80385 . . . . . Shape, e.g. interlocking features
- 2224/80395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/80399 . . . . . Material
- 2224/804 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/80401 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/80405 . . . . . Gallium [Ga] as principal constituent
- 2224/80409 . . . . . Indium [In] as principal constituent
- 2224/80411 . . . . . Tin [Sn] as principal constituent
- 2224/80413 . . . . . Bismuth [Bi] as principal constituent
- 2224/80414 . . . . . Thallium [Tl] as principal constituent
- 2224/80416 . . . . . Lead [Pb] as principal constituent
- 2224/80417 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/80418 . . . . . Zinc [Zn] as principal constituent
- 2224/8042 . . . . . Antimony [Sb] as principal constituent
- 2224/80423 . . . . . Magnesium [Mg] as principal constituent
- 2224/80424 . . . . . Aluminium [Al] as principal constituent

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2224/80438 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/805 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/80439 . . . . .	Silver [Ag] as principal constituent	2224/80501 . . . . .	the principal constituent melting at a temperature of less than 400°C
2224/80444 . . . . .	Gold [Au] as principal constituent	2224/80505 . . . . .	Gallium [Ga] as principal constituent
2224/80447 . . . . .	Copper [Cu] as principal constituent	2224/80509 . . . . .	Indium [In] as principal constituent
2224/80449 . . . . .	Manganese [Mn] as principal constituent	2224/80511 . . . . .	Tin [Sn] as principal constituent
2224/80455 . . . . .	Nickel [Ni] as principal constituent	2224/80513 . . . . .	Bismuth [Bi] as principal constituent
2224/80457 . . . . .	Cobalt [Co] as principal constituent	2224/80514 . . . . .	Thallium [Tl] as principal constituent
2224/8046 . . . . .	Iron [Fe] as principal constituent	2224/80516 . . . . .	Lead [Pb] as principal constituent
2224/80463 . . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/80517 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/80464 . . . . .	Palladium [Pd] as principal constituent	2224/80518 . . . . .	Zinc [Zn] as principal constituent
2224/80466 . . . . .	Titanium [Ti] as principal constituent	2224/8052 . . . . .	Antimony [Sb] as principal constituent
2224/80469 . . . . .	Platinum [Pt] as principal constituent	2224/80523 . . . . .	Magnesium [Mg] as principal constituent
2224/8047 . . . . .	Zirconium [Zr] as principal constituent	2224/80524 . . . . .	Aluminium [Al] as principal constituent
2224/80471 . . . . .	Chromium [Cr] as principal constituent	2224/80538 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/80472 . . . . .	Vanadium [V] as principal constituent	2224/80539 . . . . .	Silver [Ag] as principal constituent
2224/80473 . . . . .	Rhodium [Rh] as principal constituent	2224/80544 . . . . .	Gold [Au] as principal constituent
2224/80476 . . . . .	Ruthenium [Ru] as principal constituent	2224/80547 . . . . .	Copper [Cu] as principal constituent
2224/80478 . . . . .	Iridium [Ir] as principal constituent	2224/80549 . . . . .	Manganese [Mn] as principal constituent
2224/80479 . . . . .	Niobium [Nb] as principal constituent	2224/80555 . . . . .	Nickel [Ni] as principal constituent
2224/8048 . . . . .	Molybdenum [Mo] as principal constituent	2224/80557 . . . . .	Cobalt [Co] as principal constituent
2224/80481 . . . . .	Tantalum [Ta] as principal constituent	2224/8056 . . . . .	Iron [Fe] as principal constituent
2224/80483 . . . . .	Rhenium [Re] as principal constituent	2224/80563 . . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/80484 . . . . .	Tungsten [W] as principal constituent	2224/80564 . . . . .	Palladium [Pd] as principal constituent
2224/80486 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/80566 . . . . .	Titanium [Ti] as principal constituent
2224/80487 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/80488</a> )	2224/80569 . . . . .	Platinum [Pt] as principal constituent
2224/80488 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/8057 . . . . .	Zirconium [Zr] as principal constituent
2224/8049 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80571 . . . . .	Chromium [Cr] as principal constituent
2224/80491 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80572 . . . . .	Vanadium [V] as principal constituent
2224/80493 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/804</a> - <a href="#">H01L 2224/80491</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80573 . . . . .	Rhodium [Rh] as principal constituent
2224/80494 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/804</a> - <a href="#">H01L 2224/80491</a>	2224/80576 . . . . .	Ruthenium [Ru] as principal constituent
2224/80495 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/804</a> - <a href="#">H01L 2224/80491</a>		
2224/80498 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams		
2224/80499 . . . . .	Material of the matrix		

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2224/80578	.....	Iridium [Ir] as principal constituent	2224/80617	.....	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/80579	.....	Niobium [Nb] as principal constituent	2224/80618	.....	Zinc [Zn] as principal constituent
2224/8058	.....	Molybdenum [Mo] as principal constituent	2224/8062	.....	Antimony [Sb] as principal constituent
2224/80581	.....	Tantalum [Ta] as principal constituent	2224/80623	.....	Magnesium [Mg] as principal constituent
2224/80583	.....	Rhenium [Re] as principal constituent	2224/80624	.....	Aluminium [Al] as principal constituent
2224/80584	.....	Tungsten [W] as principal constituent	2224/80638	.....	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/80586	.....	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/80639	.....	Silver [Ag] as principal constituent
2224/80587	.....	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/80588</a> )	2224/80644	.....	Gold [Au] as principal constituent
2224/80588	.....	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/80647	.....	Copper [Cu] as principal constituent
2224/8059	.....	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80649	.....	Manganese [Mn] as principal constituent
2224/80591	.....	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80655	.....	Nickel [Ni] as principal constituent
2224/80593	.....	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/805</a> - <a href="#">H01L 2224/80591</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80657	.....	Cobalt [Co] as principal constituent
2224/80594	.....	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/805</a> - <a href="#">H01L 2224/80591</a>	2224/8066	.....	Iron [Fe] as principal constituent
2224/80595	.....	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/805</a> - <a href="#">H01L 2224/80591</a>	2224/80663	.....	the principal constituent melting at a temperature of greater than 1550°C
2224/80598	.....	Fillers	2224/80664	.....	Palladium [Pd] as principal constituent
2224/80599	.....	Base material	2224/80666	.....	Titanium [Ti] as principal constituent
2224/806	.....	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/80669	.....	Platinum [Pt] as principal constituent
2224/80601	.....	the principal constituent melting at a temperature of less than 400°C	2224/8067	.....	Zirconium [Zr] as principal constituent
2224/80605	.....	Gallium [Ga] as principal constituent	2224/80671	.....	Chromium [Cr] as principal constituent
2224/80609	.....	Indium [In] as principal constituent	2224/80672	.....	Vanadium [V] as principal constituent
2224/80611	.....	Tin [Sn] as principal constituent	2224/80673	.....	Rhodium [Rh] as principal constituent
2224/80613	.....	Bismuth [Bi] as principal constituent	2224/80676	.....	Ruthenium [Ru] as principal constituent
2224/80614	.....	Thallium [Tl] as principal constituent	2224/80678	.....	Iridium [Ir] as principal constituent
2224/80616	.....	Lead [Pb] as principal constituent	2224/80679	.....	Niobium [Nb] as principal constituent
			2224/8068	.....	Molybdenum [Mo] as principal constituent
			2224/80681	.....	Tantalum [Ta] as principal constituent
			2224/80683	.....	Rhenium [Re] as principal constituent
			2224/80684	.....	Tungsten [W] as principal constituent
			2224/80686	.....	with a principal constituent of the material being a non metallic, non metalloid inorganic material

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2224/80687	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/80688</a> )	2224/80724	. . . . .	Aluminium [Al] as principal constituent
2224/80688	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/80738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/8069	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/80739	. . . . .	Silver [Ag] as principal constituent
2224/80691	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/80744	. . . . .	Gold [Au] as principal constituent
2224/80693	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/806</a> - <a href="#">H01L 2224/80691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/80747	. . . . .	Copper [Cu] as principal constituent
2224/80694	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/806</a> - <a href="#">H01L 2224/80691</a>	2224/80749	. . . . .	Manganese [Mn] as principal constituent
2224/80695	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/806</a> - <a href="#">H01L 2224/80691</a>	2224/80755	. . . . .	Nickel [Ni] as principal constituent
2224/80698	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/80757	. . . . .	Cobalt [Co] as principal constituent
2224/80699	. . . . .	Coating material	2224/8076	. . . . .	Iron [Fe] as principal constituent
2224/807	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/80763	. . . . .	the principal constituent melting at a temperature of greater than 1550°C
2224/80701	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/80764	. . . . .	Palladium [Pd] as principal constituent
2224/80705	. . . . .	Gallium [Ga] as principal constituent	2224/80766	. . . . .	Titanium [Ti] as principal constituent
2224/80709	. . . . .	Indium [In] as principal constituent	2224/80769	. . . . .	Platinum [Pt] as principal constituent
2224/80711	. . . . .	Tin [Sn] as principal constituent	2224/8077	. . . . .	Zirconium [Zr] as principal constituent
2224/80713	. . . . .	Bismuth [Bi] as principal constituent	2224/80771	. . . . .	Chromium [Cr] as principal constituent
2224/80714	. . . . .	Thallium [Tl] as principal constituent	2224/80772	. . . . .	Vanadium [V] as principal constituent
2224/80716	. . . . .	Lead [Pb] as principal constituent	2224/80773	. . . . .	Rhodium [Rh] as principal constituent
2224/80717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/80776	. . . . .	Ruthenium [Ru] as principal constituent
2224/80718	. . . . .	Zinc [Zn] as principal constituent	2224/80778	. . . . .	Iridium [Ir] as principal constituent
2224/8072	. . . . .	Antimony [Sb] as principal constituent	2224/80779	. . . . .	Niobium [Nb] as principal constituent
2224/80723	. . . . .	Magnesium [Mg] as principal constituent	2224/8078	. . . . .	Molybdenum [Mo] as principal constituent
			2224/80781	. . . . .	Tantalum [Ta] as principal constituent
			2224/80783	. . . . .	Rhenium [Re] as principal constituent
			2224/80784	. . . . .	Tungsten [W] as principal constituent
			2224/80786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
			2224/80787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/80788</a> )
			2224/80788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
			2224/8079	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy

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- 2224/80791 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/80793 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/807](#) - [H01L 2224/80791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/80794 . . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/807](#) - [H01L 2224/80791](#)
- 2224/80795 . . . . . with a principal constituent of the material being a gas not provided for in groups [H01L 2224/807](#) - [H01L 2224/80791](#)
- 2224/80798 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2224/80799 . . . . . Shape or distribution of the fillers
- 2224/808 . . . Bonding techniques
- 2224/80801 . . . . Soldering or alloying
- 2224/80805 . . . . involving forming a eutectic alloy at the bonding interface
- 2224/8081 . . . . involving forming an intermetallic compound at the bonding interface
- 2224/80815 . . . . Reflow soldering
- 2224/8082 . . . . Diffusion bonding
- 2224/80825 . . . . Solid-liquid interdiffusion
- 2224/8083 . . . . Solid-solid interdiffusion
- 2224/8084 . . . . Sintering
- 2224/8085 . . . . using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/80855 . . . . Hardening the adhesive by curing, i.e. thermosetting
- 2224/80856 . . . . Pre-cured adhesive, i.e. B-stage adhesive
- 2224/80859 . . . . Localised curing of parts of the bonding area
- 2224/80862 . . . . Heat curing
- 2224/80865 . . . . Microwave curing
- 2224/80868 . . . . Infrared [IR] curing
- 2224/80871 . . . . Visible light curing
- 2224/80874 . . . . Ultraviolet [UV] curing
- 2224/80877 . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8088 . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/80885 . . . . Combinations of two or more hardening methods provided for in at least two different groups from [H01L 2224/80855](#) - [H01L 2224/8088](#), e.g. for hybrid thermoplastic-thermosetting adhesives
- 2224/8089 . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/80893 . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/80894 . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/80895 . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/80896 . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/80897 . . . . Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like
- 2224/80898 . . . . Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other
- 2224/80899 . . . . using resilient parts in the bonding area
- 2224/809 . . . with the bonding area not providing any mechanical bonding
- 2224/80901 . . . . Pressing a bonding area against another bonding area by means of a further bonding area or connector ([detachable pressure contact](#) [H01L 2224/72](#))
- 2224/80902 . . . . by means of a further bonding area
- 2224/80903 . . . . by means of a bump or layer connector
- 2224/80904 . . . . by means of an encapsulation layer or foil
- 2224/80905 . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/808](#) - [H01L 2224/80904](#)
- 2224/80906 . . . . Specific sequence of method steps
- 2224/80907 . . . . Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step
- 2224/80908 . . . involving monitoring, e.g. feedback loop
- 2224/80909 . . . Post-treatment of the bonding area
- 2224/8091 . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/80911 . . . . Chemical cleaning, e.g. etching, flux
- 2224/80912 . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/80913 . . . . Plasma cleaning
- 2224/80914 . . . . Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/80919 . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8091](#) - [H01L 2224/80914](#)
- 2224/8092 . . . . Applying permanent coating, e.g. protective coating
- 2224/8093 . . . . Reshaping
- 2224/80931 . . . . by chemical means, e.g. etching
- 2224/80935 . . . . by heating means, e.g. reflowing
- 2224/80937 . . . . using a polychromatic heating lamp
- 2224/80939 . . . . using a laser
- 2224/80941 . . . . Induction heating, i.e. eddy currents
- 2224/80943 . . . . using a flame torch, e.g. hydrogen torch
- 2224/80945 . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/80947 . . . . by mechanical means, e.g. ?pull-and-cut?, pressing, stamping

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- 2224/80948 . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/80951 . . . . Forming additional members, e.g. for reinforcing
- 2224/80986 . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/81 . . . using a bump connector
- 2224/81001 . . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/81002 . . . . being a removable or sacrificial coating
- 2224/81005 . . . . being a temporary or sacrificial substrate
- 2224/81007 . . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the bump connector during or after the bonding process
- 2224/81009 . . . . Pre-treatment of the bump connector or the bonding area
- 2224/8101 . . . . Cleaning the bump connector, e.g. oxide removal step, desmearing
- 2224/81011 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/81012 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/81013 . . . . . Plasma cleaning
- 2224/81014 . . . . . Thermal cleaning, e.g. decomposition, sublimation
- 2224/81019 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8101](#) - [H01L 2224/81014](#)
- 2224/8102 . . . . . Applying permanent coating to the bump connector in the bonding apparatus, e.g. in-situ coating
- 2224/81022 . . . . . Cleaning the bonding area, e.g. oxide removal step, desmearing
- 2224/81024 . . . . . Applying flux to the bonding area
- 2224/81026 . . . . . Applying a precursor material to the bonding area
- 2224/8103 . . . . . Reshaping the bump connector in the bonding apparatus, e.g. flattening the bump connector
- 2224/81031 . . . . . by chemical means, e.g. etching, anodisation
- 2224/81035 . . . . . by heating means
- 2224/81037 . . . . . using a polychromatic heating lamp
- 2224/81039 . . . . . using a laser
- 2224/81041 . . . . . Induction heating, i.e. eddy currents
- 2224/81047 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/81048 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/81051 . . . . . Forming additional members
- 2224/81052 . . . . . Detaching bump connectors, e.g. after testing ([unsoldering in general B23K 1/018](#))
- 2224/81053 . . . . . Bonding environment
- 2224/81054 . . . . . Composition of the atmosphere
- 2224/81055 . . . . . being oxidating
- 2224/81065 . . . . . being reducing
- 2224/81075 . . . . . being inert
- 2224/81085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/8109 . . . . . Vacuum
- 2224/81091 . . . . . Under pressure
- 2224/81092 . . . . . Atmospheric pressure
- 2224/81093 . . . . . Transient conditions, e.g. gas-flow
- 2224/81095 . . . . . Temperature settings
- 2224/81096 . . . . . Transient conditions
- 2224/81097 . . . . . Heating
- 2224/81098 . . . . . Cooling
- 2224/81099 . . . . . Ambient temperature
- 2224/811 . . . . the bump connector being supplied to the parts to be connected in the bonding apparatus
- 2224/81101 . . . . . as prepeg comprising a bump connector, e.g. provided in an insulating plate member
- 2224/8111 . . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8112 . . . . . Aligning
- 2224/81121 . . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/81122 . . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/81123 . . . . . Shape or position of the body
- 2224/81125 . . . . . Bonding areas on the body
- 2224/81127 . . . . . Bonding areas outside the body
- 2224/81129 . . . . . Shape or position of the other item
- 2224/8113 . . . . . using marks formed on the semiconductor or solid-state body
- 2224/81132 . . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/81136 . . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/81138 . . . . . the guiding structures being at least partially left in the finished device
- 2224/81139 . . . . . Guiding structures on the body
- 2224/8114 . . . . . Guiding structures outside the body
- 2224/81141 . . . . . Guiding structures both on and outside the body
- 2224/81143 . . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/81148 . . . . . involving movement of a part of the bonding apparatus
- 2224/81149 . . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8115 . . . . . Rotational movements
- 2224/8116 . . . . . Translational movements
- 2224/81169 . . . . . being the upper part of the bonding apparatus, i.e. bonding head
- 2224/8117 . . . . . Rotational movements
- 2224/8118 . . . . . Translational movements
- 2224/8119 . . . . . Arrangement of the bump connectors prior to mounting
- 2224/81191 . . . . . wherein the bump connectors are disposed only on the semiconductor or solid-state body
- 2224/81192 . . . . . wherein the bump connectors are disposed only on another item or body to be connected to the semiconductor or solid-state body
- 2224/81193 . . . . . wherein the bump connectors are disposed on both the semiconductor or solid-state body and another item or body to be connected to the semiconductor or solid-state body
- 2224/81194 . . . . . Lateral distribution of the bump connectors
- 2224/812 . . . . . Applying energy for connecting

- 2224/81201 . . . . Compression bonding
- 2224/81203 . . . . Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding
- 2224/81204 . . . . with a graded temperature profile
- 2224/81205 . . . . Ultrasonic bonding
- 2224/81206 . . . . Direction of oscillation
- 2224/81207 . . . . Thermosonic bonding
- 2224/81208 . . . . applying unidirectional static pressure
- 2224/81209 . . . . applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid
- 2224/8121 . . . . using a reflow oven
- 2224/81211 . . . . with a graded temperature profile
- 2224/8122 . . . . with energy being in the form of electromagnetic radiation
- 2224/81222 . . . . Induction heating, i.e. eddy currents
- 2224/81224 . . . . using a laser
- 2224/8123 . . . . Polychromatic or infrared lamp heating
- 2224/81232 . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/81234 . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/81236 . . . . using electro-static corona discharge
- 2224/81237 . . . . using an electron beam ([electron beam welding in general B23K 15/00](#))
- 2224/81238 . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8134 . . . . Bonding interfaces of the bump connector
- 2224/81345 . . . . Shape, e.g. interlocking features
- 2224/81355 . . . . having an external coating, e.g. protective bond-through coating
- 2224/81359 . . . . Material
- 2224/8136 . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/81365 . . . . Shape, e.g. interlocking features
- 2224/81375 . . . . having an external coating, e.g. protective bond-through coating
- 2224/81379 . . . . Material ([material of the bump connector prior to the connecting process H01L 2224/13099 and H01L 2224/13599, and subgroups](#))
- 2224/8138 . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/81385 . . . . Shape, e.g. interlocking features
- 2224/81395 . . . . having an external coating, e.g. protective bond-through coating
- 2224/81399 . . . . Material
- 2224/814 . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/81401 . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/81405 . . . . Gallium [Ga] as principal constituent
- 2224/81409 . . . . Indium [In] as principal constituent
- 2224/81411 . . . . Tin [Sn] as principal constituent
- 2224/81413 . . . . Bismuth [Bi] as principal constituent
- 2224/81414 . . . . Thallium [Tl] as principal constituent
- 2224/81416 . . . . Lead [Pb] as principal constituent
- 2224/81417 . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/81418 . . . . Zinc [Zn] as principal constituent
- 2224/8142 . . . . Antimony [Sb] as principal constituent
- 2224/81423 . . . . Magnesium [Mg] as principal constituent
- 2224/81424 . . . . Aluminium [Al] as principal constituent
- 2224/81438 . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/81439 . . . . Silver [Ag] as principal constituent
- 2224/81444 . . . . Gold [Au] as principal constituent
- 2224/81447 . . . . Copper [Cu] as principal constituent
- 2224/81449 . . . . Manganese [Mn] as principal constituent
- 2224/81455 . . . . Nickel [Ni] as principal constituent
- 2224/81457 . . . . Cobalt [Co] as principal constituent
- 2224/8146 . . . . Iron [Fe] as principal constituent
- 2224/81463 . . . . the principal constituent melting at a temperature of greater than 1550°C
- 2224/81464 . . . . Palladium [Pd] as principal constituent
- 2224/81466 . . . . Titanium [Ti] as principal constituent
- 2224/81469 . . . . Platinum [Pt] as principal constituent
- 2224/8147 . . . . Zirconium [Zr] as principal constituent
- 2224/81471 . . . . Chromium [Cr] as principal constituent
- 2224/81472 . . . . Vanadium [V] as principal constituent
- 2224/81473 . . . . Rhodium [Rh] as principal constituent
- 2224/81476 . . . . Ruthenium [Ru] as principal constituent
- 2224/81478 . . . . Iridium [Ir] as principal constituent
- 2224/81479 . . . . Niobium [Nb] as principal constituent
- 2224/8148 . . . . Molybdenum [Mo] as principal constituent
- 2224/81481 . . . . Tantalum [Ta] as principal constituent
- 2224/81483 . . . . Rhenium [Re] as principal constituent
- 2224/81484 . . . . Tungsten [W] as principal constituent
- 2224/81486 . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2224/81487 . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/81488](#))
- 2224/81488 . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8149 . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/81491 . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/81493 . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/814](#) - [H01L 2224/81491](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/81494 . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/814](#) - [H01L 2224/81491](#)

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2224/81495	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/814</a> - <a href="#">H01L 2224/81491</a>	2224/8157	. . . . .	Zirconium [Zr] as principal constituent
2224/81498	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/81571	. . . . .	Chromium [Cr] as principal constituent
2224/81499	. . . . .	Material of the matrix	2224/81572	. . . . .	Vanadium [V] as principal constituent
2224/815	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/81573	. . . . .	Rhodium [Rh] as principal constituent
2224/81501	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/81576	. . . . .	Ruthenium [Ru] as principal constituent
2224/81505	. . . . .	Gallium [Ga] as principal constituent	2224/81578	. . . . .	Iridium [Ir] as principal constituent
2224/81509	. . . . .	Indium [In] as principal constituent	2224/81579	. . . . .	Niobium [Nb] as principal constituent
2224/81511	. . . . .	Tin [Sn] as principal constituent	2224/8158	. . . . .	Molybdenum [Mo] as principal constituent
2224/81513	. . . . .	Bismuth [Bi] as principal constituent	2224/81581	. . . . .	Tantalum [Ta] as principal constituent
2224/81514	. . . . .	Thallium [Tl] as principal constituent	2224/81583	. . . . .	Rhenium [Re] as principal constituent
2224/81516	. . . . .	Lead [Pb] as principal constituent	2224/81584	. . . . .	Tungsten [W] as principal constituent
2224/81517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81518	. . . . .	Zinc [Zn] as principal constituent	2224/81587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/81588</a> )
2224/8152	. . . . .	Antimony [Sb] as principal constituent	2224/81588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/81523	. . . . .	Magnesium [Mg] as principal constituent	2224/8159	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81524	. . . . .	Aluminium [Al] as principal constituent	2224/81591	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81593	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/815</a> - <a href="#">H01L 2224/81591</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81539	. . . . .	Silver [Ag] as principal constituent	2224/81594	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/815</a> - <a href="#">H01L 2224/81591</a>
2224/81544	. . . . .	Gold [Au] as principal constituent	2224/81595	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/815</a> - <a href="#">H01L 2224/81591</a>
2224/81547	. . . . .	Copper [Cu] as principal constituent	2224/81598	. . . . .	Fillers
2224/81549	. . . . .	Manganese [Mn] as principal constituent	2224/81599	. . . . .	Base material
2224/81555	. . . . .	Nickel [Ni] as principal constituent	2224/816	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/81557	. . . . .	Cobalt [Co] as principal constituent	2224/81601	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/8156	. . . . .	Iron [Fe] as principal constituent	2224/81605	. . . . .	Gallium [Ga] as principal constituent
2224/81563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C			
2224/81564	. . . . .	Palladium [Pd] as principal constituent			
2224/81566	. . . . .	Titanium [Ti] as principal constituent			
2224/81569	. . . . .	Platinum [Pt] as principal constituent			



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2224/81609	Indium [In] as principal constituent	2224/8168	Molybdenum [Mo] as principal constituent
2224/81611	Tin [Sn] as principal constituent	2224/81681	Tantalum [Ta] as principal constituent
2224/81613	Bismuth [Bi] as principal constituent	2224/81683	Rhenium [Re] as principal constituent
2224/81614	Thallium [Tl] as principal constituent	2224/81684	Tungsten [W] as principal constituent
2224/81616	Lead [Pb] as principal constituent	2224/81686	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81687	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/81688</a> )
2224/81618	Zinc [Zn] as principal constituent	2224/81688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8162	Antimony [Sb] as principal constituent	2224/8169	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81623	Magnesium [Mg] as principal constituent	2224/81691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81624	Aluminium [Al] as principal constituent	2224/81693	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/816</a> - <a href="#">H01L 2224/81691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81694	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/816</a> - <a href="#">H01L 2224/81691</a>
2224/81639	Silver [Ag] as principal constituent	2224/81695	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/816</a> - <a href="#">H01L 2224/81691</a>
2224/81644	Gold [Au] as principal constituent	2224/81698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/81647	Copper [Cu] as principal constituent	2224/81699	Coating material
2224/81649	Manganese [Mn] as principal constituent	2224/817	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/81655	Nickel [Ni] as principal constituent	2224/81701	the principal constituent melting at a temperature of less than 400°C
2224/81657	Cobalt [Co] as principal constituent	2224/81705	Gallium [Ga] as principal constituent
2224/8166	Iron [Fe] as principal constituent	2224/81709	Indium [In] as principal constituent
2224/81663	the principal constituent melting at a temperature of greater than 1550°C	2224/81711	Tin [Sn] as principal constituent
2224/81664	Palladium [Pd] as principal constituent	2224/81713	Bismuth [Bi] as principal constituent
2224/81666	Titanium [Ti] as principal constituent	2224/81714	Thallium [Tl] as principal constituent
2224/81669	Platinum [Pt] as principal constituent		
2224/8167	Zirconium [Zr] as principal constituent		
2224/81671	Chromium [Cr] as principal constituent		
2224/81672	Vanadium [V] as principal constituent		
2224/81673	Rhodium [Rh] as principal constituent		
2224/81676	Ruthenium [Ru] as principal constituent		
2224/81678	Iridium [Ir] as principal constituent		
2224/81679	Niobium [Nb] as principal constituent		

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2224/81716	. . . . .	Lead [Pb] as principal constituent	2224/81786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/81717	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/81787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/81788</a> )
2224/81718	. . . . .	Zinc [Zn] as principal constituent	2224/81788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8172	. . . . .	Antimony [Sb] as principal constituent	2224/8179	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/81723	. . . . .	Magnesium [Mg] as principal constituent	2224/81791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/81724	. . . . .	Aluminium [Al] as principal constituent	2224/81793	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/817</a> - <a href="#">H01L 2224/81791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/81738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/81794	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/817</a> - <a href="#">H01L 2224/81791</a>
2224/81739	. . . . .	Silver [Ag] as principal constituent	2224/81795	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/817</a> - <a href="#">H01L 2224/81791</a>
2224/81744	. . . . .	Gold [Au] as principal constituent	2224/81798	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/81747	. . . . .	Copper [Cu] as principal constituent	2224/81799	. . . . .	Shape or distribution of the fillers
2224/81749	. . . . .	Manganese [Mn] as principal constituent	2224/818	. . . . .	Bonding techniques
2224/81755	. . . . .	Nickel [Ni] as principal constituent	2224/81801	. . . . .	Soldering or alloying
2224/81757	. . . . .	Cobalt [Co] as principal constituent	2224/81805	. . . . .	involving forming a eutectic alloy at the bonding interface
2224/8176	. . . . .	Iron [Fe] as principal constituent	2224/8181	. . . . .	involving forming an intermetallic compound at the bonding interface
2224/81763	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/81815	. . . . .	Reflow soldering
2224/81764	. . . . .	Palladium [Pd] as principal constituent	2224/8182	. . . . .	Diffusion bonding
2224/81766	. . . . .	Titanium [Ti] as principal constituent	2224/81825	. . . . .	Solid-liquid interdiffusion
2224/81769	. . . . .	Platinum [Pt] as principal constituent	2224/8183	. . . . .	Solid-solid interdiffusion
2224/8177	. . . . .	Zirconium [Zr] as principal constituent	2224/8184	. . . . .	Sintering
2224/81771	. . . . .	Chromium [Cr] as principal constituent	2224/8185	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/81772	. . . . .	Vanadium [V] as principal constituent	2224/81855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting
2224/81773	. . . . .	Rhodium [Rh] as principal constituent	2224/81856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive
2224/81776	. . . . .	Ruthenium [Ru] as principal constituent	2224/81859	. . . . .	Localised curing of parts of the bump connector
2224/81778	. . . . .	Iridium [Ir] as principal constituent	2224/81862	. . . . .	Heat curing
2224/81779	. . . . .	Niobium [Nb] as principal constituent	2224/81865	. . . . .	Microwave curing
2224/8178	. . . . .	Molybdenum [Mo] as principal constituent	2224/81868	. . . . .	Infrared [IR] curing
2224/81781	. . . . .	Tantalum [Ta] as principal constituent	2224/81871	. . . . .	Visible light curing
2224/81783	. . . . .	Rhenium [Re] as principal constituent	2224/81874	. . . . .	Ultraviolet [UV] curing
2224/81784	. . . . .	Tungsten [W] as principal constituent			

- 2224/81877 . . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8188 . . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/81885 . . . . . Combinations of two or more hardening methods provided for in at least two different groups from [H01L 2224/81855](#) - [H01L 2224/8188](#), e.g. for hybrid thermoplastic-thermosetting adhesives
- 2224/8189 . . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/81893 . . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/81894 . . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/81895 . . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/81896 . . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/81897 . . . . . Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like
- 2224/81898 . . . . . Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other
- 2224/81899 . . . . . using resilient parts in the bump connector or in the bonding area
- 2224/819 . . . . . with the bump connector not providing any mechanical bonding
- 2224/81901 . . . . . Pressing the bump connector against the bonding areas by means of another connector ([detachable pressure contact H01L 2224/72](#))
- 2224/81902 . . . . . by means of another bump connector
- 2224/81903 . . . . . by means of a layer connector
- 2224/81904 . . . . . by means of an encapsulation layer or foil
- 2224/81905 . . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/818](#) - [H01L 2224/81904](#)
- 2224/81906 . . . . . Specific sequence of method steps
- 2224/81907 . . . . . Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step
- 2224/81908 . . . . . involving monitoring, e.g. feedback loop
- 2224/81909 . . . . . Post-treatment of the bump connector or bonding area
- 2224/8191 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/81911 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/81912 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/81913 . . . . . Plasma cleaning
- 2224/81914 . . . . . Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/81919 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8191](#) - [H01L 2224/81914](#)
- 2224/8192 . . . . . Applying permanent coating, e.g. protective coating
- 2224/8193 . . . . . Reshaping
- 2224/81931 . . . . . by chemical means, e.g. etching
- 2224/81935 . . . . . by heating means, e.g. reflowing
- 2224/81937 . . . . . using a polychromatic heating lamp
- 2224/81939 . . . . . using a laser
- 2224/81941 . . . . . Induction heating, i.e. eddy currents
- 2224/81943 . . . . . using a flame torch, e.g. hydrogen torch
- 2224/81945 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/81947 . . . . . by mechanical means, e.g. "pull-and-cut", pressing, stamping
- 2224/81948 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/81951 . . . . . Forming additional members, e.g. for reinforcing
- 2224/81986 . . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/82 . . . . . by forming build-up interconnects at chip-level, e.g. for high density interconnects [HDI]
- 2224/82001 . . . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/82002 . . . . . being a removable or sacrificial coating
- 2224/82005 . . . . . being a temporary or sacrificial substrate
- 2224/82007 . . . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting a build-up interconnect during or after the bonding process
- 2224/82009 . . . . . Pre-treatment of the connector or the bonding area
- 2224/8201 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/8203 . . . . . Reshaping, e.g. forming vias
- 2224/82031 . . . . . by chemical means, e.g. etching, anodisation
- 2224/82035 . . . . . by heating means
- 2224/82039 . . . . . using a laser
- 2224/82045 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/82047 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/82048 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/82051 . . . . . Forming additional members
- 2224/82053 . . . . . Bonding environment
- 2224/82054 . . . . . Composition of the atmosphere
- 2224/82085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/8209 . . . . . Vacuum
- 2224/82091 . . . . . Under pressure
- 2224/82095 . . . . . Temperature settings
- 2224/82096 . . . . . Transient conditions
- 2224/82097 . . . . . Heating
- 2224/82098 . . . . . Cooling
- 2224/82099 . . . . . Ambient temperature
- 2224/821 . . . . . Forming a build-up interconnect
- 2224/82101 . . . . . by additive methods, e.g. direct writing
- 2224/82102 . . . . . using jetting, e.g. ink jet
- 2224/82103 . . . . . using laser direct writing

- 2224/82104 . . . . . using screen printing
- 2224/82105 . . . . . by using a preform
- 2224/82106 . . . . . by subtractive methods
- 2224/82108 . . . . . by self-assembly processes
- 2224/82111 . . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/82112 . . . . . Aligning
- 2224/82121 . . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/82122 . . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/8213 . . . . . using marks formed on the semiconductor or solid-state body
- 2224/82132 . . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/82136 . . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/82138 . . . . . the guiding structures being at least partially left in the finished device
- 2224/82143 . . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/82148 . . . . . involving movement of a part of the bonding apparatus
- 2224/82149 . . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8215 . . . . . Rotational movements
- 2224/8216 . . . . . Translational movements
- 2224/82169 . . . . . being the upper part of the bonding apparatus, e.g. nozzle
- 2224/8217 . . . . . Rotational movement
- 2224/8218 . . . . . Translational movements
- 2224/82181 . . . . . connecting first on the semiconductor or solid-state body, i.e. on-chip,
- 2224/82186 . . . . . connecting first outside the semiconductor or solid-state body, i.e. off-chip
- 2224/82191 . . . . . connecting first both on and outside the semiconductor or solid-state body
- 2224/822 . . . . . Applying energy for connecting
- 2224/82201 . . . . . Compression bonding
- 2224/82203 . . . . . Thermocompression bonding
- 2224/82205 . . . . . Ultrasonic bonding
- 2224/82207 . . . . . Thermosonic bonding
- 2224/8221 . . . . . with energy being in the form of electromagnetic radiation
- 2224/82212 . . . . . Induction heating, i.e. eddy currents
- 2224/82214 . . . . . using a laser
- 2224/8223 . . . . . Polychromatic or infrared lamp heating
- 2224/82232 . . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/82234 . . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/82236 . . . . . using electro-static corona discharge
- 2224/82237 . . . . . using electron beam, ([electron beam in general B23K 15/00](#))
- 2224/82238 . . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8234 . . . . . Bonding interfaces of the connector
- 2224/82345 . . . . . Shape, e.g. interlocking features
- 2224/82355 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/82359 . . . . . Material
- 2224/8236 . . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/82365 . . . . . Shape, e.g. interlocking features
- 2224/82375 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/82379 . . . . . Material
- 2224/8238 . . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/82385 . . . . . Shape, e.g. interlocking features
- 2224/82395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/82399 . . . . . Material
- 2224/828 . . . . . Bonding techniques
- 2224/82801 . . . . . Soldering or alloying
- 2224/82805 . . . . . involving forming a eutectic alloy at the bonding interface
- 2224/8281 . . . . . involving forming an intermetallic compound at the bonding interface
- 2224/82815 . . . . . Reflow soldering
- 2224/8282 . . . . . Diffusion bonding
- 2224/82825 . . . . . Solid-liquid interdiffusion
- 2224/8283 . . . . . Solid-solid interdiffusion
- 2224/8284 . . . . . Sintering
- 2224/8285 . . . . . using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/82855 . . . . . Hardening the adhesive by curing, i.e. thermosetting
- 2224/82856 . . . . . Pre-cured adhesive, i.e. B-stage adhesive
- 2224/82859 . . . . . Localised curing of parts of the connector
- 2224/82862 . . . . . Heat curing
- 2224/82865 . . . . . Microwave curing
- 2224/82868 . . . . . Infrared [IR] curing
- 2224/82871 . . . . . Visible light curing
- 2224/82874 . . . . . Ultraviolet [UV] curing
- 2224/82877 . . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8288 . . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/82885 . . . . . Combinations of two or more hardening methods provided for in at least two different groups from [H01L 2224/82855](#) - [H01L 2224/8288](#), e.g. for hybrid thermoplastic-thermosetting adhesives
- 2224/8289 . . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/82893 . . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/82895 . . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/82896 . . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding

- 2224/82897 . . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/82899 . . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/828](#) - [H01L 2224/82897](#)
- 2224/829 . . . . . involving monitoring, e.g. feedback loop
- 2224/82909 . . . . . Post-treatment of the connector or the bonding area
- 2224/8291 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/8293 . . . . . Reshaping
- 2224/82931 . . . . . by chemical means, e.g. etching, anodisation
- 2224/82935 . . . . . by heating means
- 2224/82939 . . . . . using a laser
- 2224/82945 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/82947 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/82948 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/82951 . . . . . Forming additional members
- 2224/82986 . . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/83 . . . . . using a layer connector
- 2224/83001 . . . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/83002 . . . . . being a removable or sacrificial coating
- 2224/83005 . . . . . being a temporary or sacrificial substrate
- 2224/83007 . . . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the layer connector during or after the bonding process
- 2224/83009 . . . . . Pre-treatment of the layer connector or the bonding area
- 2224/8301 . . . . . Cleaning the layer connector, e.g. oxide removal step, desmearing
- 2224/83011 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/83012 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/83013 . . . . . Plasma cleaning
- 2224/83014 . . . . . Thermal cleaning, e.g. decomposition, sublimation
- 2224/83019 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8301](#) - [H01L 2224/83014](#)
- 2224/8302 . . . . . Applying permanent coating to the layer connector in the bonding apparatus, e.g. in-situ coating
- 2224/83022 . . . . . Cleaning the bonding area, e.g. oxide removal step, desmearing
- 2224/83024 . . . . . Applying flux to the bonding area
- 2224/83026 . . . . . Applying a precursor material to the bonding area
- 2224/8303 . . . . . Reshaping the layer connector in the bonding apparatus, e.g. flattening the layer connector
- 2224/83031 . . . . . by chemical means, e.g. etching, anodisation
- 2224/83035 . . . . . by heating means
- 2224/83037 . . . . . using a polychromatic heating lamp
- 2224/83039 . . . . . using a laser
- 2224/83041 . . . . . Induction heating, i.e. eddy currents
- 2224/83047 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/83048 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/83051 . . . . . Forming additional members, e.g. dam structures
- 2224/83052 . . . . . Detaching layer connectors, e.g. after testing ([unsoldering in general B23K 1/018](#))
- 2224/83053 . . . . . Bonding environment
- 2224/83054 . . . . . Composition of the atmosphere
- 2224/83055 . . . . . being oxidating
- 2224/83065 . . . . . being reducing
- 2224/83075 . . . . . being inert
- 2224/83085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/8309 . . . . . Vacuum
- 2224/83091 . . . . . Under pressure
- 2224/83092 . . . . . Atmospheric pressure
- 2224/83093 . . . . . Transient conditions, e.g. gas-flow
- 2224/83095 . . . . . Temperature settings
- 2224/83096 . . . . . Transient conditions
- 2224/83097 . . . . . Heating
- 2224/83098 . . . . . Cooling
- 2224/83099 . . . . . Ambient temperature
- 2224/831 . . . . . the layer connector being supplied to the parts to be connected in the bonding apparatus
- 2224/83101 . . . . . as prepeg comprising a layer connector, e.g. provided in an insulating plate member
- 2224/83102 . . . . . using surface energy, e.g. capillary forces
- 2224/83104 . . . . . by applying pressure, e.g. by injection
- 2224/8311 . . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8312 . . . . . Aligning
- 2224/83121 . . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/83122 . . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/83123 . . . . . Shape or position of the body
- 2224/83125 . . . . . Bonding areas on the body
- 2224/83127 . . . . . Bonding areas outside the body
- 2224/83129 . . . . . Shape or position of the other item
- 2224/8313 . . . . . using marks formed on the semiconductor or solid-state body
- 2224/83132 . . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/83136 . . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/83138 . . . . . the guiding structures being at least partially left in the finished device
- 2224/83139 . . . . . Guiding structures on the body
- 2224/8314 . . . . . Guiding structures outside the body
- 2224/83141 . . . . . Guiding structures both on and outside the body
- 2224/83143 . . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/83148 . . . . . involving movement of a part of the bonding apparatus
- 2224/83149 . . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8315 . . . . . Rotational movements

- 2224/8316 . . . . . Translational movements
- 2224/83169 . . . . . being the upper part of the bonding apparatus, i.e. bonding head
- 2224/8317 . . . . . Rotational movements
- 2224/8318 . . . . . Translational movements
- 2224/8319 . . . Arrangement of the layer connectors prior to mounting
- 2224/83191 . . . . . wherein the layer connectors are disposed only on the semiconductor or solid-state body
- 2224/83192 . . . . . wherein the layer connectors are disposed only on another item or body to be connected to the semiconductor or solid-state body
- 2224/83193 . . . . . wherein the layer connectors are disposed on both the semiconductor or solid-state body and another item or body to be connected to the semiconductor or solid-state body
- 2224/83194 . . . . . Lateral distribution of the layer connectors
- 2224/832 . . . Applying energy for connecting
- 2224/83201 . . . . . Compression bonding
- 2224/83203 . . . . . Thermocompression bonding, e.g. diffusion bonding, pressure joining, thermocompression welding or solid-state welding
- 2224/83204 . . . . . with a graded temperature profile
- 2224/83205 . . . . . Ultrasonic bonding
- 2224/83206 . . . . . Direction of oscillation
- 2224/83207 . . . . . Thermosonic bonding
- 2224/83208 . . . . . applying unidirectional static pressure
- 2224/83209 . . . . . applying isostatic pressure, e.g. degassing using vacuum or a pressurised liquid
- 2224/8321 . . . . . using a reflow oven
- 2224/83211 . . . . . with a graded temperature profile
- 2224/8322 . . . . . with energy being in the form of electromagnetic radiation
- 2224/83222 . . . . . Induction heating, i.e. eddy currents
- 2224/83224 . . . . . using a laser
- 2224/8323 . . . . . Polychromatic or infrared lamp heating
- 2224/83232 . . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/83234 . . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/83236 . . . . . using electro-static corona discharge
- 2224/83237 . . . . . using an electron beam ([electron beam welding in general B23K 15/00](#))
- 2224/83238 . . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8334 . . . . . Bonding interfaces of the layer connector
- 2224/83345 . . . . . Shape, e.g. interlocking features
- 2224/83355 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/83359 . . . . . Material
- 2224/8336 . . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/83365 . . . . . Shape, e.g. interlocking features
- 2224/83375 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/83379 . . . . . Material ([material of the layer connector prior to the connecting process H01L 2224/29099 and H01L 2224/29599, and subgroups](#))
- 2224/8338 . . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/83385 . . . . . Shape, e.g. interlocking features
- 2224/83395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/83399 . . . . . Material
- 2224/834 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/83401 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/83405 . . . . . Gallium [Ga] as principal constituent
- 2224/83409 . . . . . Indium [In] as principal constituent
- 2224/83411 . . . . . Tin [Sn] as principal constituent
- 2224/83413 . . . . . Bismuth [Bi] as principal constituent
- 2224/83414 . . . . . Thallium [Tl] as principal constituent
- 2224/83416 . . . . . Lead [Pb] as principal constituent
- 2224/83417 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/83418 . . . . . Zinc [Zn] as principal constituent
- 2224/8342 . . . . . Antimony [Sb] as principal constituent
- 2224/83423 . . . . . Magnesium [Mg] as principal constituent
- 2224/83424 . . . . . Aluminium [Al] as principal constituent
- 2224/83438 . . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/83439 . . . . . Silver [Ag] as principal constituent
- 2224/83444 . . . . . Gold [Au] as principal constituent
- 2224/83447 . . . . . Copper [Cu] as principal constituent
- 2224/83449 . . . . . Manganese [Mn] as principal constituent
- 2224/83455 . . . . . Nickel [Ni] as principal constituent
- 2224/83457 . . . . . Cobalt [Co] as principal constituent
- 2224/8346 . . . . . Iron [Fe] as principal constituent
- 2224/83463 . . . . . the principal constituent melting at a temperature of greater than 1550°C
- 2224/83464 . . . . . Palladium [Pd] as principal constituent
- 2224/83466 . . . . . Titanium [Ti] as principal constituent
- 2224/83469 . . . . . Platinum [Pt] as principal constituent
- 2224/8347 . . . . . Zirconium [Zr] as principal constituent
- 2224/83471 . . . . . Chromium [Cr] as principal constituent
- 2224/83472 . . . . . Vanadium [V] as principal constituent
- 2224/83473 . . . . . Rhodium [Rh] as principal constituent
- 2224/83476 . . . . . Ruthenium [Ru] as principal constituent
- 2224/83478 . . . . . Iridium [Ir] as principal constituent
- 2224/83479 . . . . . Niobium [Nb] as principal constituent
- 2224/8348 . . . . . Molybdenum [Mo] as principal constituent
- 2224/83481 . . . . . Tantalum [Ta] as principal constituent
- 2224/83483 . . . . . Rhenium [Re] as principal constituent
- 2224/83484 . . . . . Tungsten [W] as principal constituent
- 2224/83486 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material

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- 2224/83487 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/83488](#))
- 2224/83488 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8349 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/83491 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/83493 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/834](#) - [H01L 2224/83491](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/83494 . . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/834](#) - [H01L 2224/83491](#)
- 2224/83495 . . . . . with a principal constituent of the material being a gas not provided for in groups [H01L 2224/834](#) - [H01L 2224/83491](#)
- 2224/83498 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2224/83499 . . . . . Material of the matrix
- 2224/835 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/83501 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/83505 . . . . . Gallium [Ga] as principal constituent
- 2224/83509 . . . . . Indium [In] as principal constituent
- 2224/83511 . . . . . Tin [Sn] as principal constituent
- 2224/83513 . . . . . Bismuth [Bi] as principal constituent
- 2224/83514 . . . . . Thallium [Tl] as principal constituent
- 2224/83516 . . . . . Lead [Pb] as principal constituent
- 2224/83517 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/83518 . . . . . Zinc [Zn] as principal constituent
- 2224/8352 . . . . . Antimony [Sb] as principal constituent
- 2224/83523 . . . . . Magnesium [Mg] as principal constituent
- 2224/83524 . . . . . Aluminium [Al] as principal constituent
- 2224/83538 . . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/83539 . . . . . Silver [Ag] as principal constituent
- 2224/83544 . . . . . Gold [Au] as principal constituent
- 2224/83547 . . . . . Copper [Cu] as principal constituent
- 2224/83549 . . . . . Manganese [Mn] as principal constituent
- 2224/83555 . . . . . Nickel [Ni] as principal constituent
- 2224/83557 . . . . . Cobalt [Co] as principal constituent
- 2224/8356 . . . . . Iron [Fe] as principal constituent
- 2224/83563 . . . . . the principal constituent melting at a temperature of greater than 1550°C
- 2224/83564 . . . . . Palladium [Pd] as principal constituent
- 2224/83566 . . . . . Titanium [Ti] as principal constituent
- 2224/83569 . . . . . Platinum [Pt] as principal constituent
- 2224/8357 . . . . . Zirconium [Zr] as principal constituent
- 2224/83571 . . . . . Chromium [Cr] as principal constituent
- 2224/83572 . . . . . Vanadium [V] as principal constituent
- 2224/83573 . . . . . Rhodium [Rh] as principal constituent
- 2224/83576 . . . . . Ruthenium [Ru] as principal constituent
- 2224/83578 . . . . . Iridium [Ir] as principal constituent
- 2224/83579 . . . . . Niobium [Nb] as principal constituent
- 2224/8358 . . . . . Molybdenum [Mo] as principal constituent
- 2224/83581 . . . . . Tantalum [Ta] as principal constituent
- 2224/83583 . . . . . Rhenium [Re] as principal constituent
- 2224/83584 . . . . . Tungsten [W] as principal constituent
- 2224/83586 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2224/83587 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/83588](#))
- 2224/83588 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8359 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/83591 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/83593 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/835](#) - [H01L 2224/83591](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond

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2224/83594 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/835</a> - <a href="#">H01L 2224/83591</a>	2224/83664 . . . . .	Palladium [Pd] as principal constituent
2224/83595 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/835</a> - <a href="#">H01L 2224/83591</a>	2224/83666 . . . . .	Titanium [Ti] as principal constituent
2224/83598 . . . . .	Fillers	2224/83669 . . . . .	Platinum [Pt] as principal constituent
2224/83599 . . . . .	Base material	2224/8367 . . . . .	Zirconium [Zr] as principal constituent
2224/836 . . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/83671 . . . . .	Chromium [Cr] as principal constituent
2224/83601 . . . . .	the principal constituent melting at a temperature of less than 400°C	2224/83672 . . . . .	Vanadium [V] as principal constituent
2224/83605 . . . . .	Gallium [Ga] as principal constituent	2224/83673 . . . . .	Rhodium [Rh] as principal constituent
2224/83609 . . . . .	Indium [In] as principal constituent	2224/83676 . . . . .	Ruthenium [Ru] as principal constituent
2224/83611 . . . . .	Tin [Sn] as principal constituent	2224/83678 . . . . .	Iridium [Ir] as principal constituent
2224/83613 . . . . .	Bismuth [Bi] as principal constituent	2224/83679 . . . . .	Niobium [Nb] as principal constituent
2224/83614 . . . . .	Thallium [Tl] as principal constituent	2224/8368 . . . . .	Molybdenum [Mo] as principal constituent
2224/83616 . . . . .	Lead [Pb] as principal constituent	2224/83681 . . . . .	Tantalum [Ta] as principal constituent
2224/83617 . . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/83683 . . . . .	Rhenium [Re] as principal constituent
2224/83618 . . . . .	Zinc [Zn] as principal constituent	2224/83684 . . . . .	Tungsten [W] as principal constituent
2224/8362 . . . . .	Antimony [Sb] as principal constituent	2224/83686 . . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/83623 . . . . .	Magnesium [Mg] as principal constituent	2224/83687 . . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/83688</a> )
2224/83624 . . . . .	Aluminium [Al] as principal constituent	2224/83688 . . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/83638 . . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/8369 . . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/83639 . . . . .	Silver [Ag] as principal constituent	2224/83691 . . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/83644 . . . . .	Gold [Au] as principal constituent	2224/83693 . . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/836</a> - <a href="#">H01L 2224/83691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/83647 . . . . .	Copper [Cu] as principal constituent	2224/83694 . . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/836</a> - <a href="#">H01L 2224/83691</a>
2224/83649 . . . . .	Manganese [Mn] as principal constituent	2224/83695 . . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/836</a> - <a href="#">H01L 2224/83691</a>
2224/83655 . . . . .	Nickel [Ni] as principal constituent	2224/83698 . . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/83657 . . . . .	Cobalt [Co] as principal constituent	2224/83699 . . . . .	Coating material
2224/8366 . . . . .	Iron [Fe] as principal constituent		
2224/83663 . . . . .	the principal constituent melting at a temperature of greater than 1550°C		



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2224/837	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof	2224/83772	Vanadium [V] as principal constituent
2224/83701	the principal constituent melting at a temperature of less than 400°C	2224/83773	Rhodium [Rh] as principal constituent
2224/83705	Gallium [Ga] as principal constituent	2224/83776	Ruthenium [Ru] as principal constituent
2224/83709	Indium [In] as principal constituent	2224/83778	Iridium [Ir] as principal constituent
2224/83711	Tin [Sn] as principal constituent	2224/83779	Niobium [Nb] as principal constituent
2224/83713	Bismuth [Bi] as principal constituent	2224/8378	Molybdenum [Mo] as principal constituent
2224/83714	Thallium [Tl] as principal constituent	2224/83781	Tantalum [Ta] as principal constituent
2224/83716	Lead [Pb] as principal constituent	2224/83783	Rhenium [Re] as principal constituent
2224/83717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/83784	Tungsten [W] as principal constituent
2224/83718	Zinc [Zn] as principal constituent	2224/83786	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/8372	Antimony [Sb] as principal constituent	2224/83787	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/83788</a> )
2224/83723	Magnesium [Mg] as principal constituent	2224/83788	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/83724	Aluminium [Al] as principal constituent	2224/8379	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/83738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/83791	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/83739	Silver [Ag] as principal constituent	2224/83793	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/837</a> - <a href="#">H01L 2224/83791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/83744	Gold [Au] as principal constituent	2224/83794	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/837</a> - <a href="#">H01L 2224/83791</a>
2224/83747	Copper [Cu] as principal constituent	2224/83795	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/837</a> - <a href="#">H01L 2224/83791</a>
2224/83749	Manganese [Mn] as principal constituent	2224/83798	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/83755	Nickel [Ni] as principal constituent	2224/83799	Shape or distribution of the fillers
2224/83757	Cobalt [Co] as principal constituent	2224/838	Bonding techniques
2224/8376	Iron [Fe] as principal constituent	2224/83801	Soldering or alloying
2224/83763	the principal constituent melting at a temperature of greater than 1550°C	2224/83805	involving forming a eutectic alloy at the bonding interface
2224/83764	Palladium [Pd] as principal constituent	2224/8381	involving forming an intermetallic compound at the bonding interface
2224/83766	Titanium [Ti] as principal constituent	2224/83815	Reflow soldering
2224/83769	Platinum [Pt] as principal constituent	2224/8382	Diffusion bonding
2224/8377	Zirconium [Zr] as principal constituent	2224/83825	Solid-liquid interdiffusion
2224/83771	Chromium [Cr] as principal constituent		

- 2224/8383 . . . . . Solid-solid interdiffusion
- 2224/8384 . . . . . Sintering
- 2224/8385 . . . . . using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/83851 . . . . . being an anisotropic conductive adhesive
- 2224/83855 . . . . . Hardening the adhesive by curing, i.e. thermosetting
- 2224/83856 . . . . . Pre-cured adhesive, i.e. B-stage adhesive
- 2224/83859 . . . . . Localised curing of parts of the layer connector
- 2224/83862 . . . . . Heat curing
- 2224/83865 . . . . . Microwave curing
- 2224/83868 . . . . . Infrared [IR] curing
- 2224/83871 . . . . . Visible light curing
- 2224/83874 . . . . . Ultraviolet [UV] curing
- 2224/83877 . . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8388 . . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/83885 . . . . . Combinations of two or more hardening methods provided for in at least two different groups from [H01L 2224/83855](#) - [H01L 2224/8388](#), e.g. for hybrid thermoplastic-thermosetting adhesives
- 2224/83886 . . . . . Involving a self-assembly process, e.g. self-agglomeration of a material dispersed in a fluid
- 2224/83887 . . . . . Auxiliary means therefor, e.g. for self-assembly activation
- 2224/83888 . . . . . with special adaptation of the surface of the body to be connected, e.g. surface shape specially adapted for the self-assembly process
- 2224/83889 . . . . . involving the material of the bonding area, e.g. bonding pad
- 2224/8389 . . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/83893 . . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/83894 . . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/83895 . . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/83896 . . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/83897 . . . . . Mechanical interlocking, e.g. anchoring, hook and loop-type fastening or the like
- 2224/83898 . . . . . Press-fitting, i.e. pushing the parts together and fastening by friction, e.g. by compression of one part against the other
- 2224/83899 . . . . . using resilient parts in the layer connector or in the bonding area
- 2224/839 . . . . . with the layer connector not providing any mechanical bonding
- 2224/83901 . . . . . Pressing the layer connector against the bonding areas by means of another connector
- 2224/83902 . . . . . by means of another layer connector
- 2224/83903 . . . . . by means of a bump connector
- 2224/83904 . . . . . by means of an encapsulation layer or foil
- 2224/83905 . . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/838](#) - [H01L 2224/83904](#)
- 2224/83906 . . . . . Specific sequence of method steps
- 2224/83907 . . . . . Intermediate bonding, i.e. intermediate bonding step for temporarily bonding the semiconductor or solid-state body, followed by at least a further bonding step
- 2224/83908 . . . . . involving monitoring, e.g. feedback loop
- 2224/83909 . . . . . Post-treatment of the layer connector or bonding area
- 2224/8391 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/83911 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/83912 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/83913 . . . . . Plasma cleaning
- 2224/83914 . . . . . Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/83919 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8391](#) - [H01L 2224/83914](#)
- 2224/8392 . . . . . Applying permanent coating, e.g. protective coating
- 2224/8393 . . . . . Reshaping
- 2224/83931 . . . . . by chemical means, e.g. etching
- 2224/83935 . . . . . by heating means, e.g. reflowing
- 2224/83937 . . . . . using a polychromatic heating lamp
- 2224/83939 . . . . . using a laser
- 2224/83941 . . . . . Induction heating, i.e. eddy currents
- 2224/83943 . . . . . using a flame torch, e.g. hydrogen torch
- 2224/83945 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/83947 . . . . . by mechanical means, e.g. "pull-and-cut", pressing, stamping
- 2224/83948 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/83951 . . . . . Forming additional members, e.g. for reinforcing, fillet sealant
- 2224/83986 . . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/84 . . . . . using a strap connector
- 2224/84001 . . . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/84002 . . . . . being a removable or sacrificial coating
- 2224/84005 . . . . . being a temporary substrate
- 2224/84007 . . . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the strap connector during or after the bonding process
- 2224/84009 . . . . . Pre-treatment of the connector and/or the bonding area
- 2224/8401 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/84011 . . . . . Chemical cleaning, e.g. etching, flux

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- 2224/84012 . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/84013 . . . . Plasma cleaning
- 2224/84014 . . . . Thermal cleaning, e.g. decomposition, sublimation
- 2224/84019 . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8401](#) - [H01L 2224/84014](#)
- 2224/8402 . . . . Applying permanent coating, e.g. in-situ coating
- 2224/8403 . . . . Reshaping
- 2224/84031 . . . . by chemical means, e.g. etching, anodisation
- 2224/84035 . . . . by heating means, e.g. "free-air-ball"
- 2224/84037 . . . . using a polychromatic heating lamp
- 2224/84039 . . . . using a laser
- 2224/84041 . . . . Induction heating, i.e. eddy currents
- 2224/84043 . . . . using a flame torch, e.g. hydrogen torch
- 2224/84045 . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/84047 . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/84048 . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/84051 . . . . Forming additional members
- 2224/84053 . . . Bonding environment
- 2224/84054 . . . . Composition of the atmosphere
- 2224/84055 . . . . being oxidating
- 2224/84065 . . . . being reducing
- 2224/84075 . . . . being inert
- 2224/84085 . . . . being a liquid (e.g. for fluidic self-assembly)
- 2224/8409 . . . . Vacuum
- 2224/84091 . . . . Under pressure
- 2224/84092 . . . . Atmospheric pressure
- 2224/84093 . . . . Transient conditions, e.g. gas-flow
- 2224/84095 . . . . Temperature settings
- 2224/84096 . . . . Transient conditions
- 2224/84097 . . . . Heating
- 2224/84098 . . . . Cooling
- 2224/84099 . . . . Ambient temperature
- 2224/841 . . . . the connector being supplied to the parts to be connected in the bonding apparatus
- 2224/8411 . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8412 . . . . Aligning
- 2224/84121 . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/84122 . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/84123 . . . . Shape or position of the body
- 2224/84125 . . . . Bonding areas on the body
- 2224/84127 . . . . Bonding areas outside the body
- 2224/84129 . . . . Shape or position of the other item
- 2224/8413 . . . . using marks formed on the semiconductor or solid-state body
- 2224/84132 . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/84136 . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/84138 . . . . the guiding structures being at least partially left in the finished device
- 2224/84143 . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/84148 . . . . involving movement of a part of the bonding apparatus
- 2224/84149 . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8415 . . . . . Rotational movements
- 2224/8416 . . . . . Translational movements
- 2224/84169 . . . . . being the upper part of the bonding apparatus, i.e. bonding head,
- 2224/8417 . . . . . Rotational movements
- 2224/8418 . . . . . Translational movements
- 2224/84181 . . . . . connecting first on the semiconductor or solid-state body, i.e. on-chip, regular stitch
- 2224/84186 . . . . . connecting first outside the semiconductor or solid-state body, i.e. off-chip, reverse stitch
- 2224/84191 . . . . . connecting first both on and outside the semiconductor or solid-state body, i.e. regular and reverse stitches
- 2224/84196 . . . . . involving intermediate connecting steps before cutting the strap connector
- 2224/842 . . . . Applying energy for connecting
- 2224/84201 . . . . Compression bonding
- 2224/84203 . . . . Thermocompression bonding
- 2224/84205 . . . . Ultrasonic bonding
- 2224/84206 . . . . . Direction of oscillation
- 2224/84207 . . . . . Thermosonic bonding
- 2224/8421 . . . . with energy being in the form of electromagnetic radiation
- 2224/84212 . . . . Induction heating, i.e. eddy currents
- 2224/84214 . . . . using a laser
- 2224/8423 . . . . Polychromatic or infrared lamp heating
- 2224/84232 . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/84234 . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/84236 . . . . using electro-static corona discharge
- 2224/84237 . . . . using an electron beam ([electron beam welding in general B23K 15/00](#))
- 2224/84238 . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8434 . . . . Bonding interfaces of the connector
- 2224/84345 . . . . Shape, e.g. interlocking features
- 2224/84355 . . . . having an external coating, e.g. protective bond-through coating
- 2224/84359 . . . . Material
- 2224/8436 . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/84365 . . . . Shape, e.g. interlocking features
- 2224/84375 . . . . having an external coating, e.g. protective bond-through coating
- 2224/84379 . . . . Material
- 2224/8438 . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/84385 . . . . Shape, e.g. interlocking features

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- 2224/84395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/84399 . . . . . Material
- 2224/844 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/84401 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/84405 . . . . . Gallium [Ga] as principal constituent
- 2224/84409 . . . . . Indium [In] as principal constituent
- 2224/84411 . . . . . Tin [Sn] as principal constituent
- 2224/84413 . . . . . Bismuth [Bi] as principal constituent
- 2224/84414 . . . . . Thallium [Tl] as principal constituent
- 2224/84416 . . . . . Lead [Pb] as principal constituent
- 2224/84417 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/84418 . . . . . Zinc [Zn] as principal constituent
- 2224/8442 . . . . . Antimony [Sb] as principal constituent
- 2224/84423 . . . . . Magnesium [Mg] as principal constituent
- 2224/84424 . . . . . Aluminium [Al] as principal constituent
- 2224/84438 . . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/84439 . . . . . Silver [Ag] as principal constituent
- 2224/84444 . . . . . Gold [Au] as principal constituent
- 2224/84447 . . . . . Copper [Cu] as principal constituent
- 2224/84449 . . . . . Manganese [Mn] as principal constituent
- 2224/84455 . . . . . Nickel [Ni] as principal constituent
- 2224/84457 . . . . . Cobalt [Co] as principal constituent
- 2224/8446 . . . . . Iron [Fe] as principal constituent
- 2224/84463 . . . . . the principal constituent melting at a temperature of greater than 1550°C
- 2224/84464 . . . . . Palladium [Pd] as principal constituent
- 2224/84466 . . . . . Titanium [Ti] as principal constituent
- 2224/84469 . . . . . Platinum [Pt] as principal constituent
- 2224/8447 . . . . . Zirconium [Zr] as principal constituent
- 2224/84471 . . . . . Chromium [Cr] as principal constituent
- 2224/84472 . . . . . Vanadium [V] as principal constituent
- 2224/84473 . . . . . Rhodium [Rh] as principal constituent
- 2224/84476 . . . . . Ruthenium [Ru] as principal constituent
- 2224/84478 . . . . . Iridium [Ir] as principal constituent
- 2224/84479 . . . . . Niobium [Nb] as principal constituent
- 2224/8448 . . . . . Molybdenum [Mo] as principal constituent
- 2224/84481 . . . . . Tantalum [Ta] as principal constituent
- 2224/84483 . . . . . Rhenium [Re] as principal constituent
- 2224/84484 . . . . . Tungsten [W] as principal constituent
- 2224/84486 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2224/84487 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/84488](#))
- 2224/84488 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8449 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/84491 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/84493 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/844](#) - [H01L 2224/84491](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/84494 . . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/844](#) - [H01L 2224/84491](#)
- 2224/84495 . . . . . with a principal constituent of the material being a gas not provided for in groups [H01L 2224/844](#) - [H01L 2224/84491](#)
- 2224/84498 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2224/84499 . . . . . Material of the matrix
- 2224/845 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2224/84501 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/84505 . . . . . Gallium [Ga] as principal constituent
- 2224/84509 . . . . . Indium [In] as principal constituent
- 2224/84511 . . . . . Tin [Sn] as principal constituent
- 2224/84513 . . . . . Bismuth [Bi] as principal constituent
- 2224/84514 . . . . . Thallium [Tl] as principal constituent
- 2224/84516 . . . . . Lead [Pb] as principal constituent
- 2224/84517 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/84518 . . . . . Zinc [Zn] as principal constituent
- 2224/8452 . . . . . Antimony [Sb] as principal constituent
- 2224/84523 . . . . . Magnesium [Mg] as principal constituent
- 2224/84524 . . . . . Aluminium [Al] as principal constituent
- 2224/84538 . . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/84539 . . . . . Silver [Ag] as principal constituent
- 2224/84544 . . . . . Gold [Au] as principal constituent

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2224/84547	. . . . .	Copper [Cu] as principal constituent	2224/84594	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/845</a> - <a href="#">H01L 2224/84591</a>
2224/84549	. . . . .	Manganese [Mn] as principal constituent	2224/84595	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/845</a> - <a href="#">H01L 2224/84591</a>
2224/84555	. . . . .	Nickel [Ni] as principal constituent	2224/84598	. . . . .	Fillers
2224/84557	. . . . .	Cobalt [Co] as principal constituent	2224/84599	. . . . .	Base material
2224/8456	. . . . .	Iron [Fe] as principal constituent	2224/846	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/84563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/84601	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/84564	. . . . .	Palladium [Pd] as principal constituent	2224/84605	. . . . .	Gallium [Ga] as principal constituent
2224/84566	. . . . .	Titanium [Ti] as principal constituent	2224/84609	. . . . .	Indium [In] as principal constituent
2224/84569	. . . . .	Platinum [Pt] as principal constituent	2224/84611	. . . . .	Tin [Sn] as principal constituent
2224/8457	. . . . .	Zirconium [Zr] as principal constituent	2224/84613	. . . . .	Bismuth [Bi] as principal constituent
2224/84571	. . . . .	Chromium [Cr] as principal constituent	2224/84614	. . . . .	Thallium [Tl] as principal constituent
2224/84572	. . . . .	Vanadium [V] as principal constituent	2224/84616	. . . . .	Lead [Pb] as principal constituent
2224/84573	. . . . .	Rhodium [Rh] as principal constituent	2224/84617	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/84576	. . . . .	Ruthenium [Ru] as principal constituent	2224/84618	. . . . .	Zinc [Zn] as principal constituent
2224/84578	. . . . .	Iridium [Ir] as principal constituent	2224/8462	. . . . .	Antimony [Sb] as principal constituent
2224/84579	. . . . .	Niobium [Nb] as principal constituent	2224/84623	. . . . .	Magnesium [Mg] as principal constituent
2224/8458	. . . . .	Molybdenum [Mo] as principal constituent	2224/84624	. . . . .	Aluminium [Al] as principal constituent
2224/84581	. . . . .	Tantalum [Ta] as principal constituent	2224/84638	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/84583	. . . . .	Rhenium [Re] as principal constituent	2224/84639	. . . . .	Silver [Ag] as principal constituent
2224/84584	. . . . .	Tungsten [W] as principal constituent	2224/84644	. . . . .	Gold [Au] as principal constituent
2224/84586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/84647	. . . . .	Copper [Cu] as principal constituent
2224/84587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/84588</a> )	2224/84649	. . . . .	Manganese [Mn] as principal constituent
2224/84588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/84655	. . . . .	Nickel [Ni] as principal constituent
2224/8459	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/84657	. . . . .	Cobalt [Co] as principal constituent
2224/84591	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/8466	. . . . .	Iron [Fe] as principal constituent
2224/84593	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/845</a> - <a href="#">H01L 2224/84591</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/84663	. . . . .	the principal constituent melting at a temperature of greater than 1550°C

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2224/84664	Palladium [Pd] as principal constituent	2224/847	with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
2224/84666	Titanium [Ti] as principal constituent	2224/84701	the principal constituent melting at a temperature of less than 400°C
2224/84669	Platinum [Pt] as principal constituent	2224/84705	Gallium [Ga] as principal constituent
2224/8467	Zirconium [Zr] as principal constituent	2224/84709	Indium [In] as principal constituent
2224/84671	Chromium [Cr] as principal constituent	2224/84711	Tin [Sn] as principal constituent
2224/84672	Vanadium [V] as principal constituent	2224/84713	Bismuth [Bi] as principal constituent
2224/84673	Rhodium [Rh] as principal constituent	2224/84714	Thallium [Tl] as principal constituent
2224/84676	Ruthenium [Ru] as principal constituent	2224/84716	Lead [Pb] as principal constituent
2224/84678	Iridium [Ir] as principal constituent	2224/84717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/84679	Niobium [Nb] as principal constituent	2224/84718	Zinc [Zn] as principal constituent
2224/8468	Molybdenum [Mo] as principal constituent	2224/8472	Antimony [Sb] as principal constituent
2224/84681	Tantalum [Ta] as principal constituent	2224/84723	Magnesium [Mg] as principal constituent
2224/84683	Rhenium [Re] as principal constituent	2224/84724	Aluminium [Al] as principal constituent
2224/84684	Tungsten [W] as principal constituent	2224/84738	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
2224/84686	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/84739	Silver [Ag] as principal constituent
2224/84687	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/84688</a> )	2224/84744	Gold [Au] as principal constituent
2224/84688	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/84747	Copper [Cu] as principal constituent
2224/8469	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/84749	Manganese [Mn] as principal constituent
2224/84691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene	2224/84755	Nickel [Ni] as principal constituent
2224/84693	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/846</a> - <a href="#">H01L 2224/84691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond	2224/84757	Cobalt [Co] as principal constituent
2224/84694	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/846</a> - <a href="#">H01L 2224/84691</a>	2224/8476	Iron [Fe] as principal constituent
2224/84695	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/846</a> - <a href="#">H01L 2224/84691</a>	2224/84763	the principal constituent melting at a temperature of greater than 1550°C
2224/84698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams	2224/84764	Palladium [Pd] as principal constituent
2224/84699	Coating material	2224/84766	Titanium [Ti] as principal constituent
		2224/84769	Platinum [Pt] as principal constituent
		2224/8477	Zirconium [Zr] as principal constituent
		2224/84771	Chromium [Cr] as principal constituent

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- 2224/84772 . . . . . Vanadium [V] as principal constituent
- 2224/84773 . . . . . Rhodium [Rh] as principal constituent
- 2224/84776 . . . . . Ruthenium [Ru] as principal constituent
- 2224/84778 . . . . . Iridium [Ir] as principal constituent
- 2224/84779 . . . . . Niobium [Nb] as principal constituent
- 2224/8478 . . . . . Molybdenum [Mo] as principal constituent
- 2224/84781 . . . . . Tantalum [Ta] as principal constituent
- 2224/84783 . . . . . Rhenium [Re] as principal constituent
- 2224/84784 . . . . . Tungsten [W] as principal constituent
- 2224/84786 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2224/84787 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/84788](#))
- 2224/84788 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8479 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/84791 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/84793 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/847](#) - [H01L 2224/84791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/84794 . . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/847](#) - [H01L 2224/84791](#)
- 2224/84795 . . . . . with a principal constituent of the material being a gas not provided for in groups [H01L 2224/847](#) - [H01L 2224/84791](#)
- 2224/84798 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2224/84799 . . . . . Shape or distribution of the fillers
- 2224/848 . . . . . Bonding techniques
- 2224/84801 . . . . . Soldering or alloying
- 2224/84805 . . . . . involving forming a eutectic alloy at the bonding interface
- 2224/8481 . . . . . involving forming an intermetallic compound at the bonding interface
- 2224/84815 . . . . . Reflow soldering
- 2224/8482 . . . . . Diffusion bonding
- 2224/84825 . . . . . Solid-liquid interdiffusion
- 2224/8483 . . . . . Solid-solid interdiffusion
- 2224/8484 . . . . . Sintering
- 2224/8485 . . . . . using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/84855 . . . . . Hardening the adhesive by curing, i.e. thermosetting
- 2224/84856 . . . . . Pre-cured adhesive, i.e. B-stage adhesive
- 2224/84859 . . . . . Localised curing of parts of the connector
- 2224/84862 . . . . . Heat curing
- 2224/84865 . . . . . Microwave curing
- 2224/84868 . . . . . Infrared [IR] curing
- 2224/84871 . . . . . Visible light curing
- 2224/84874 . . . . . Ultraviolet [UV] curing
- 2224/84877 . . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8488 . . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/84885 . . . . . Combinations of two or more hardening methods provided for in at least two different groups from [H01L 2224/84855](#) - [H01L 2224/8488](#), e.g. for hybrid thermoplastic-thermosetting adhesives
- 2224/8489 . . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/84893 . . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/84895 . . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/84897 . . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/84898 . . . . . between electrically insulating surfaces, e.g. oxide or nitride layersg
- 2224/84899 . . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/848](#) - [H01L 2224/84898](#)
- 2224/849 . . . . . involving monitoring, e.g. feedback loop
- 2224/84909 . . . . . Post-treatment of the connector or bonding area
- 2224/8491 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/84911 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/84912 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/84913 . . . . . Plasma cleaning
- 2224/84914 . . . . . Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/84919 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8491](#) - [H01L 2224/84914](#)
- 2224/8492 . . . . . Applying permanent coating, e.g. protective coating
- 2224/8493 . . . . . Reshaping, e.g. for severing the strap, modifying the loop shape

- 2224/84931 . . . . . by chemical means, e.g. etching
- 2224/84935 . . . . . by heating means, e.g. reflowing
- 2224/84937 . . . . . using a polychromatic heating lamp
- 2224/84939 . . . . . using a laser
- 2224/84941 . . . . . Induction heating, i.e. eddy currents
- 2224/84943 . . . . . using a flame torch, e.g. hydrogen torch
- 2224/84945 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/84947 . . . . . by mechanical means, e.g. pressing, stamping
- 2224/84948 . . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/84951 . . . . . Forming additional members, e.g. for reinforcing
- 2224/84986 . . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/85 . . . . . using a wire connector
- 2224/85001 . . . . . involving a temporary auxiliary member not forming part of the bonding apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/85002 . . . . . being a removable or sacrificial coating
- 2224/85005 . . . . . being a temporary or sacrificial substrate
- 2224/85007 . . . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the wire connector during or after the bonding process
- 2224/85009 . . . . . Pre-treatment of the connector or the bonding area
- 2224/8501 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/85011 . . . . . Chemical cleaning, e.g. etching, flux
- 2224/85012 . . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/85013 . . . . . Plasma cleaning
- 2224/85014 . . . . . Thermal cleaning, e.g. decomposition, sublimation
- 2224/85016 . . . . . using a laser
- 2224/85017 . . . . . Electron beam cleaning
- 2224/85019 . . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8501](#) - [H01L 2224/85014](#)
- 2224/8502 . . . . . Applying permanent coating, e.g. in-situ coating
- 2224/8503 . . . . . Reshaping, e.g. forming the ball or the wedge of the wire connector
- 2224/85031 . . . . . by chemical means, e.g. etching, anodisation
- 2224/85035 . . . . . by heating means, e.g. "free-air-ball"
- 2224/85037 . . . . . using a polychromatic heating lamp
- 2224/85039 . . . . . using a laser
- 2224/85041 . . . . . Induction heating, i.e. eddy currents
- 2224/85043 . . . . . using a flame torch, e.g. hydrogen torch
- 2224/85045 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/85047 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/85048 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/85051 . . . . . Forming additional members, e.g. for "wedge-on-ball", "ball-on-wedge", "ball-on-ball" connections
- 2224/85053 . . . . . Bonding environment
- 2224/85054 . . . . . Composition of the atmosphere
- 2224/85055 . . . . . being oxidating
- 2224/85065 . . . . . being reducing
- 2224/85075 . . . . . being inert
- 2224/85085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/8509 . . . . . Vacuum
- 2224/85091 . . . . . Under pressure
- 2224/85092 . . . . . Atmospheric pressure
- 2224/85093 . . . . . Transient conditions, e.g. gas-flow
- 2224/85095 . . . . . Temperature settings
- 2224/85096 . . . . . Transient conditions
- 2224/85097 . . . . . Heating
- 2224/85098 . . . . . Cooling
- 2224/85099 . . . . . Ambient temperature
- 2224/851 . . . . . the connector being supplied to the parts to be connected in the bonding apparatus
- 2224/8511 . . . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8512 . . . . . Aligning
- 2224/85121 . . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/85122 . . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/85123 . . . . . Shape or position of the body
- 2224/85125 . . . . . Bonding areas on the body
- 2224/85127 . . . . . Bonding areas outside the body
- 2224/85129 . . . . . Shape or position of the other item
- 2224/8513 . . . . . using marks formed on the semiconductor or solid-state body
- 2224/85132 . . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/85136 . . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/85138 . . . . . the guiding structures being at least partially left in the finished device
- 2224/85143 . . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/85148 . . . . . involving movement of a part of the bonding apparatus
- 2224/85149 . . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8515 . . . . . Rotational movements
- 2224/8516 . . . . . Translational movements
- 2224/85169 . . . . . being the upper part of the bonding apparatus, i.e. bonding head, e.g. capillary or wedge
- 2224/8517 . . . . . Rotational movements
- 2224/8518 . . . . . Translational movements
- 2224/85181 . . . . . connecting first on the semiconductor or solid-state body, i.e. on-chip, regular stitch
- 2224/85186 . . . . . connecting first outside the semiconductor or solid-state body, i.e. off-chip, reverse stitch
- 2224/85191 . . . . . connecting first both on and outside the semiconductor or solid-state body, i.e. regular and reverse stitches



- 2224/85196 . . . . . involving intermediate connecting steps before cutting the wire connector
- 2224/852 . . . . . Applying energy for connecting
- 2224/85201 . . . . . Compression bonding
- 2224/85203 . . . . . Thermocompression bonding
- 2224/85205 . . . . . Ultrasonic bonding
- 2224/85206 . . . . . Direction of oscillation
- 2224/85207 . . . . . Thermosonic bonding
- 2224/8521 . . . . . with energy being in the form of electromagnetic radiation
- 2224/85212 . . . . . Induction heating, i.e. eddy currents
- 2224/85214 . . . . . using a laser
- 2224/8523 . . . . . Polychromatic or infrared lamp heating
- 2224/85232 . . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/85234 . . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/85236 . . . . . using electro-static corona discharge
- 2224/85237 . . . . . using electron beam ([using electron beam in general B23K 15/00](#))
- 2224/85238 . . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8534 . . . . . Bonding interfaces of the connector
- 2224/85345 . . . . . Shape, e.g. interlocking features
- 2224/85355 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/85359 . . . . . Material
- 2224/8536 . . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/85365 . . . . . Shape, e.g. interlocking features
- 2224/85375 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/85379 . . . . . Material
- 2224/8538 . . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/85385 . . . . . Shape, e.g. interlocking features
- 2224/85395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/85399 . . . . . Material
- 2224/854 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
- 2224/85401 . . . . . the principal constituent melting at a temperature of less than 400°C
- 2224/85405 . . . . . Gallium (Ga) as principal constituent
- 2224/85409 . . . . . Indium (In) as principal constituent
- 2224/85411 . . . . . Tin (Sn) as principal constituent
- 2224/85413 . . . . . Bismuth (Bi) as principal constituent
- 2224/85414 . . . . . Thallium (Tl) as principal constituent
- 2224/85416 . . . . . Lead (Pb) as principal constituent
- 2224/85417 . . . . . the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
- 2224/85418 . . . . . Zinc (Zn) as principal constituent
- 2224/8542 . . . . . Antimony (Sb) as principal constituent
- 2224/85423 . . . . . Magnesium (Mg) as principal constituent
- 2224/85424 . . . . . Aluminium (Al) as principal constituent
- 2224/85438 . . . . . the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C
- 2224/85439 . . . . . Silver (Ag) as principal constituent
- 2224/85444 . . . . . Gold (Au) as principal constituent
- 2224/85447 . . . . . Copper (Cu) as principal constituent
- 2224/85449 . . . . . Manganese (Mn) as principal constituent
- 2224/85455 . . . . . Nickel (Ni) as principal constituent
- 2224/85457 . . . . . Cobalt (Co) as principal constituent
- 2224/8546 . . . . . Iron (Fe) as principal constituent
- 2224/85463 . . . . . the principal constituent melting at a temperature of greater than 1550°C
- 2224/85464 . . . . . Palladium (Pd) as principal constituent
- 2224/85466 . . . . . Titanium (Ti) as principal constituent
- 2224/85469 . . . . . Platinum (Pt) as principal constituent
- 2224/8547 . . . . . Zirconium (Zr) as principal constituent
- 2224/85471 . . . . . Chromium (Cr) as principal constituent
- 2224/85472 . . . . . Vanadium (V) as principal constituent
- 2224/85473 . . . . . Rhodium (Rh) as principal constituent
- 2224/85476 . . . . . Ruthenium (Ru) as principal constituent
- 2224/85478 . . . . . Iridium (Ir) as principal constituent
- 2224/85479 . . . . . Niobium (Nb) as principal constituent
- 2224/8548 . . . . . Molybdenum (Mo) as principal constituent
- 2224/85481 . . . . . Tantalum (Ta) as principal constituent
- 2224/85483 . . . . . Rhenium (Re) as principal constituent
- 2224/85484 . . . . . Tungsten (W) as principal constituent
- 2224/85486 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2224/85487 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/85488](#))
- 2224/85488 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2224/8549 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2224/85491 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2224/85493 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2224/854](#) - [H01L 2224/85491](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2224/85494 . . . . . with a principal constituent of the material being a liquid not provided for in groups [H01L 2224/854](#) - [H01L 2224/85491](#)
- 2224/85495 . . . . . with a principal constituent of the material being a gas not provided for in groups [H01L 2224/854](#) - [H01L 2224/85491](#)
- 2224/85498 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2224/85499 . . . . . Material of the matrix

2224/855	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof	2224/85578	. . . . .	Iridium (Ir) as principal constituent
2224/85501	. . . . .	the principal constituent melting at a temperature of less than 400°C	2224/85579	. . . . .	Niobium (Nb) as principal constituent
2224/85505	. . . . .	Gallium (Ga) as principal constituent	2224/8558	. . . . .	Molybdenum (Mo) as principal constituent
2224/85509	. . . . .	Indium (In) as principal constituent	2224/85581	. . . . .	Tantalum (Ta) as principal constituent
2224/85511	. . . . .	Tin (Sn) as principal constituent	2224/85583	. . . . .	Rhenium (Re) as principal constituent
2224/85513	. . . . .	Bismuth (Bi) as principal constituent	2224/85584	. . . . .	Tungsten (W) as principal constituent
2224/85514	. . . . .	Thallium (Tl) as principal constituent	2224/85586	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material
2224/85516	. . . . .	Lead (Pb) as principal constituent	2224/85587	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/85588</a> )
2224/85517	. . . . .	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/85588	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/85518	. . . . .	Zinc (Zn) as principal constituent	2224/8559	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/8552	. . . . .	Antimony (Sb) as principal constituent	2224/85591	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85523	. . . . .	Magnesium (Mg) as principal constituent	2224/85593	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/855</a> - <a href="#">H01L 2224/85591</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85524	. . . . .	Aluminium (Al) as principal constituent	2224/85594	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/855</a> - <a href="#">H01L 2224/85591</a>
2224/85538	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85595	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/855</a> - <a href="#">H01L 2224/85591</a>
2224/85539	. . . . .	Silver (Ag) as principal constituent	2224/85598	. . . . .	Fillers
2224/85544	. . . . .	Gold (Au) as principal constituent	2224/85599	. . . . .	Base material
2224/85547	. . . . .	Copper (Cu) as principal constituent	2224/856	. . . . .	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/85549	. . . . .	Manganese (Mn) as principal constituent	2224/85601	. . . . .	the principal constituent melting at a temperature of less than 400°C
2224/85555	. . . . .	Nickel (Ni) as principal constituent	2224/85605	. . . . .	Gallium (Ga) as principal constituent
2224/85557	. . . . .	Cobalt (Co) as principal constituent	2224/85609	. . . . .	Indium (In) as principal constituent
2224/8556	. . . . .	Iron (Fe) as principal constituent	2224/85611	. . . . .	Tin (Sn) as principal constituent
2224/85563	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/85613	. . . . .	Bismuth (Bi) as principal constituent
2224/85564	. . . . .	Palladium (Pd) as principal constituent	2224/85614	. . . . .	Thallium (Tl) as principal constituent
2224/85566	. . . . .	Titanium (Ti) as principal constituent	2224/85616	. . . . .	Lead (Pb) as principal constituent
2224/85569	. . . . .	Platinum (Pt) as principal constituent			
2224/8557	. . . . .	Zirconium (Zr) as principal constituent			
2224/85571	. . . . .	Chromium (Cr) as principal constituent			
2224/85572	. . . . .	Vanadium (V) as principal constituent			
2224/85573	. . . . .	Rhodium (Rh) as principal constituent			
2224/85576	. . . . .	Ruthenium (Ru) as principal constituent			

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2224/85617	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C	2224/85687	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/85688</a> )
2224/85618	Zinc (Zn) as principal constituent	2224/85688	Glasses, e.g. amorphous oxides, nitrides or fluorides
2224/8562	Antimony (Sb) as principal constituent	2224/8569	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
2224/85623	Magnesium (Mg) as principal constituent	2224/85691	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85624	Aluminium (Al) as principal constituent	2224/85693	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/856</a> - <a href="#">H01L 2224/85691</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85638	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85694	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/856</a> - <a href="#">H01L 2224/85691</a>
2224/85639	Silver (Ag) as principal constituent	2224/85695	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/856</a> - <a href="#">H01L 2224/85691</a>
2224/85644	Gold (Au) as principal constituent	2224/85698	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/85647	Copper (Cu) as principal constituent	2224/85699	Coating material
2224/85649	Manganese (Mn) as principal constituent	2224/857	with a principal constituent of the material being a metal or a metalloid, e.g. boron (B), silicon (Si), germanium (Ge), arsenic (As), antimony (Sb), tellurium (Te) and polonium (Po), and alloys thereof
2224/85655	Nickel (Ni) as principal constituent	2224/85701	the principal constituent melting at a temperature of less than 400°C
2224/85657	Cobalt (Co) as principal constituent	2224/85705	Gallium (Ga) as principal constituent
2224/8566	Iron (Fe) as principal constituent	2224/85709	Indium (In) as principal constituent
2224/85663	the principal constituent melting at a temperature of greater than 1550°C	2224/85711	Tin (Sn) as principal constituent
2224/85664	Palladium (Pd) as principal constituent	2224/85713	Bismuth (Bi) as principal constituent
2224/85666	Titanium (Ti) as principal constituent	2224/85714	Thallium (Tl) as principal constituent
2224/85669	Platinum (Pt) as principal constituent	2224/85716	Lead (Pb) as principal constituent
2224/8567	Zirconium (Zr) as principal constituent	2224/85717	the principal constituent melting at a temperature of greater than or equal to 400°C and less than 950°C
2224/85671	Chromium (Cr) as principal constituent	2224/85718	Zinc (Zn) as principal constituent
2224/85672	Vanadium (V) as principal constituent	2224/8572	Antimony (Sb) as principal constituent
2224/85673	Rhodium (Rh) as principal constituent	2224/85723	Magnesium (Mg) as principal constituent
2224/85676	Ruthenium (Ru) as principal constituent		
2224/85678	Iridium (Ir) as principal constituent		
2224/85679	Niobium (Nb) as principal constituent		
2224/8568	Molybdenum (Mo) as principal constituent		
2224/85681	Tantalum (Ta) as principal constituent		
2224/85683	Rhenium (Re) as principal constituent		
2224/85684	Tungsten (W) as principal constituent		
2224/85686	with a principal constituent of the material being a non metallic, non metalloid inorganic material		

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2224/85724	. . . . .	Aluminium (Al) as principal constituent	2224/85791	. . . . .	The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
2224/85738	. . . . .	the principal constituent melting at a temperature of greater than or equal to 950°C and less than 1550°C	2224/85793	. . . . .	with a principal constituent of the material being a solid not provided for in groups <a href="#">H01L 2224/857</a> - <a href="#">H01L 2224/85791</a> , e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
2224/85739	. . . . .	Silver (Ag) as principal constituent	2224/85794	. . . . .	with a principal constituent of the material being a liquid not provided for in groups <a href="#">H01L 2224/857</a> - <a href="#">H01L 2224/85791</a>
2224/85744	. . . . .	Gold (Au) as principal constituent	2224/85795	. . . . .	with a principal constituent of the material being a gas not provided for in groups <a href="#">H01L 2224/857</a> - <a href="#">H01L 2224/85791</a>
2224/85747	. . . . .	Copper (Cu) as principal constituent	2224/85798	. . . . .	with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
2224/85749	. . . . .	Manganese (Mn) as principal constituent	2224/85799	. . . . .	Shape or distribution of the fillers
2224/85755	. . . . .	Nickel (Ni) as principal constituent	2224/858	. . . . .	Bonding techniques
2224/85757	. . . . .	Cobalt (Co) as principal constituent	2224/85801	. . . . .	Soldering or alloying
2224/8576	. . . . .	Iron (Fe) as principal constituent	2224/85805	. . . . .	involving forming a eutectic alloy at the bonding interface
2224/85763	. . . . .	the principal constituent melting at a temperature of greater than 1550°C	2224/8581	. . . . .	involving forming an intermetallic compound at the bonding interface
2224/85764	. . . . .	Palladium (Pd) as principal constituent	2224/85815	. . . . .	Reflow soldering
2224/85766	. . . . .	Titanium (Ti) as principal constituent	2224/8582	. . . . .	Diffusion bonding
2224/85769	. . . . .	Platinum (Pt) as principal constituent	2224/85825	. . . . .	Solid-liquid interdiffusion
2224/8577	. . . . .	Zirconium (Zr) as principal constituent	2224/8583	. . . . .	Solid-solid interdiffusion, e.g. "direct bonding"
2224/85771	. . . . .	Chromium (Cr) as principal constituent	2224/8584	. . . . .	Sintering
2224/85772	. . . . .	Vanadium (V) as principal constituent	2224/8585	. . . . .	using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
2224/85773	. . . . .	Rhodium (Rh) as principal constituent	2224/85855	. . . . .	Hardening the adhesive by curing, i.e. thermosetting
2224/85776	. . . . .	Ruthenium (Ru) as principal constituent	2224/85856	. . . . .	Pre-cured adhesive, i.e. B-stage adhesive
2224/85778	. . . . .	Iridium (Ir) as principal constituent	2224/85859	. . . . .	Localised curing of parts of the connector
2224/85779	. . . . .	Niobium (Nb) as principal constituent	2224/85862	. . . . .	Heat curing
2224/8578	. . . . .	Molybdenum (Mo) as principal constituent	2224/85865	. . . . .	Microwave curing
2224/85781	. . . . .	Tantalum (Ta) as principal constituent	2224/85868	. . . . .	Infrared [IR] curing
2224/85783	. . . . .	Rhenium (Re) as principal constituent	2224/85871	. . . . .	Visible light curing
2224/85784	. . . . .	Tungsten (W) as principal constituent	2224/85874	. . . . .	Ultraviolet [UV] curing
2224/85786	. . . . .	with a principal constituent of the material being a non metallic, non metalloid inorganic material	2224/85877	. . . . .	Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
2224/85787	. . . . .	Ceramics, e.g. crystalline carbides, nitrides or oxides ( <a href="#">glass ceramics H01L 2224/85788</a> )	2224/8588	. . . . .	Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
2224/85788	. . . . .	Glasses, e.g. amorphous oxides, nitrides or fluorides	2224/85885	. . . . .	Combinations of two or more hardening methods provided for in at least two different groups from <a href="#">H01L 2224/85855</a> - <a href="#">H01L 2224/85888</a> , e.g. for hybrid thermoplastic-thermosetting adhesives
2224/8579	. . . . .	with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy	2224/8589	. . . . .	using an inorganic non metallic glass type adhesive, e.g. solder glass

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- 2224/85893 . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/85895 . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/85897 . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/85898 . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/85899 . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/858](#) - [H01L 2224/85898](#)
- 2224/859 . . . involving monitoring, e.g. feedback loop
- 2224/85909 . . . Post-treatment of the connector or wire bonding area
- 2224/8591 . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/85911 . . . . Chemical cleaning, e.g. etching, flux
- 2224/85912 . . . . Mechanical cleaning, e.g. abrasion using hydro blasting, brushes, ultrasonic cleaning, dry ice blasting, gas-flow
- 2224/85913 . . . . Plasma cleaning
- 2224/85914 . . . . Thermal cleaning, e.g. using laser ablation or by electrostatic corona discharge
- 2224/85916 . . . . using a laser
- 2224/85917 . . . . Electron beam cleaning
- 2224/85919 . . . . Combinations of two or more cleaning methods provided for in at least two different groups from [H01L 2224/8591](#) - [H01L 2224/85914](#)
- 2224/8592 . . . . Applying permanent coating, e.g. protective coating
- 2224/8593 . . . . Reshaping, e.g. for severing the wire, modifying the wedge or ball or the loop shape
- 2224/85931 . . . . by chemical means, e.g. etching
- 2224/85935 . . . . by heating means, e.g. reflowing
- 2224/85937 . . . . using a polychromatic heating lamp
- 2224/85939 . . . . using a laser
- 2224/85941 . . . . Induction heating, i.e. eddy currents
- 2224/85943 . . . . using a flame torch, e.g. hydrogen torch
- 2224/85945 . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/85947 . . . . by mechanical means, e.g. "pull-and-cut", pressing, stamping
- 2224/85948 . . . . Thermal treatments, e.g. annealing, controlled cooling
- 2224/85951 . . . . Forming additional members, e.g. for reinforcing
- 2224/85986 . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/86 . . using tape automated bonding [TAB]
- 2224/86001 . . . involving a temporary auxiliary member not forming part of the bonding apparatus
- 2224/86002 . . . . being a removable or sacrificial coating
- 2224/86005 . . . . being a temporary or sacrificial substrate
- 2224/86007 . . . involving a permanent auxiliary member being left in the finished device, e.g. aids for holding or protecting the TAB connector during or after the bonding process
- 2224/86009 . . . . Pre-treatment of the connector or the bonding area
- 2224/8601 . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/8603 . . . . Reshaping
- 2224/86031 . . . . by chemical means, e.g. etching, anodisation
- 2224/86035 . . . . by heating
- 2224/86039 . . . . using a laser
- 2224/86045 . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/86047 . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/86048 . . . . Thermal treatment, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/86051 . . . . Forming additional members
- 2224/86053 . . . Bonding environment
- 2224/86054 . . . . Composition of the atmosphere
- 2224/86085 . . . . being a liquid, e.g. fluidic self-assembly
- 2224/8609 . . . . Vacuum
- 2224/86091 . . . . Under pressure
- 2224/86095 . . . . Temperature settings
- 2224/86096 . . . . Transient conditions
- 2224/86097 . . . . Heating
- 2224/86098 . . . . Cooling
- 2224/86099 . . . . Ambient temperature
- 2224/861 . . . the connector being supplied to the parts to be connected in the bonding apparatus
- 2224/8611 . . . involving protection against electrical discharge, e.g. removing electrostatic charge
- 2224/8612 . . . . Aligning
- 2224/86121 . . . . Active alignment, i.e. by apparatus steering, e.g. optical alignment using marks or sensors
- 2224/86122 . . . . by detecting inherent features of, or outside, the semiconductor or solid-state body
- 2224/8613 . . . . using marks formed on the semiconductor or solid-state body
- 2224/86132 . . . . using marks formed outside the semiconductor or solid-state body, i.e. "off-chip"
- 2224/86136 . . . . involving guiding structures, e.g. spacers or supporting members
- 2224/86138 . . . . the guiding structures being at least partially left in the finished device
- 2224/86143 . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/86148 . . . . involving movement of a part of the bonding apparatus
- 2224/86149 . . . . being the lower part of the bonding apparatus, i.e. holding means for the bodies to be connected, e.g. XY table
- 2224/8615 . . . . . Rotational movements
- 2224/8616 . . . . . Translational movements
- 2224/86169 . . . . . being the upper part of the bonding apparatus, e.g. nozzle
- 2224/8617 . . . . . Rotational movement
- 2224/8618 . . . . . Translational movements
- 2224/86181 . . . . . connecting first on the semiconductor or solid-state body, i.e. on-chip,

- 2224/86186 . . . . . connecting first outside the semiconductor or solid-state body, i.e. off-chip
- 2224/86191 . . . . . connecting first both on and outside the semiconductor or solid-state body
- 2224/862 . . . . . Applying energy for connecting
- 2224/86201 . . . . . Compression bonding
- 2224/86203 . . . . . Thermo-compression bonding
- 2224/86205 . . . . . Ultrasonic bonding
- 2224/86207 . . . . . Thermosonic bonding
- 2224/8621 . . . . . with energy being in the form of electromagnetic radiation
- 2224/86212 . . . . . Induction heating, i.e. eddy currents
- 2224/86214 . . . . . using a laser
- 2224/8623 . . . . . Polychromatic or infrared lamp heating
- 2224/86232 . . . . . using an autocatalytic reaction, e.g. exothermic brazing
- 2224/86234 . . . . . using means for applying energy being within the device, e.g. integrated heater
- 2224/86236 . . . . . using electro-static corona discharge
- 2224/86237 . . . . . using electron beam ([electron beam in general B23K 15/00](#))
- 2224/86238 . . . . . using electric resistance welding, i.e. ohmic heating
- 2224/8634 . . . . . Bonding interfaces of the connector
- 2224/86345 . . . . . Shape, e.g. interlocking features
- 2224/86355 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/86359 . . . . . Material
- 2224/8636 . . . . . Bonding interfaces of the semiconductor or solid state body
- 2224/86365 . . . . . Shape, e.g. interlocking features
- 2224/86375 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/86379 . . . . . Material
- 2224/8638 . . . . . Bonding interfaces outside the semiconductor or solid-state body
- 2224/86385 . . . . . Shape, e.g. interlocking features
- 2224/86395 . . . . . having an external coating, e.g. protective bond-through coating
- 2224/86399 . . . . . Material
- 2224/868 . . . . . Bonding techniques
- 2224/86801 . . . . . Soldering or alloying
- 2224/86805 . . . . . involving forming a eutectic alloy at the bonding interface
- 2224/8681 . . . . . involving forming an intermetallic compound at the bonding interface
- 2224/86815 . . . . . Reflow soldering
- 2224/8682 . . . . . Diffusion bonding
- 2224/86825 . . . . . Solid-liquid interdiffusion
- 2224/8683 . . . . . Solid-solid interdiffusion
- 2224/8684 . . . . . Sintering
- 2224/8685 . . . . . using a polymer adhesive, e.g. an adhesive based on silicone, epoxy, polyimide, polyester
- 2224/86855 . . . . . Hardening the adhesive by curing, i.e. thermosetting
- 2224/86856 . . . . . Pre-cured adhesive, i.e. B-stage adhesive
- 2224/86859 . . . . . Localised curing of parts of the connector
- 2224/86862 . . . . . Heat curing
- 2224/86865 . . . . . Microwave curing
- 2224/86868 . . . . . Infrared [IR] curing
- 2224/86871 . . . . . Visible light curing
- 2224/86874 . . . . . Ultraviolet [UV] curing
- 2224/86877 . . . . . Moisture curing, i.e. curing by exposing to humidity, e.g. for silicones and polyurethanes
- 2224/8688 . . . . . Hardening the adhesive by cooling, e.g. for thermoplastics or hot-melt adhesives
- 2224/86885 . . . . . Combinations of two or more hardening methods provided for in at least two different groups selected from [H01L 2224/86855](#) - [H01L 2224/8688](#), e.g. hybrid thermoplastic-thermosetting adhesives
- 2224/8689 . . . . . using an inorganic non metallic glass type adhesive, e.g. solder glass
- 2224/86893 . . . . . Anodic bonding, i.e. bonding by applying a voltage across the interface in order to induce ions migration leading to an irreversible chemical bond
- 2224/86895 . . . . . Direct bonding, i.e. joining surfaces by means of intermolecular attracting interactions at their interfaces, e.g. covalent bonds, van der Waals forces
- 2224/86896 . . . . . between electrically conductive surfaces, e.g. copper-copper direct bonding, surface activated bonding
- 2224/86897 . . . . . between electrically insulating surfaces, e.g. oxide or nitride layers
- 2224/86899 . . . . . Combinations of bonding methods provided for in at least two different groups from [H01L 2224/868](#) - [H01L 2224/86897](#)
- 2224/869 . . . . . involving monitoring, e.g. feedback loop
- 2224/86909 . . . . . Post-treatment of the connector or the bonding area
- 2224/8691 . . . . . Cleaning, e.g. oxide removal step, desmearing
- 2224/8693 . . . . . Reshaping
- 2224/86931 . . . . . by chemical means, e.g. etching, anodisation
- 2224/86935 . . . . . by heating means
- 2224/86939 . . . . . using a laser
- 2224/86945 . . . . . using a corona discharge, e.g. electronic flame off [EFO]
- 2224/86947 . . . . . by mechanical means, e.g. severing, pressing, stamping
- 2224/86948 . . . . . Thermal treatments, e.g. annealing, controlled pre-heating or pre-cooling
- 2224/86951 . . . . . Forming additional members
- 2224/86986 . . . . . Specific sequence of steps, e.g. repetition of manufacturing steps, time sequence
- 2224/89 . . . . . using at least one connector not provided for in any of the groups [H01L 2224/81](#) - [H01L 2224/86](#)
- 2224/90 . . . . . Methods for connecting semiconductor or solid state bodies using means for bonding not being attached to, or not being formed on, the body surface to be connected, e.g. pressure contacts using springs or clips
- 2224/91 . . . . . Methods for connecting semiconductor or solid state bodies including different methods provided for in two or more of groups [H01L 2224/80](#) - [H01L 2224/90](#)
- 2224/92 . . . . . Specific sequence of method steps

- 2224/9201 . . . Forming connectors during the connecting process, e.g. in-situ formation of bumps
- 2224/9202 . . . Forming additional connectors after the connecting process
- 2224/9205 . . . Intermediate bonding steps, i.e. partial connection of the semiconductor or solid-state body during the connecting process
- 2224/921 . . . Connecting a surface with connectors of different types
- 2224/9211 . . . . Parallel connecting processes
- 2224/9212 . . . . Sequential connecting processes
- 2224/92122 . . . . . the first connecting process involving a bump connector
- 2224/92124 . . . . . the second connecting process involving a build-up interconnect
- 2224/92125 . . . . . the second connecting process involving a layer connector
- 2224/92127 . . . . . the second connecting process involving a wire connector
- 2224/92132 . . . . . the first connecting process involving a build-up interconnect
- 2224/92133 . . . . . the second connecting process involving a bump connector
- 2224/92135 . . . . . the second connecting process involving a layer connector
- 2224/92136 . . . . . the second connecting process involving a strap connector
- 2224/92137 . . . . . the second connecting process involving a wire connector
- 2224/92138 . . . . . the second connecting process involving a TAB connector
- 2224/92142 . . . . . the first connecting process involving a layer connector
- 2224/92143 . . . . . the second connecting process involving a bump connector
- 2224/92144 . . . . . the second connecting process involving a build-up interconnect
- 2224/92147 . . . . . the second connecting process involving a wire connector
- 2224/92148 . . . . . the second connecting process involving a TAB connector
- 2224/92152 . . . . . the first connecting process involving a strap connector
- 2224/92153 . . . . . the second connecting process involving a bump connector
- 2224/92155 . . . . . the second connecting process involving a layer connector
- 2224/92157 . . . . . the second connecting process involving a wire connector
- 2224/92158 . . . . . the second connecting process involving a TAB connector
- 2224/92162 . . . . . the first connecting process involving a wire connector
- 2224/92163 . . . . . the second connecting process involving a bump connector
- 2224/92164 . . . . . the second connecting process involving a build-up interconnect
- 2224/92165 . . . . . the second connecting process involving a layer connector
- 2224/92166 . . . . . the second connecting process involving a strap connector
- 2224/92168 . . . . . the second connecting process involving a TAB connector
- 2224/92172 . . . . . the first connecting process involving a TAB connector
- 2224/92173 . . . . . the second connecting process involving a bump connector
- 2224/92174 . . . . . the second connecting process involving a build-up interconnect
- 2224/92175 . . . . . the second connecting process involving a layer connector
- 2224/92176 . . . . . the second connecting process involving a strap connector
- 2224/92177 . . . . . the second connecting process involving a wire connector
- 2224/922 . . . . Connecting different surfaces of the semiconductor or solid-state body with connectors of different types
- 2224/9221 . . . . . Parallel connecting processes
- 2224/9222 . . . . . Sequential connecting processes
- 2224/92222 . . . . . the first connecting process involving a bump connector
- 2224/92224 . . . . . the second connecting process involving a build-up interconnect
- 2224/92225 . . . . . the second connecting process involving a layer connector
- 2224/92226 . . . . . the second connecting process involving a strap connector
- 2224/92227 . . . . . the second connecting process involving a wire connector
- 2224/92228 . . . . . the second connecting process involving a TAB connector
- 2224/92242 . . . . . the first connecting process involving a layer connector
- 2224/92244 . . . . . the second connecting process involving a build-up interconnect
- 2224/92246 . . . . . the second connecting process involving a strap connector
- 2224/92247 . . . . . the second connecting process involving a wire connector
- 2224/92248 . . . . . the second connecting process involving a TAB connector
- 2224/92252 . . . . . the first connecting process involving a strap connector
- 2224/92253 . . . . . the second connecting process involving a bump connector
- 2224/92255 . . . . . the second connecting process involving a layer connector
- 2224/93 . . . . Batch processes
- 2224/94 . . . . at wafer-level, i.e. with connecting carried out on a wafer comprising a plurality of undiced individual devices
- 2224/95 . . . . at chip-level, i.e. with connecting carried out on a plurality of singulated devices, i.e. on diced chips
- 2224/95001 . . . . involving a temporary auxiliary member not forming part of the bonding apparatus, e.g. removable or sacrificial coating, film or substrate
- 2224/95053 . . . . Bonding environment
- 2224/95085 . . . . . being a liquid, e.g. for fluidic self-assembly
- 2224/95091 . . . . . Under pressure
- 2224/95092 . . . . . Atmospheric pressure, e.g. dry self-assembly
- 2224/95093 . . . . . Transient conditions, e.g. assisted by a gas flow or a liquid flow
- 2224/951 . . . . Supplying the plurality of semiconductor or solid-state bodies

- 2224/95101 . . . . in a liquid medium
- 2224/95102 . . . . being a colloidal droplet
- 2224/95111 . . . . using a rack or rail
- 2224/95115 . . . . using a roll-to-roll transfer technique
- 2224/95112 . . . . Aligning the plurality of semiconductor or solid-state bodies
- 2224/95121 . . . . Active alignment, i.e. by apparatus steering
- 2224/95122 . . . . by applying vibration
- 2224/95123 . . . . by applying a pressurised fluid flow, e.g. liquid or gas flow
- 2224/95133 . . . . by applying an electromagnetic field
- 2224/95134 . . . . . Electrowetting, i.e. by changing the surface energy of a droplet
- 2224/95136 . . . . involving guiding structures, e.g. shape matching, spacers or supporting members
- 2224/95143 . . . . Passive alignment, i.e. self alignment, e.g. using surface energy, chemical reactions, thermal equilibrium
- 2224/95144 . . . . . Magnetic alignment, i.e. using permanent magnetic parts in the semiconductor or solid-state body
- 2224/95145 . . . . . Electrostatic alignment, i.e. polarity alignment with Coulomb charges
- 2224/95146 . . . . . by surface tension
- 2224/95147 . . . . . by molecular lock-key, e.g. by DNA
- 2224/95148 . . . . . involving movement of a part of the bonding apparatus
- 2224/96 . . . . the devices being encapsulated in a common layer, e.g. neo-wafer or pseudo-wafer, said common layer being separable into individual assemblies after connecting
- 2224/97 . . . . the devices being connected to a common substrate, e.g. interposer, said common substrate being separable into individual assemblies after connecting
- 2224/98 . . . . Methods for disconnecting semiconductor or solid-state bodies
- 2225/00** **Details relating to assemblies covered by the group [H01L 25/00](#) but not provided for in its subgroups**
- 2225/03 . . . . All the devices being of a type provided for in the same subgroup of groups [H01L 27/00](#) - [H01L 51/00](#)
- 2225/04 . . . . the devices not having separate containers
- 2225/065 . . . . the devices being of a type provided for in group [H01L 27/00](#)
- 2225/06503 . . . . Stacked arrangements of devices
- 2225/06506 . . . . . Wire or wire-like electrical connections between devices
- 2225/0651 . . . . . Wire or wire-like electrical connections from device to substrate
- 2225/06513 . . . . . Bump or bump-like direct electrical connections between devices, e.g. flip-chip connection, solder bumps
- 2225/06517 . . . . . Bump or bump-like direct electrical connections from device to substrate
- 2225/0652 . . . . . Bump or bump-like direct electrical connections from substrate to substrate
- 2225/06524 . . . . . Electrical connections formed on device or on substrate, e.g. a deposited or grown layer
- 2225/06527 . . . . . Special adaptation of electrical connections, e.g. rewiring, engineering changes, pressure contacts, layout
- 2225/06531 . . . . . Non-galvanic coupling, e.g. capacitive coupling
- 2225/06534 . . . . . Optical coupling
- 2225/06537 . . . . . Electromagnetic shielding
- 2225/06541 . . . . . Conductive via connections through the device, e.g. vertical interconnects, through silicon via [TSV] ([manufacturing via connections per se H01L 21/76898](#))
- 2225/06544 . . . . . Design considerations for via connections, e.g. geometry or layout
- 2225/06548 . . . . . Conductive via connections through the substrate, container, or encapsulation
- 2225/06551 . . . . . Conductive connections on the side of the device
- 2225/06555 . . . . . Geometry of the stack, e.g. form of the devices, geometry to facilitate stacking
- 2225/06558 . . . . . the devices having passive surfaces facing each other, i.e. in a back-to-back arrangement
- 2225/06562 . . . . . at least one device in the stack being rotated or offset
- 2225/06565 . . . . . the devices having the same size and there being no auxiliary carrier between the devices
- 2225/06568 . . . . . the devices decreasing in size, e.g. pyramidal stack
- 2225/06572 . . . . . Auxiliary carrier between devices, the carrier having an electrical connection structure
- 2225/06575 . . . . . Auxiliary carrier between devices, the carrier having no electrical connection structure
- 2225/06579 . . . . . TAB carriers; beam leads
- 2225/06582 . . . . . Housing for the assembly, e.g. chip scale package [CSP]
- 2225/06586 . . . . . Housing with external bump or bump-like connectors
- 2225/06589 . . . . . Thermal management, e.g. cooling
- 2225/06593 . . . . . Mounting aids permanently on device; arrangements for alignment ([use of temporary supports H01L 21/6835](#))
- 2225/06596 . . . . . Structural arrangements for testing ([testing or measuring during manufacture or treatment H01L 22/00](#); [testing electrical properties or locating electrical faults G01R 31/00](#))
- 2225/10 . . . . the devices having separate containers
- 2225/1005 . . . . the devices being of a type provided for in group [H01L 27/00](#)
- 2225/1011 . . . . the containers being in a stacked arrangement
- 2225/1017 . . . . . the lowermost container comprising a device support
- 2225/1023 . . . . . the support being an insulating substrate
- 2225/1029 . . . . . the support being a lead frame
- 2225/1035 . . . . . the device being entirely enclosed by the support, e.g. high-density interconnect [HDI]
- 2225/1041 . . . . . Special adaptations for top connections of the lowermost container, e.g. redistribution layer, integral interposer
- 2225/1047 . . . . . Details of electrical connections between containers
- 2225/1052 . . . . . Wire or wire-like electrical connections



- 2225/1058 . . . . . Bump or bump-like electrical connections, e.g. balls, pillars, posts
- 2225/1064 . . . . . Electrical connections provided on a side surface of one or more of the containers
- 2225/107 . . . . . Indirect electrical connections, e.g. via an interposer, a flexible substrate, using TAB ([printed circuits H05K 1/00](#))
- 2225/1076 . . . . . Shape of the containers
- 2225/1082 . . . . . for improving alignment between containers, e.g. interlocking features
- 2225/1088 . . . . . Arrangements to limit the height of the assembly
- 2225/1094 . . . . . Thermal management, e.g. cooling
- 2227/00** **Indexing scheme for devices consisting of a plurality of semiconductor or other solid state components formed in or on a common substrate covered by group [H01L 27/00](#)**
- 2227/32 . . . . . Devices including an organic light emitting device [OLED], e.g. OLED display
- 2227/323 . . . . . Multistep processes for AMOLED
- 2227/326 . . . . . Use of temporary substrate, e.g. for manufacturing of OLED displays having an inorganic driving circuit
- 2229/00** **Indexing scheme for semiconductor devices adapted for rectifying, amplifying, oscillating or switching, or capacitors or resistors with at least one potential-jump barrier or surface barrier, for details of semiconductor bodies or of electrodes thereof, or for multistep manufacturing processes therefor**
- 2251/00** **Indexing scheme relating to organic semiconductor devices covered by group [H01L 51/00](#)**
- 2251/10 . . . . . Processes specially adapted for the manufacture or treatment of organic semiconductor devices
- 2251/105 . . . . . Patterning of a layer by embossing, e.g. to form trenches in an insulating layer
- 2251/30 . . . . . Materials
- 2251/301 . . . . . Inorganic materials
- 2251/303 . . . . . Oxides, e.g. metal oxides
- 2251/305 . . . . . Transparent conductive oxides [TCO]
- 2251/306 . . . . . composed of tin oxides, e.g. F doped SnO<sub>2</sub>
- 2251/308 . . . . . composed of indium oxides, e.g. ITO
- 2251/50 . . . . . Organic light emitting devices
- 2251/53 . . . . . Structure
- 2251/5307 . . . . . specially adapted for controlling the direction of light emission
- 2251/5315 . . . . . Top emission
- 2251/5323 . . . . . Two-side emission, i.e. TOLED
- 2251/533 . . . . . End-face emission
- 2251/5338 . . . . . Flexible OLED
- 2251/5346 . . . . . Graded composition
- 2251/5353 . . . . . Inverted OLED
- 2251/5361 . . . . . OLED lamp
- 2251/5369 . . . . . Nanoparticles used in whatever layer except emissive layer, e.g. in packaging
- 2251/5376 . . . . . Combination of fluorescent and phosphorescent emission
- 2251/5384 . . . . . Multiple hosts in the emissive layer
- 2251/5392 . . . . . Short-circuit prevention
- 2251/55 . . . . . characterised by parameters
- 2251/552 . . . . . HOMO-LUMO-EF
- 2251/554 . . . . . Oxidation-reduction potential
- 2251/556 . . . . . Temperature
- 2251/558 . . . . . Thickness
- 2251/56 . . . . . Processes specially adapted for the manufacture or treatment of OLED
- 2251/562 . . . . . Aging
- 2251/564 . . . . . Application of alternating current
- 2251/566 . . . . . Division of substrate, e.g. for manufacturing of OLED displays
- 2251/568 . . . . . Repairing
- 2924/00** **Indexing scheme for arrangements or methods for connecting or disconnecting semiconductor or solid-state bodies as covered by [H01L 24/00](#)**
- 2924/0001 . . . . . Technical content checked by a classifier
- NOTE**
- Codes [H01L 2924/0001](#) - [H01L 2924/0002](#) are used to describe the status of reclassification; they do not relate to technical features as such
- 2924/00011 . . . . . Not relevant to the scope of the group, the symbol of which is combined with the symbol of this group
- 2924/00012 . . . . . Relevant to the scope of the group, the symbol of which is combined with the symbol of this group
- 2924/00013 . . . . . Fully indexed content
- 2924/00014 . . . . . the subject-matter covered by the group, the symbol of which is combined with the symbol of this group, being disclosed without further technical details
- 2924/00015 . . . . . the subject-matter covered by the group, the symbol of which is combined with the symbol of this group, being disclosed as prior art
- 2924/0002 . . . . . Not covered by any one of groups [H01L 24/00](#), [H01L 24/00](#) and [H01L 2224/00](#)
- 2924/01 . . . . . Chemical elements
- 2924/01001 . . . . . Hydrogen [H]
- 2924/01002 . . . . . Helium [He]
- 2924/01003 . . . . . Lithium [Li]
- 2924/01004 . . . . . Beryllium [Be]
- 2924/01005 . . . . . Boron [B]
- 2924/01006 . . . . . Carbon [C]
- 2924/01007 . . . . . Nitrogen [N]
- 2924/01008 . . . . . Oxygen [O]
- 2924/01009 . . . . . Fluorine [F]
- 2924/0101 . . . . . Neon [Ne]
- 2924/01011 . . . . . Sodium [Na]
- 2924/01012 . . . . . Magnesium [Mg]
- 2924/01013 . . . . . Aluminum [Al]
- 2924/01014 . . . . . Silicon [Si]
- 2924/01015 . . . . . Phosphorus [P]
- 2924/01016 . . . . . Sulfur [S]
- 2924/01017 . . . . . Chlorine [Cl]
- 2924/01018 . . . . . Argon [Ar]
- 2924/01019 . . . . . Potassium [K]
- 2924/0102 . . . . . Calcium [Ca]
- 2924/01021 . . . . . Scandium [Sc]
- 2924/01022 . . . . . Titanium [Ti]
- 2924/01023 . . . . . Vanadium [V]
- 2924/01024 . . . . . Chromium [Cr]
- 2924/01025 . . . . . Manganese [Mn]
- 2924/01026 . . . . . Iron [Fe]
- 2924/01027 . . . . . Cobalt [Co]

2924/01028	. . Nickel [Ni]	2924/01089	. . Actinium [Ac]
2924/01029	. . Copper [Cu]	2924/0109	. . Thorium [Th]
2924/0103	. . Zinc [Zn]	2924/01091	. . Protactinium [Pa]
2924/01031	. . Gallium [Ga]	2924/01092	. . Uranium [U]
2924/01032	. . Germanium [Ge]	2924/01093	. . Neptunium [Np]
2924/01033	. . Arsenic [As]	2924/01094	. . Plutonium [Pu]
2924/01034	. . Selenium [Se]	2924/011	. Groups of the periodic table
2924/01035	. . Bromine [Br]	2924/01101	. . Alkali metals
2924/01036	. . Krypton [Kr]	2924/01102	. . Alkali earth metals
2924/01037	. . Rubidium [Rb]	2924/01103	. . Transition metals
2924/01038	. . Strontium [Sr]	2924/01104	. . Refractory metals
2924/01039	. . Yttrium [Y]	2924/01105	. . Rare earth metals
2924/0104	. . Zirconium [Zr]	2924/01106	. . . Lanthanides, i.e. Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
2924/01041	. . Niobium [Nb]	2924/01107	. . . Actinides, i.e. Th, Pa, U, Np, Pu, Am, Cm, Bk, Cf, Es, Fm, Md, No, Lr
2924/01042	. . Molybdenum [Mo]	2924/01108	. . Noble metals
2924/01043	. . Technetium [Tc]	2924/01109	. . Metalloids or Semi-metals
2924/01044	. . Ruthenium [Ru]	2924/0111	. . Chalcogens
2924/01045	. . Rhodium [Rh]	2924/01111	. . Halogens
2924/01046	. . Palladium [Pd]	2924/01112	. . Noble gases
2924/01047	. . Silver [Ag]	2924/012	. Semiconductor purity grades
2924/01048	. . Cadmium [Cd]	2924/01201	. . 1N purity grades, i.e. 90%
2924/01049	. . Indium [In]	2924/01202	. . 2N purity grades, i.e. 99%
2924/0105	. . Tin [Sn]	2924/01203	. . 3N purity grades, i.e. 99.9%
2924/01051	. . Antimony [Sb]	2924/01204	. . 4N purity grades, i.e. 99.99%
2924/01052	. . Tellurium [Te]	2924/01205	. . 5N purity grades, i.e. 99.999%
2924/01053	. . Iodine [I]	2924/01206	. . 6N purity grades, i.e. 99.9999%
2924/01054	. . Xenon [Xe]	2924/01207	. . 7N purity grades, i.e. 99.99999%
2924/01055	. . Cesium [Cs]	2924/01208	. . 8N purity grades, i.e. 99.999999%
2924/01056	. . Barium [Ba]	2924/013	. Alloys
2924/01057	. . Lanthanum [La]	2924/0132	. . Binary Alloys
2924/01058	. . Cerium [Ce]	2924/01321	. . . Isomorphous Alloys
2924/01059	. . Praseodymium [Pr]	2924/01322	. . . Eutectic Alloys, i.e. obtained by a liquid transforming into two solid phases
2924/0106	. . Neodymium [Nd]	2924/01323	. . . . Hypoeutectic alloys i.e. with compositions lying to the left of the eutectic point
2924/01061	. . Promethium [Pm]	2924/01324	. . . . Hypereutectic alloys i.e. with compositions lying to the right of the eutectic point
2924/01062	. . Samarium [Sm]	2924/01325	. . . Peritectic Alloys, i.e. obtained by a liquid and a solid transforming into a new and different solid phase
2924/01063	. . Europium [Eu]	2924/01326	. . . Monotectics, i.e. obtained by a liquid transforming into a solid and a new and different liquid phase
2924/01064	. . Gadolinium [Gd]	2924/01327	. . . Intermediate phases, i.e. intermetallics compounds
2924/01065	. . Terbium [Tb]	2924/0133	. . Ternary Alloys
2924/01066	. . Dysprosium [Dy]	2924/0134	. . Quaternary Alloys
2924/01067	. . Holmium [Ho]	2924/0135	. . Quinary Alloys
2924/01068	. . Erbium [Er]	2924/014	. . Solder alloys
2924/01069	. . Thulium [Tm]	2924/01402	. . Invar, i.e. single-phase alloy of around 36% nickel and 64% iron
2924/0107	. . Ytterbium [Yb]	2924/01403	. . Kovar, i.e. FeNiCo alloys
2924/01071	. . Lutetium [Lu]	2924/01404	. . Alloy 42, i.e. FeNi42
2924/01072	. . Hafnium [Hf]	2924/01405	. . Inovco, i.e. Fe-33Ni-4.5Co
2924/01073	. . Tantalum [Ta]	2924/042	. Borides composed of metals from groups of the periodic table
2924/01074	. . Tungsten [W]	2924/0421	. . 1st Group
2924/01075	. . Rhenium [Re]	2924/0422	. . 2nd Group
2924/01076	. . Osmium [Os]	2924/0423	. . 3rd Group
2924/01077	. . Iridium [Ir]	2924/0424	. . 4th Group
2924/01078	. . Platinum [Pt]		
2924/01079	. . Gold [Au]		
2924/0108	. . Mercury [Hg]		
2924/01081	. . Thallium [Tl]		
2924/01082	. . Lead [Pb]		
2924/01083	. . Bismuth [Bi]		
2924/01084	. . Polonium [Po]		
2924/01085	. . Astatine [At]		
2924/01086	. . Radon [Rn]		
2924/01087	. . Francium [Fr]		
2924/01088	. . Radium [Ra]		

## H01L

2924/0425	. . 5th Group	2924/0486	. . Actinides
2924/0426	. . 6th Group	2924/0489	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0471</a> - <a href="#">H01L 2924/0486</a>
2924/0427	. . 7th Group	2924/04891	. . having a monocrystalline microstructure
2924/0428	. . 8th Group	2924/04892	. . having a polycrystalline microstructure
2924/0429	. . 9th Group	2924/04894	. . having an amorphous microstructure, i.e. glass
2924/044	. . 10th Group	2924/049	. Nitrides composed of metals from groups of the periodic table
2924/0441	. . 11th Group	2924/0491	. . 1st Group
2924/0442	. . 12th Group	2924/0492	. . 2nd Group
2924/0443	. . 13th Group	2924/0493	. . 3rd Group
2924/0444	. . 14th Group	2924/0494	. . 4th Group
2924/0445	. . Lanthanides	2924/04941	. . . TiN
2924/0446	. . Actinides	2924/0495	. . 5th Group
2924/0449	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0421</a> - <a href="#">H01L 2924/0446</a>	2924/04953	. . . TaN
2924/04491	. . having a monocrystalline microstructure	2924/0496	. . 6th Group
2924/04492	. . having a polycrystalline microstructure	2924/0497	. . 7th Group
2924/04494	. . having an amorphous microstructure, i.e. glass	2924/0498	. . 8th Group
2924/045	. Carbides composed of metals from groups of the periodic table	2924/0499	. . 9th Group
2924/0451	. . 1st Group	2924/05	. . 10th Group
2924/0452	. . 2nd Group	2924/0501	. . 11th Group
2924/0453	. . 3rd Group	2924/0502	. . 12th Group
2924/0454	. . 4th Group	2924/0503	. . 13th Group
2924/04541	. . . TiC	2924/05032	. . . AlN
2924/0455	. . 5th Group	2924/0504	. . 14th Group
2924/0456	. . 6th Group	2924/05042	. . . Si <sub>3</sub> N <sub>4</sub>
2924/04563	. . . WC	2924/0505	. . Lanthanides
2924/0457	. . 7th Group	2924/0506	. . Actinides
2924/0458	. . 8th Group	2924/0509	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0491</a> - <a href="#">H01L 2924/0506</a>
2924/0459	. . 9th Group	2924/05091	. . having a monocrystalline microstructure
2924/046	. . 10th Group	2924/05092	. . having a polycrystalline microstructure
2924/0461	. . 11th Group	2924/05094	. . having an amorphous microstructure, i.e. glass
2924/0462	. . 12th Group	2924/051	. Phosphides composed of metals from groups of the periodic table
2924/0463	. . 13th Group	2924/0511	. . 1st Group
2924/0464	. . 14th Group	2924/0512	. . 2nd Group
2924/04642	. . . SiC	2924/0513	. . 3rd Group
2924/0465	. . Lanthanides	2924/0514	. . 4th Group
2924/0466	. . Actinides	2924/0515	. . 5th Group
2924/0469	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0451</a> - <a href="#">H01L 2924/0466</a>	2924/0516	. . 6th Group
2924/04691	. . having a monocrystalline microstructure	2924/0517	. . 7th Group
2924/04692	. . having a polycrystalline microstructure	2924/0518	. . 8th Group
2924/04694	. . having an amorphous microstructure, i.e. glass	2924/0519	. . 9th Group
2924/047	. Silicides composed of metals from groups of the periodic table	2924/052	. . 10th Group
2924/0471	. . 1st Group	2924/0521	. . 11th Group
2924/0472	. . 2nd Group	2924/0522	. . 12th Group
2924/0473	. . 3rd Group	2924/0523	. . 13th Group
2924/0474	. . 4th Group	2924/0524	. . 14th Group
2924/0475	. . 5th Group	2924/0525	. . Lanthanides
2924/0476	. . 6th Group	2924/0526	. . Actinides
2924/0477	. . 7th Group	2924/0529	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0511</a> - <a href="#">H01L 2924/0526</a>
2924/0478	. . 8th Group	2924/05291	. . having a monocrystalline microstructure
2924/0479	. . 9th Group	2924/05292	. . having a polycrystalline microstructure
2924/048	. . 10th Group	2924/05294	. . having an amorphous microstructure, i.e. glass
2924/0481	. . 11th Group	2924/053	. Oxides composed of metals from groups of the periodic table
2924/0482	. . 12th Group	2924/0531	. . 1st Group
2924/0483	. . 13th Group		
2924/0484	. . 14th Group		
2924/0485	. . Lanthanides		

## H01L

2924/0532	. . 2nd Group	2924/058	. . 10th Group
2924/0533	. . 3rd Group	2924/0581	. . 11th Group
2924/0534	. . 4th Group	2924/0582	. . 12th Group
2924/05341	. . . TiO <sub>2</sub>	2924/0583	. . 13th Group
2924/05342	. . . ZrO <sub>2</sub>	2924/0584	. . 14th Group
2924/0535	. . 5th Group	2924/0585	. . Lanthanides
2924/0536	. . 6th Group	2924/0586	. . Actinides
2924/0537	. . 7th Group	2924/0589	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0571</a> - <a href="#">H01L 2924/0586</a>
2924/0538	. . 8th Group		
2924/05381	. . . FeOx		
2924/0539	. . 9th Group	2924/05891	. . having a monocrystalline microstructure
2924/054	. . 10th Group	2924/05892	. . having a polycrystalline microstructure
2924/0541	. . 11th Group	2924/05894	. . having an amorphous microstructure, i.e. glass
2924/0542	. . 12th Group	2924/059	. . Being combinations of any of the materials from the groups <a href="#">H01L 2924/042</a> - <a href="#">H01L 2924/0584</a> , e.g. oxynitrides
2924/0543	. . 13th Group		
2924/05432	. . . Al <sub>2</sub> O <sub>3</sub>	2924/05991	. . having a monocrystalline microstructure
2924/0544	. . 14th Group	2924/05992	. . having a polycrystalline microstructure
2924/05442	. . . SiO <sub>2</sub>	2924/05994	. . having an amorphous microstructure, i.e. glass
2924/0545	. . Lanthanides	2924/06	. . Polymers ( <a href="#">polymers per se C08</a> ; <a href="#">polymer adhesives C09J</a> )
2924/0546	. . Actinides		
2924/0549	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0531</a> - <a href="#">H01L 2924/0546</a>	2924/061	. . Polyolefin polymer
		2924/0615	. . Styrenic polymer
2924/05491	. . having a monocrystalline microstructure	2924/062	. . Halogenated polymer
2924/05492	. . having a polycrystalline microstructure	2924/0625	. . Polyvinyl alcohol
2924/05494	. . having an amorphous microstructure, i.e. glass	2924/063	. . Polyvinyl acetate
2924/055	. . Chalcogenides other than oxygen i.e. sulfides, selenides and tellurides composed of metals from groups of the periodic table	2924/0635	. . Acrylic polymer
		2924/064	. . Graft polymer
2924/0551	. . 1st Group	2924/0645	. . Block copolymer
2924/0552	. . 2nd Group	2924/065	. . ABS
2924/0553	. . 3rd Group	2924/0655	. . Polyacetal
2924/0554	. . 4th Group	2924/066	. . Phenolic resin
2924/0555	. . 5th Group	2924/0665	. . Epoxy resin
2924/0556	. . 6th Group	2924/067	. . Polyphenylene
2924/0557	. . 7th Group	2924/0675	. . Polyester
2924/0558	. . 8th Group	2924/068	. . Polycarbonate
2924/0559	. . 9th Group	2924/0685	. . Polyether
2924/056	. . 10th Group	2924/069	. . Polyurethane
2924/0561	. . 11th Group	2924/0695	. . Polyamide
2924/0562	. . 12th Group	2924/07	. . Polyamine or polyimide
2924/0563	. . 13th Group	2924/07001	. . . Polyamine
2924/0564	. . 14th Group	2924/07025	. . . Polyimide
2924/0565	. . Lanthanides	2924/0705	. . Sulfur containing polymer
2924/0566	. . Actinides	2924/0715	. . Polysiloxane
2924/0569	. . being a combination of two or more materials provided in the groups <a href="#">H01L 2924/0551</a> - <a href="#">H01L 2924/0566</a>	2924/078	. . Adhesive characteristics other than chemical
		2924/07802	. . . not being an ohmic electrical conductor
2924/05691	. . having a monocrystalline microstructure	2924/0781	. . . being an ohmic electrical conductor
2924/05692	. . having a polycrystalline microstructure	2924/07811	. . . . Extrinsic, i.e. with electrical conductive fillers
2924/05694	. . having an amorphous microstructure, i.e. glass		
2924/057	. . Halides composed of metals from groups of the periodic table	2924/07812	. . . . Intrinsic, e.g. polyaniline [PANI]
		2924/0782	. . . being pressure sensitive
2924/0571	. . 1st Group	2924/095	. . with a principal constituent of the material being a combination of two or more materials provided in the groups <a href="#">H01L 2924/013</a> - <a href="#">H01L 2924/0715</a>
2924/0572	. . 2nd Group		
2924/0573	. . 3rd Group	2924/0951	. . Glass epoxy laminates
2924/0574	. . 4th Group	2924/09511	. . . FR-4
2924/0575	. . 5th Group	2924/09512	. . . FR-5
2924/0576	. . 6th Group	2924/09522	. . . G10
2924/0577	. . 7th Group	2924/09523	. . . G11
2924/0578	. . 8th Group	2924/096	. . Cermets, i.e. composite material composed of ceramic and metallic materials
2924/0579	. . 9th Group	2924/097	. . Glass-ceramics, e.g. devitrified glass

2924/09701	. . . Low temperature co-fired ceramic [LTCC]	2924/10353	. . . . . Indium arsenide antimonide phosphide [InAsSbP]
2924/10	. Details of semiconductor or other solid state devices to be connected	2924/10354	. . . . . Aluminium indium arsenide phosphide [AlInAsP]
2924/1011	. . Structure	2924/10355	. . . . . Aluminium gallium arsenide nitride [AlGaAsN]
2924/1015	. . Shape	2924/10356	. . . . . Indium gallium arsenide nitride [InGaAsN]
2924/10155	. . . being other than a cuboid	2924/10357	. . . . . Indium aluminium arsenide nitride [InAlAsN]
2924/10156	. . . . at the periphery	2924/10358	. . . . . Gallium arsenide antimonide nitride [GaAsSbN]
2924/10157	. . . . at the active surface	2924/10359	. . . . . Gallium indium nitride arsenide antimonide [GaInNASb]
2924/10158	. . . . at the passive surface	2924/1036	. . . . . Gallium indium arsenide antimonide phosphide [GaInAsSbP]
2924/1016	. . . being a cuboid	2924/1037	. . . . . II-VI
2924/10161	. . . . with a rectangular active surface	2924/10371	. . . . . Cadmium selenide [CdSe]
2924/10162	. . . . with a square active surface	2924/10372	. . . . . Cadmium sulfide [CdS]
2924/1017	. . . being a sphere	2924/10373	. . . . . Cadmium telluride [CdTe]
2924/102	. . Material of the semiconductor or solid state bodies	2924/10375	. . . . . Zinc selenide [ZnSe]
2924/1025	. . . Semiconducting materials	2924/10376	. . . . . Zinc sulfide [ZnS]
2924/10251	. . . . Elemental semiconductors, i.e. Group IV	2924/10377	. . . . . Zinc telluride [ZnTe]
2924/10252	. . . . . Germanium [Ge]	2924/10378	. . . . . Cadmium zinc telluride, i.e. CZT [CdZnTe]
2924/10253	. . . . . Silicon [Si]	2924/10379	. . . . . Mercury cadmium telluride [HgZnTe]
2924/10254	. . . . . Diamond [C]	2924/1038	. . . . . Mercury zinc telluride [HgZnSe]
2924/1026	. . . . Compound semiconductors	2924/10381	. . . . . Mercury zinc selenide [HgZnSe]
2924/1027	. . . . . IV	2924/1042	. . . . . I-VII
2924/10271	. . . . . Silicon-germanium [SiGe]	2924/10421	. . . . . Cuprous chloride [CuCl]
2924/10272	. . . . . Silicon Carbide [SiC]	2924/1047	. . . . . I-VI
2924/1032	. . . . . III-V	2924/10471	. . . . . Copper sulfide [CuS]
2924/10321	. . . . . Aluminium antimonide [AlSb]	2924/1052	. . . . . IV-VI
2924/10322	. . . . . Aluminium arsenide [AlAs]	2924/10521	. . . . . Lead selenide [PbSe]
2924/10323	. . . . . Aluminium nitride [AlN]	2924/10522	. . . . . Lead(II)sulfide [PbS]
2924/10324	. . . . . Aluminium phosphide [AlP]	2924/10523	. . . . . Lead telluride [PbTe]
2924/10325	. . . . . Boron nitride [BN], e.g. cubic, hexagonal, nanotube	2924/10524	. . . . . Tin sulfide [SnS, SnS <sub>2</sub> ]
2924/10326	. . . . . Boron phosphide [BP]	2924/10525	. . . . . Tin telluride [SnTe]
2924/10327	. . . . . Boron arsenide [BAs, B <sub>12</sub> As <sub>2</sub> ]	2924/10526	. . . . . Lead tin telluride [PbSnTe]
2924/10328	. . . . . Gallium antimonide [GaSb]	2924/10527	. . . . . Thallium tin telluride [Tl <sub>2</sub> SnTe <sub>5</sub> ]
2924/10329	. . . . . Gallium arsenide [GaAs]	2924/10528	. . . . . Thallium germanium telluride [Tl <sub>2</sub> GeTe <sub>5</sub> ]
2924/1033	. . . . . Gallium nitride [GaN]	2924/1057	. . . . . V-VI
2924/10331	. . . . . Gallium phosphide [GaP]	2924/10571	. . . . . Bismuth telluride [Bi <sub>2</sub> Te <sub>3</sub> ]
2924/10332	. . . . . Indium antimonide [InSb]	2924/1062	. . . . . II-V
2924/10333	. . . . . Indium arsenide [InAs]	2924/10621	. . . . . Cadmium phosphide [Cd <sub>3</sub> P <sub>2</sub> ]
2924/10334	. . . . . Indium nitride [InN]	2924/10622	. . . . . Cadmium arsenide [Cd <sub>3</sub> As <sub>2</sub> ]
2924/10335	. . . . . Indium phosphide [InP]	2924/10623	. . . . . Cadmium antimonide [Cd <sub>3</sub> Sb <sub>2</sub> ]
2924/10336	. . . . . Aluminium gallium arsenide [AlGaAs]	2924/10624	. . . . . Zinc phosphide [Zn <sub>3</sub> P <sub>2</sub> ]
2924/10337	. . . . . Indium gallium arsenide [InGaAs]	2924/10625	. . . . . Zinc arsenide [Zn <sub>3</sub> As <sub>2</sub> ]
2924/10338	. . . . . Indium gallium phosphide [InGaP]	2924/10626	. . . . . Zinc antimonide [Zn <sub>3</sub> Sb <sub>2</sub> ]
2924/10339	. . . . . Aluminium indium arsenide [AlInAs]	2924/1067	. . . . . Oxide
2924/1034	. . . . . Aluminium indium antimonide [AlInSb]	2924/10671	. . . . . Titanium dioxide, anatase, rutile, brookite [TiO <sub>2</sub> ]
2924/10341	. . . . . Gallium arsenide nitride [GaAsN]	2924/10672	. . . . . Copper(I)oxide [Cu <sub>2</sub> O]
2924/10342	. . . . . Gallium arsenide phosphide [GaAsP]	2924/10673	. . . . . Copper(II)oxide [CuO]
2924/10343	. . . . . Gallium arsenide antimonide [GaAsSb]	2924/10674	. . . . . Uranium dioxide [UO <sub>2</sub> ]
2924/10344	. . . . . Aluminium gallium nitride [AlGaN]	2924/10675	. . . . . Uranium trioxide [UO <sub>3</sub> ]
2924/10345	. . . . . Aluminium gallium phosphide [AlGaP]	2924/10676	. . . . . Bismuth trioxide [Bi <sub>2</sub> O <sub>3</sub> ]
2924/10346	. . . . . Indium gallium nitride [InGaN]	2924/10677	. . . . . Tin dioxide [SnO <sub>2</sub> ]
2924/10347	. . . . . Indium arsenide antimonide [InAsSb]	2924/10678	. . . . . Barium titanate [BaTiO <sub>3</sub> ]
2924/10348	. . . . . Indium gallium antimonide [InGaSb]		
2924/10349	. . . . . Aluminium gallium indium phosphide [AlGaInP]		
2924/1035	. . . . . Aluminium gallium arsenide phosphide [AlGaInP]		
2924/10351	. . . . . Indium gallium arsenide phosphide [InGaAsP]		
2924/10352	. . . . . Indium gallium arsenide antimonide [InGaAsSb]		

2924/10679	. . . . .	Strontium titanate [SrTiO <sub>3</sub> ]	2924/13014	. . . . .	Breakover Diode [BOD]
2924/1068	. . . . .	Lithium niobate [LiNbO <sub>3</sub> ]	2924/13015	. . . . .	DIAC - Bidirectional trigger device
2924/10681	. . . . .	Lanthanum copper oxide [La <sub>2</sub> CuO <sub>4</sub> ]	2924/13016	. . . . .	Dynistor - Unidirectional switching device
2924/1072	. . . . .	Layered	2924/13017	. . . . .	Shockley diode - Unidirectional trigger and switching device
2924/10721	. . . . .	Lead(II)iodide [PbI <sub>2</sub> ]	2924/13018	. . . . .	SIDAC - Bidirectional switching device
2924/10722	. . . . .	Molybdenum disulfide [MoS <sub>2</sub> ]	2924/13019	. . . . .	Trisil, SIDACtor - Bidirectional protection devices
2924/10723	. . . . .	Gallium selenide [GaSe]	2924/1302	. . . . .	GTO - Gate Turn-Off thyristor
2924/10724	. . . . .	Tin sulfide [SnS]	2924/13021	. . . . .	DB-GTO - Distributed Buffer Gate Turn-Off thyristor
2924/10725	. . . . .	Bismuth sulfide [Bi <sub>2</sub> S <sub>3</sub> ]	2924/13022	. . . . .	MA-GTO - Modified Anode Gate Turn-Off thyristor
2924/1077	. . . . .	Magnetic diluted [DMS]	2924/13023	. . . . .	IGCT - Integrated Gate Commutated Thyristor
2924/10771	. . . . .	Gallium manganese arsenide [GaMnAs]	2924/13024	. . . . .	LASCR - Light Activated SCR, or LTT - Light triggered thyristor
2924/10772	. . . . .	Indium manganese arsenide [InMnAs]	2924/13025	. . . . .	Light Activated Semiconducting Switch [LASS]
2924/10773	. . . . .	Cadmium manganese telluride [CdMnTe]	2924/13026	. . . . .	MCT - MOSFET Controlled Thyristor - It contains two additional FET structures for on/off control
2924/10774	. . . . .	Lead manganese telluride [PbMnTe]	2924/13027	. . . . .	BRT - Base Resistance Controlled Thyristor
2924/10775	. . . . .	Lanthanum calcium manganate [La <sub>0.7</sub> Ca <sub>0.3</sub> MnO <sub>3</sub> ]	2924/13028	. . . . .	RCT - Reverse Conducting Thyristor
2924/10776	. . . . .	Iron(II)oxide [FeO]	2924/13029	. . . . .	PUT or PUJT - Programmable Unijunction Transistor - A thyristor with gate on n-type layer near to the anode used as a functional replacement for unijunction transistor
2924/10777	. . . . .	Nickel(II)oxide [NiO]	2924/1303	. . . . .	SCS - Silicon Controlled Switch or Thyristor Tetrode - A thyristor with both cathode and anode gates
2924/10778	. . . . .	Europium(II)oxide [EuO]	2924/13032	. . . . .	SITH - Static Induction Thyristor, or FCTh - Field Controlled Thyristor - containing a gate structure that can shut down anode current flow
2924/10779	. . . . .	Europium(II)sulfide [EuS]	2924/13033	. . . . .	TRIAC - Triode for Alternating Current - A bidirectional switching device containing two thyristor structures with common gate contact
2924/1078	. . . . .	Chromium(III)bromide [CrBr <sub>3</sub> ]	2924/13034	. . . . .	Silicon Controlled Rectifier [SCR]
2924/1082	. . . . .	Other	2924/13035	. . . . .	Asymmetrical SCR [ASCR]
2924/10821	. . . . .	Copper indium gallium selenide, CIGS [Cu[In,Ga]Se <sub>2</sub> ]	2924/1304	. . . . .	Transistor
2924/10822	. . . . .	Copper zinc tin sulfide, CZTS [Cu <sub>2</sub> ZnSnS <sub>4</sub> ]	2924/1305	. . . . .	Bipolar Junction Transistor [BJT]
2924/10823	. . . . .	Copper indium selenide, CIS [CuInSe <sub>2</sub> ]	2924/13051	. . . . .	Heterojunction bipolar transistor [HBT]
2924/10824	. . . . .	Silver gallium sulfide [AgGaS <sub>2</sub> ]	2924/13052	. . . . .	Schottky transistor
2924/10825	. . . . .	Zinc silicon phosphide [ZnSiP <sub>2</sub> ]	2924/13053	. . . . .	Avalanche transistor
2924/10826	. . . . .	Arsenic selenide [As <sub>2</sub> S <sub>3</sub> ]	2924/13054	. . . . .	Darlington transistor
2924/10827	. . . . .	Platinum silicide [PtSi]	2924/13055	. . . . .	Insulated gate bipolar transistor [IGBT]
2924/10828	. . . . .	Bismuth(III)iodide [BiI <sub>3</sub> ]	2924/13056	. . . . .	Photo transistor
2924/10829	. . . . .	Mercury(II)iodide [HgI <sub>2</sub> ]	2924/1306	. . . . .	Field-effect transistor [FET]
2924/1083	. . . . .	Thallium(I)bromide [TlBr]	2924/13061	. . . . .	Carbon nanotube field-effect transistor [CNFET]
2924/10831	. . . . .	Selenium [Se]	2924/13062	. . . . .	Junction field-effect transistor [JFET]
2924/10832	. . . . .	Silver sulfide [Ag <sub>2</sub> S]	2924/13063	. . . . .	Metal-Semiconductor Field-Effect Transistor [MESFET]
2924/10833	. . . . .	Iron disulfide [FeS <sub>2</sub> ]	2924/13064	. . . . .	High Electron Mobility Transistor [HEMT, HFET [heterostructure FET], MODFET]
2924/11	. .	Device type	2924/13066	. . . . .	Inverted-T field effect transistor [ITFET]
2924/12	. . .	Passive devices, e.g. 2 terminal devices	2924/13067	. . . . .	FinFET, source/drain region shapes fins on the silicon surface
2924/1203	. . . . .	Rectifying Diode			
2924/12031	. . . . .	PIN diode			
2924/12032	. . . . .	Schottky diode			
2924/12033	. . . . .	Gunn diode			
2924/12034	. . . . .	Varactor			
2924/12035	. . . . .	Zener diode			
2924/12036	. . . . .	PN diode			
2924/12037	. . . . .	Cat's whisker diode			
2924/12038	. . . . .	Point contact			
2924/1204	. . . . .	Optical Diode			
2924/12041	. . . . .	LED			
2924/12042	. . . . .	LASER			
2924/12043	. . . . .	Photo diode			
2924/12044	. . . . .	OLED			
2924/1205	. . . . .	Capacitor			
2924/1206	. . . . .	Inductor			
2924/1207	. . . . .	Resistor			
2924/13	. . .	Discrete devices, e.g. 3 terminal devices			
2924/1301	. . . . .	Thyristor			
2924/13011	. . . . .	Anode Gate Thyristor [AGT]			
2924/13013	. . . . .	Bidirectional Control Thyristor [BCT]			

2924/13068	. . . . .	Fast-reverse epitaxial diode field-effect transistor [FREDFET]	2924/1436	. . . . .	Dynamic random-access memory [DRAM]
2924/13069	. . . . .	Thin film transistor [TFT]	2924/14361	. . . . .	Synchronous dynamic random access memory [SDRAM]
2924/1307	. . . . .	Organic Field-Effect Transistor [OFET]	2924/14362	. . . . .	RAS Only Refresh [ROR]
2924/13071	. . . . .	Ballistic transistor	2924/14363	. . . . .	CAS before RAS refresh [CBR]
2924/13072	. . . . .	Sensor FET	2924/14364	. . . . .	Multibank DRAM [MDRAM]
2924/13073	. . . . .	ion-sensitive field-effect transistor [ISFET]	2924/14365	. . . . .	Video DRAM [VRAM]
2924/13074	. . . . .	Electrolyte-oxide-semiconductor field effect transistor [EOSFET], e.g. Neurochip	2924/14366	. . . . .	Window DRAM [WRAM]
2924/13075	. . . . .	Deoxyribonucleic acid field-effect transistor [DNAFET]	2924/14367	. . . . .	Fast page mode DRAM [FPM DRAM]
2924/13076	. . . . .	DEPFET	2924/14368	. . . . .	Extended data out DRAM [EDO DRAM]
2924/13078	. . . . .	Unijunction transistors	2924/14369	. . . . .	Burst EDO DRAM [BEDO DRAM]
2924/13079	. . . . .	Single-electron transistors [SET]	2924/1437	. . . . .	Static random-access memory [SRAM]
2924/1308	. . . . .	Nanofluidic transistor	2924/1438	. . . . .	Flash memory
2924/13081	. . . . .	Multigate devices	2924/1441	. . . . .	Ferroelectric RAM [FeRAM or FRAM]
2924/13082	. . . . .	Tetrode transistor	2924/1442	. . . . .	Synchronous graphics RAM [SGRAM]
2924/13083	. . . . .	Pentode transistor	2924/1443	. . . . .	Non-volatile random-access memory [NVRAM]
2924/13084	. . . . .	Trigate transistor	2924/1444	. . . . .	PBRAM
2924/13085	. . . . .	Dual gate FETs	2924/145	. . . . .	Read-only memory [ROM]
2924/13086	. . . . .	Junctionless Nanowire Transistor [JNT]	2924/1451	. . . . .	EPROM
2924/13087	. . . . .	Vertical-Slit Field-Effect Transistor [VeSFET]	2924/14511	. . . . .	EEPROM
2924/13088	. . . . .	Graphene Nanoribbon Field-Effect Transistor [GNRFET]	2924/1453	. . . . .	PROM
2924/13089	. . . . .	Nanoparticle Organic Memory Field-Effect Transistor [NOMFET]	2924/146	. . .	Mixed devices
2924/1309	. . . . .	Modulation-Doped Field Effect Transistor [MODFET]	2924/1461	. . .	MEMS
2924/13091	. . . . .	Metal-Oxide-Semiconductor Field-Effect Transistor [MOSFET]	2924/15	. . .	Details of package parts other than the semiconductor or other solid state devices to be connected
2924/13092	. . . . .	Dual Gate Metal-Oxide-Semiconductor Field-Effect Transistor [DG MOSFET]	2924/151	. . .	Die mounting substrate
2924/14	. . .	Integrated circuits	2924/1511	. . .	Structure
2924/141	. . . . .	Analog devices	2924/1515	. . .	Shape
2924/142	. . . . .	HF devices	2924/15151	. . . . .	the die mounting substrate comprising an aperture, e.g. for underfilling, outgassing, window type wire connections
2924/1421	. . . . .	RF devices	2924/15153	. . . . .	the die mounting substrate comprising a recess for hosting the device
2924/14211	. . . . .	Voltage-controlled oscillator [VCO]	2924/15155	. . . . .	the shape of the recess being other than a cuboid
2924/14215	. . . . .	Low-noise amplifier [LNA]	2924/15156	. . . . .	Side view
2924/1422	. . . . .	Mixer	2924/15157	. . . . .	Top view
2924/14221	. . . . .	Electronic mixer	2924/15158	. . . . .	the die mounting substrate being other than a cuboid
2924/14222	. . . . .	Frequency mixer	2924/15159	. . . . .	Side view
2924/1423	. . . . .	Monolithic Microwave Integrated Circuit [MMIC]	2924/15162	. . . . .	Top view
2924/1424	. . . . .	Operational amplifier	2924/15165	. . .	Monolayer substrate
2924/1425	. . . . .	Converter	2924/1517	. . .	Multilayer substrate
2924/14251	. . . . .	Frequency converter	2924/15172	. . . . .	Fan-out arrangement of the internal vias
2924/14252	. . . . .	Voltage converter	2924/15173	. . . . .	in a single layer of the multilayer substrate
2924/14253	. . . . .	Digital-to-analog converter [DAC]	2924/15174	. . . . .	in different layers of the multilayer substrate
2924/1426	. . . . .	Driver	2924/15182	. . . . .	Fan-in arrangement of the internal vias
2924/1427	. . . . .	Voltage regulator [VR]	2924/15183	. . . . .	in a single layer of the multilayer substrate
2924/143	. . . . .	Digital devices	2924/15184	. . . . .	in different layers of the multilayer substrate
2924/1431	. . . . .	Logic devices	2924/15192	. . . . .	Resurf arrangement of the internal vias
2924/1432	. . . . .	Central processing unit [CPU]	2924/152	. . .	Disposition
2924/1433	. . . . .	Application-specific integrated circuit [ASIC]	2924/153	. . .	Connection portion
2924/14335	. . . . .	Digital signal processor [DSP]			
2924/1434	. . . . .	Memory			
2924/1435	. . . . .	Random access memory [RAM]			

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- 2924/1531 . . . . the connection portion being formed only on the surface of the substrate opposite to the die mounting surface
- 2924/15311 . . . . . being a ball array, e.g. BGA
- 2924/15312 . . . . . being a pin array, e.g. PGA
- 2924/15313 . . . . . being a land array, e.g. LGA
- 2924/1532 . . . . the connection portion being formed on the die mounting surface of the substrate
- 2924/15321 . . . . . being a ball array, e.g. BGA
- 2924/15322 . . . . . being a pin array, e.g. PGA
- 2924/15323 . . . . . being a land array, e.g. LGA
- 2924/1533 . . . . . the connection portion being formed both on the die mounting surface of the substrate and outside the die mounting surface of the substrate
- 2924/15331 . . . . . being a ball array, e.g. BGA
- 2924/15332 . . . . . being a pin array, e.g. PGA
- 2924/15333 . . . . . being a land array, e.g. LGA
- 2924/156 . . . . Material
- 2924/157 . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2924/15701 . . . . . the principal constituent melting at a temperature of less than 400 C
- 2924/15717 . . . . . the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C
- 2924/15724 . . . . . Aluminium [Al] as principal constituent
- 2924/15738 . . . . . the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C
- 2924/15747 . . . . . Copper [Cu] as principal constituent
- 2924/1576 . . . . . Iron [Fe] as principal constituent
- 2924/15763 . . . . . the principal constituent melting at a temperature of greater than 1550 C
- 2924/15786 . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2924/15787 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides
- 2924/15788 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2924/1579 . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2924/15791 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2924/15793 . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2924/157](#) - [H01L 2924/15791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2924/15798 . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2924/161 . . . . Cap
- 2924/1611 . . . . Structure
- 2924/1615 . . . . Shape
- 2924/16151 . . . . . Cap comprising an aperture, e.g. for pressure control, encapsulation
- 2924/16152 . . . . . Cap comprising a cavity for hosting the device, e.g. U-shaped cap
- 2924/16153 . . . . . Cap enclosing a plurality of side-by-side cavities [e.g. E-shaped cap]
- 2924/1616 . . . . . Cavity shape
- 2924/1617 . . . . . Cavity coating
- 2924/16171 . . . . . Material
- 2924/16172 . . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2924/16173 . . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2924/16174 . . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides ([glass ceramics H01L 2224/16175](#))
- 2924/16175 . . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2924/16176 . . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2924/16177 . . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2924/16178 . . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2924/157](#) - [H01L 2924/15791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2924/16179 . . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2924/1619 . . . . . Cavity coating shape
- 2924/16195 . . . . . Flat cap [not enclosing an internal cavity]
- 2924/16196 . . . . . Cap forming a cavity, e.g. being a curved metal foil
- 2924/162 . . . . Disposition
- 2924/16235 . . . . . Connecting to a semiconductor or solid-state bodies, i.e. cap-to-chip
- 2924/16251 . . . . . Connecting to an item not being a semiconductor or solid-state body, e.g. cap-to-substrate
- 2924/1626 . . . . . Cap-in-cap assemblies
- 2924/1627 . . . . . stacked type assemblies, e.g. stacked multi-cavities
- 2924/163 . . . . Connection portion, e.g. seal
- 2924/1631 . . . . . Structure
- 2924/16315 . . . . . Shape
- 2924/1632 . . . . . Disposition
- 2924/164 . . . . . Material



- 2924/165 . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2924/16586 . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2924/16587 . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides
- 2924/16588 . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2924/1659 . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2924/16593 . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2924/157](#) - [H01L 2924/15791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2924/16598 . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2924/166 . . . Material
- 2924/167 . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2924/16701 . . . . the principal constituent melting at a temperature of less than 400 C
- 2924/16717 . . . . the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C
- 2924/16724 . . . . Aluminium [Al] as principal constituent
- 2924/16738 . . . . the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C
- 2924/16747 . . . . Copper [Cu] as principal constituent
- 2924/1676 . . . . Iron [Fe] as principal constituent
- 2924/16763 . . . . the principal constituent melting at a temperature of greater than 1550 C
- 2924/16786 . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2924/16787 . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides
- 2924/16788 . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2924/1679 . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2924/16791 . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2924/16793 . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2924/167](#) - [H01L 2924/16791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2924/16798 . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2924/171 . . . Frame
- 2924/1711 . . . Structure
- 2924/1715 . . . Shape
- 2924/17151 . . . . Frame comprising an aperture, e.g. for pressure control, encapsulation
- 2924/172 . . . Disposition
- 2924/173 . . . Connection portion, e.g. seal
- 2924/176 . . . Material
- 2924/177 . . . . with a principal constituent of the material being a metal or a metalloid, e.g. boron [B], silicon [Si], germanium [Ge], arsenic [As], antimony [Sb], tellurium [Te] and polonium [Po], and alloys thereof
- 2924/17701 . . . . the principal constituent melting at a temperature of less than 400 C
- 2924/17717 . . . . the principal constituent melting at a temperature of greater than or equal to 400 C and less than 950 C
- 2924/17724 . . . . Aluminium [Al] as principal constituent
- 2924/17738 . . . . the principal constituent melting at a temperature of greater than or equal to 950 C and less than 1550 C
- 2924/17747 . . . . Copper [Cu] as principal constituent
- 2924/1776 . . . . Iron [Fe] as principal constituent
- 2924/17763 . . . . the principal constituent melting at a temperature of greater than 1550 C
- 2924/17786 . . . . with a principal constituent of the material being a non metallic, non metalloid inorganic material
- 2924/17787 . . . . Ceramics, e.g. crystalline carbides, nitrides or oxides
- 2924/17788 . . . . Glasses, e.g. amorphous oxides, nitrides or fluorides
- 2924/1779 . . . . with a principal constituent of the material being a polymer, e.g. polyester, phenolic based polymer, epoxy
- 2924/17791 . . . . The principal constituent being an elastomer, e.g. silicones, isoprene, neoprene
- 2924/17793 . . . . with a principal constituent of the material being a solid not provided for in groups [H01L 2924/177](#) - [H01L 2924/17791](#), e.g. allotropes of carbon, fullerene, graphite, carbon-nanotubes, diamond
- 2924/17798 . . . . with a principal constituent of the material being a combination of two or more materials in the form of a matrix with a filler, i.e. being a hybrid material, e.g. segmented structures, foams
- 2924/181 . . . Encapsulation
- 2924/1811 . . . Structure
- 2924/1815 . . . Shape
- 2924/1816 . . . . Exposing the passive side of the semiconductor or solid-state body
- 2924/18161 . . . . of a flip chip
- 2924/18162 . . . . of a chip with build-up interconnect
- 2924/18165 . . . . of a wire bonded chip
- 2924/182 . . . Disposition
- 2924/183 . . . Connection portion, e.g. seal

2924/18301	. . . .	being an anchoring portion, i.e. mechanical interlocking between the encapsulation resin and another package part	2924/20201	. . .	Gamma radiation, i.e. wavelength less than 0.01 nm
2924/186	. . .	Material	2924/20202	. . .	X-ray radiation, i.e. wavelength 0.01 to 10 nm
2924/19	. . .	Details of hybrid assemblies other than the semiconductor or other solid state devices to be connected	2924/2021	. . .	Ultraviolet radiation
2924/1901	. .	Structure	2924/20211	. . . .	UV-C $100 \leq W < 280$ nm
2924/19011	. . .	including integrated passive components	2924/20212	. . . .	UV-B $280 \leq W < 315$ nm
2924/19015	. . .	including thin film passive components	2924/20213	. . . .	UV-A $315 \leq W < 400$ nm
2924/1902	. . .	including thick film passive components	2924/2024	. . .	Visible spectrum wavelength $390 \leq W < 700$ nm, i.e. 400-790 THz
2924/1903	. . .	including wave guides	2924/2026	. . .	Infrared radiation $700 \leq W < 3000$ nm
2924/19031	. . . .	being a strip line type	2924/20261	. . . .	IR-A $700 \leq W < 1400$ nm, i.e. 215 THz-430 THz
2924/19032	. . . .	being a microstrip line type	2924/20262	. . . .	IR-B $1400 \leq W < 3000$ nm, i.e. 100THz-215 THz
2924/19033	. . . .	being a coplanar line type	2924/20263	. . . .	IR-C $3000 \text{ nm} \leq W < 1 \text{ mm}$ , i.e. 300 GHz-100THz
2924/19038	. . . .	being a hybrid line type	2924/2027	. . .	Radio 1 mm - km 300 GHz - 3 Hz
2924/19039	. . . . .	impedance transition between different types of wave guides	2924/20271	. . . .	Microwave radiation 1 mm - 1 meter, i.e 300 GHz - 300 MHz
2924/1904	. . .	Component type	2924/203	. .	Ultrasonic frequency ranges, i.e. KHz
2924/19041	. . . .	being a capacitor	2924/20301	. . .	Ultrasonic frequency [f] $f < 25$ kHz
2924/19042	. . . .	being an inductor	2924/20302	. . .	Ultrasonic frequency [f] $25 \text{ KHz} \leq f < 50 \text{ KHz}$
2924/19043	. . . .	being a resistor	2924/20303	. . .	Ultrasonic frequency [f] $50 \text{ KHz} \leq f < 75 \text{ KHz}$
2924/1905	. .	Shape	2924/20304	. . .	Ultrasonic frequency [f] $75 \text{ KHz} \leq f < 100 \text{ KHz}$
2924/19051	. . .	Impedance matching structure [e.g. balun]	2924/20305	. . .	Ultrasonic frequency [f] $100 \text{ KHz} \leq f < 125 \text{ KHz}$
2924/191	. .	Disposition	2924/20306	. . .	Ultrasonic frequency [f] $125 \text{ KHz} \leq f < 150 \text{ KHz}$
2924/19101	. . .	of discrete passive components	2924/20307	. . .	Ultrasonic frequency [f] $150 \text{ KHz} \leq f < 175 \text{ KHz}$
2924/19102	. . . .	in a stacked assembly with the semiconductor or solid state device	2924/20308	. . .	Ultrasonic frequency [f] $175 \text{ KHz} \leq f < 200 \text{ KHz}$
2924/19103	. . . . .	interposed between the semiconductor or sold-state device and the die mounting substrate [i.e. chip-on-passive]	2924/20309	. . .	Ultrasonic frequency [f] $f \geq 200 \text{ KHz}$
2924/19104	. . . . .	on the semiconductor or sold-state device [i.e. passive-on-chip]	2924/206	. .	Length ranges
2924/19105	. . . .	in a side-by-side arrangement on a common die mounting substrate	2924/2064	. . .	larger or equal to 1 micron less than 100 microns
2924/19106	. . . .	in a mirrored arrangement on two different side of a common die mounting substrate	2924/20641	. . .	larger or equal to 100 microns less than 200 microns
2924/19107	. . . .	off-chip wires	2924/20642	. . .	larger or equal to 200 microns less than 300 microns
2924/20	. .	Parameters	2924/20643	. . .	larger or equal to 300 microns less than 400 microns
2924/201	. .	Temperature ranges	2924/20644	. . .	larger or equal to 400 microns less than 500 microns
2924/20101	. . .	Temperature range $T < 0 \text{ C}$ , $T < 273.15 \text{ K}$	2924/20645	. . .	larger or equal to 500 microns less than 600 microns
2924/20102	. . .	Temperature range $0 \text{ C} \leq T < 60 \text{ C}$ , $273.15 \text{ K} \leq T < 333.15 \text{ K}$	2924/20646	. . .	larger or equal to 600 microns less than 700 microns
2924/20103	. . .	Temperature range $60 \text{ C} \leq T < 100 \text{ C}$ , $333.15 \text{ K} \leq T < 373.15 \text{ K}$	2924/20647	. . .	larger or equal to 700 microns less than 800 microns
2924/20104	. . .	Temperature range $100 \text{ C} \leq T < 150 \text{ C}$ , $373.15 \text{ K} \leq T < 423.15 \text{ K}$	2924/20648	. . .	larger or equal to 800 microns less than 900 microns
2924/20105	. . .	Temperature range $150 \text{ C} \leq T < 200 \text{ C}$ , $423.15 \text{ K} \leq T < 473.15 \text{ K}$	2924/20649	. . .	larger or equal to 900 microns less than 1000 microns
2924/20106	. . .	Temperature range $200 \text{ C} \leq T < 250 \text{ C}$ , $473.15 \text{ K} \leq T < 523.15 \text{ K}$	2924/2065	. . .	larger or equal to 1000 microns less than 1500 microns
2924/20107	. . .	Temperature range $250 \text{ C} \leq T < 300 \text{ C}$ , $523.15 \text{ K} \leq T < 573.15 \text{ K}$	2924/20651	. . .	larger or equal to 1500 microns less than 2000 microns
2924/20108	. . .	Temperature range $300 \text{ C} \leq T < 350 \text{ C}$ , $573.15 \text{ K} \leq T < 623.15 \text{ K}$	2924/20652	. . .	larger or equal to 2000 microns less than 2500 microns
2924/20109	. . .	Temperature range $350 \text{ C} \leq T < 400 \text{ C}$ , $623.15 \text{ K} \leq T < 673.15 \text{ K}$	2924/20653	. . .	larger or equal to 2500 microns less than 3000 microns
2924/2011	. . .	Temperature range $400 \text{ C} \leq T < 450 \text{ C}$ , $673.15 \text{ K} \leq T < 723.15 \text{ K}$			
2924/20111	. . .	Temperature range $450 \text{ C} \leq T < 500 \text{ C}$ , $723.15 \text{ K} \leq T < 773.15 \text{ K}$			
2924/202	. .	Electromagnetic wavelength ranges [W]			

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- 2924/20654 . . . larger or equal to 3000 microns less than 4000 microns
- 2924/20655 . . . larger or equal to 4000 microns less than 5000 microns
- 2924/20656 . . . larger or equal to 5000 microns less than 6000 microns
- 2924/20657 . . . larger or equal to 6000 microns less than 7000 microns
- 2924/20658 . . . larger or equal to 7000 microns less than 8000 microns
- 2924/207 . . Diameter ranges
- 2924/2075 . . . larger or equal to 1 micron less than 10 microns
- 2924/20751 . . . larger or equal to 10 microns less than 20 microns
- 2924/20752 . . . larger or equal to 20 microns less than 30 microns
- 2924/20753 . . . larger or equal to 30 microns less than 40 microns
- 2924/20754 . . . larger or equal to 40 microns less than 50 microns
- 2924/20755 . . . larger or equal to 50 microns less than 60 microns
- 2924/20756 . . . larger or equal to 60 microns less than 70 microns
- 2924/20757 . . . larger or equal to 70 microns less than 80 microns
- 2924/20758 . . . larger or equal to 80 microns less than 90 microns
- 2924/20759 . . . larger or equal to 90 microns less than 100 microns
- 2924/2076 . . . equal to or larger than 100 microns
- 2924/30 . Technical effects
- 2924/301 . . Electrical effects
- 2924/30101 . . . Resistance
- 2924/30105 . . . Capacitance
- 2924/30107 . . . Inductance
- 2924/3011 . . . Impedance
- 2924/30111 . . . . matching
- 2924/302 . . . Electrostatic
- 2924/30201 . . . . Charge
- 2924/30205 . . . . Discharge
- 2924/3025 . . . Electromagnetic shielding
- 2924/35 . . Mechanical effects
- 2924/351 . . . Thermal stress
- 2924/3511 . . . . Warping
- 2924/3512 . . . . Cracking
- 2924/35121 . . . . . Peeling or delaminating
- 2924/36 . . Material effects
- 2924/364 . . . Polymers
- 2924/3641 . . . . Outgassing
- 2924/365 . . . Metallurgical effects
- 2924/3651 . . . . Formation of intermetallics
- 2924/36511 . . . . . Purple plague
- 2924/3656 . . . . Formation of Kirkendall voids
- 2924/37 . . Effects of the manufacturing process
- 2924/37001 . . . Yield
- 2924/37002 . . . Shelf life
- 2924/3701 . . . increased through put
- 2924/38 . . Effects and problems related to the device integration
- 2924/381 . . . Pitch distance
- 2924/384 . . . Bump effects
- 2924/3841 . . . . Solder bridging
- 2924/386 . . . Wire effects
- 2924/3861 . . . . Sag
- 2924/3862 . . . . Sweep
- 2924/40 . Details of apparatuses used for either manufacturing connectors or connecting the semiconductor or solid-state body
- 2924/401 . . LASER
- 2924/40101 . . . Mode
- 2924/40102 . . . . being pulsed
- 2924/40103 . . . . being continuous
- 2924/40105 . . . Beam details
- 2924/4015 . . . . Shape
- 2924/402 . . . Type
- 2924/40201 . . . . being a chemical
- 2924/40202 . . . . . Deuterium Fluoride [DF] LASER
- 2924/40203 . . . . . Hydrogen Fluoride [HF] LASER
- 2924/40207 . . . . . Dye laser
- 2924/4025 . . . . being a gas
- 2924/40251 . . . . . argon-ion LASER
- 2924/40252 . . . . . CO<sub>2</sub> LASER
- 2924/40253 . . . . . HeAg LASER
- 2924/40254 . . . . . HeNe LASER
- 2924/40255 . . . . . NeCu LASER
- 2924/403 . . . . being an Excimer
- 2924/40301 . . . . . ArF LASER
- 2924/40302 . . . . . F<sub>2</sub> LASER
- 2924/40303 . . . . . KrCl LASER
- 2924/40304 . . . . . KrF LASER
- 2924/40305 . . . . . XeCl LASER
- 2924/40306 . . . . . XeF LASER
- 2924/4035 . . . . being a fiber hosted LASER
- 2924/404 . . . . being a solid state
- 2924/40401 . . . . . Free electron LASER
- 2924/40402 . . . . . Photonic crystal LASER
- 2924/40403 . . . . . Fiber solid state LASER
- 2924/40404 . . . . . Yttrium Aluminium Garnet Nd:YAG LASER
- 2924/40405 . . . . . Yttrium Lithium Fluoride Nd:YLF LASER
- 2924/40406 . . . . . Ruby LASER
- 2924/40407 . . . . . Yb:YAG LASER
- 2924/405 . . . Wavelength
- 2924/40501 . . . . UV spectrum
- 2924/40502 . . . . Visible spectrum
- 2924/40503 . . . . IR spectrum
- 2933/00** **Details relating to devices covered by the group [H01L 33/00](#) but not provided for in its subgroups**
- 2933/0008 . Processes
- 2933/0016 . . relating to electrodes
- 2933/0025 . . relating to coatings
- 2933/0033 . . relating to semiconductor body packages
- 2933/0041 . . relating to wavelength conversion elements
- 2933/005 . . relating to encapsulations
- 2933/0058 . . relating to optical field-shaping elements
- 2933/0066 . . relating to arrangements for conducting electric current to or from the semiconductor body
- 2933/0075 . . relating to heat extraction or cooling elements
- 2933/0083 . Periodic patterns for optical field-shaping in or on the semiconductor body or semiconductor body package, e.g. photonic bandgap structures

## H01L

- 2933/0091 . Scattering means in or on the semiconductor body or semiconductor body package ([H01L 33/22](#) takes precedence)