

## H01G

### **CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES OR LIGHT-SENSITIVE DEVICES, OF THE ELECTROLYTIC TYPE (selection of specified materials as dielectric [H01B 3/00](#); [N: ceramics [C04B](#)])**

#### **Definition statement**

*This subclass/group covers:*

Passive two-terminal electrical components used to store energy in an electrical field, typically two electrical conductors, i.e. electrodes, separated by a dielectric or dielectric medium.

Non-electrolytic, fixed capacitors, per se, e.g. thin and thick film capacitors, details thereof, e.g. electrodes, dielectrics, housings and encapsulations, and structural combinations thereof with each other, e.g. stacked, multilayer, feed-through or anti-noise capacitors, or with electrolytic devices covered by this subclass, or with other electric elements not covered by this subclass where the structure consists mainly of a capacitor. Processes of manufacture thereof. [H01G 4/00](#).

Non-electrolytic, variable capacitors per se, in which the capacitance is varied by mechanical means, e.g. using variation of effective area of electrode, using variation of distance between electrodes, e.g. capacitors making use of micro-electromechanical systems (MEMS), or using multiple capacitors. Details thereof, and structural combinations thereof with each other, with electrolytic devices covered by this subclass, or with other electric elements not covered by this subclass where the structure consists mainly of a capacitor. Processes of manufacture thereof. [H01G 5/00](#).

Non-electrolytic, variable capacitors per se, in which the capacitance is varied by non-mechanical means, e.g. electrets, ferroelectric capacitors. Details thereof, and structural combinations thereof with each other, with electrolytic devices covered by this subclass, or with other electric elements not covered by this subclass where the structure consists mainly of a capacitor. Processes of manufacture thereof. [H01G 7/00](#).

Electrolytic capacitors per se, e.g. liquid, solid, electric double layer, hybrid or redox capacitors, details thereof, e.g. terminals, electrolytes, electrodes, housings, and processes of manufacture thereof. Electrolytic rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices per se, and details thereof. Structural combinations thereof with each other, with non-electrolytic capacitors or with other electric components not covered by this subclass. Processes of manufacture thereof. [H01G 9/00](#).

Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in other main groups of this subclass. [H01G 13/00](#).

Structural combinations of capacitors or other devices covered by at least two

different main groups of this subclass with each other. [H01G 15/00](#).

Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with other electric elements, not covered by this subclass, e.g. RC combinations. [H01G 17/00](#). Details common to two or more main types of devices covered by this subclass, e.g. special adaptation for mounting; cooling, heating and ventilating arrangements; housings, encapsulations and protection or prevention arrangements. [H01G 2/00](#).

## References relevant to classification in this subclass

*This subclass/group does not cover:*

Selection of specified materials as dielectric	<a href="#">H01B 3/00</a>
Capacitors with potential-jump or surface barrier	<a href="#">H01L 29/92</a> , <a href="#">H01L 51/05</a> .
Electret transducers	<a href="#">H04R 19/00</a>
Impedance networks utilizing capacitors, e.g. filters and circuitry thereof	<a href="#">H03H</a>

*Examples of places where the subject matter of this subclass is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:*

Capacitive deionisation for electrochemical separation	<a href="#">C02F 1/4691</a>
Indicating or measuring liquid level, or level of fluent solid material by measuring variations of capacity of capacitors	<a href="#">G01F 23/26</a>
Measuring temperature using capacitive elements	<a href="#">G01K 7/34</a>
Thin- or thick-film integrated circuits; Capacitors as components of an integrated circuit, e.g. stacked capacitors in DRAMs	<a href="#">H01L 27/00</a>
Thin-film capacitors for integrated circuits; corresponding multi-step	<a href="#">H01L 28/40</a>

manufacturing processes	
Thin- or thick-film solid state devices	<a href="#">H01L 49/02</a>
Printed circuits incorporating printed capacitors	<a href="#">H05K 1/16</a>

## Informative references

*Attention is drawn to the following places, which may be of interest for search:*

Powder metallurgy	<a href="#">B22F</a>
Layered products	<a href="#">B32B</a>
Micro-mechanical devices, comprising flexible or deformable elements	<a href="#">B81B 3/00</a>
Active carbon	<a href="#">C01B 31/08</a>
Compositions of ceramic materials	<a href="#">C04B 35/00</a>
Polymeric films or sheets	<a href="#">C08J 5/18</a>
Electrolytic coating by surface reaction, i.e. forming conversion layers	<a href="#">C25D 11/00-C25D 11/38</a>
Measuring force or stress by measuring variations in capacitance	<a href="#">G01L 1/14</a>
Measuring steady or quasi-steady pressure of a fluid or a fluent solid material by making use of variations in capacitance	<a href="#">G01L 9/12</a>
Investigating or analyzing material by investigating capacitance	<a href="#">G01N 27/22</a>
Measuring capacitance; Measuring dielectric constants	<a href="#">G01R 27/26</a>
Variable capacitance devices operated as switches	<a href="#">H01H 1/00</a>

Casings for electrical apparatus in general	<a href="#">H05K 5/00</a>
Batteries and fuel cells	<a href="#">H01M</a>
Circuit arrangements for charging or depolarising batteries or for supplying loads from batteries	<a href="#">H02J 7/00</a>

### Special rules of classification within this subclass

Processes of manufacture specially adapted for manufacturing capacitors, e.g. parts thereof. e.g. dielectrics, electrodes, etc are covered by the corresponding product subgroups.

The following exceptions apply:

- Solid inorganic dielectrics vapour deposited are covered by [H01G 4/08](#).
- Formation of the dielectric layer is covered by [H01G 9/0032](#).
- Formation of a solid electrolyte layer is covered by [H01G 9/0036](#).

### Glossary of terms

*In this subclass/group, the following terms (or expressions) are used with the meaning indicated:*

Collector	a conductive component in intimate contact with an electrode material in an electrolytic or electric double layer capacitor
Electrolyte	an ionic conducting liquid or solid either comprised in one of the electrodes, typically the cathode, of an electrolytic capacitor or ensuring electric conduction between electrode active parts or electric double layers therein in Electric Double Layer Capacitors

### Synonyms and Keywords

*In patent documents the following abbreviations are often used:*

MLCC	Multilayer Ceramic Capacitor
EDLC	Electric Double Layer Capacitor

*In patent documents the following expressions/words are often used as synonyms:*

*In patent documents the following expressions/words "capacitor" and "condenser" are often used as synonyms.*

*In patent documents the following expressions/words "supercapacitor", "ultracapacitor", "electrochemical capacitor" and "electric double layer capacitor" are often used as synonyms.*

*In patent documents the following expressions/words "multilayer capacitor" and "stacked capacitor" are often used as synonyms.*

## **H01G 2/00**

**Details of capacitors not covered by a single one of groups [H01G 4/00-H01G 11/00](#)**

## **H01G 4/00**

**Fixed capacitors; Processes of their manufacture (electrolytic capacitors [H01G 9/00](#) )**

## **H01G 5/00**

**Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture**

## **H01G 7/00**

**Capacitors in which the capacitance is varied by non-mechanical means; Processes of their manufacture (capacitors with potential jump or surface barrier [H01L 29/00](#) )**

## **H01G 9/00**

**Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture**

## **H01G 9/20**

## Light-sensitive devices

### Definition statement

*This subclass/group covers:*

Photoelectrochemical cells based on junctions between an inorganic semiconductor and an electrolyte

Photoelectrochemical cells based on a dye dissolved in the electrolyte or adsorbed on an electrode

### References relevant to classification in this group

*This subclass/group does not cover:*

Photo electrochemical storage cells	<a href="#">H01M 14/005</a>
Solid state light sensitive devices using an organic semiconductor as the active part	<a href="#">H01L 51/42</a>
Solid state light sensitive devices using an inorganic semiconductor as the active part	<a href="#">H01L 31/00</a>

### Special rules of classification within this group

In this group, documents are classified according to the ECLA Reform approach, i.e. "invention information" is identified with ECLA classification symbols, e.g. [H01G 9/2031](#), while "additional information" is identified with Indexing Code symbols, e.g. [H01G 9/2059](#).

In this subclass, Indexing Codes are mainly attributed with a view to allow retrieval of documents comprising a combination of technical characteristics, some of them being unimportant per se, and, hence, identified with an Indexing Code symbol rather than with the corresponding ECLA onepotential-jump barrier or surface barrier.

### Synonyms and Keywords

DSSC	dye sensitized solar cell
PEC	photo electrochemical cell

## H01G 9/2004

[N: characterised by the electrolyte, e.g. comprising an organic electrolyte]

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Accumulators with non-aqueous electrolyte	<a href="#">H01M 10/05</a>
Primary cells with non-aqueous electrolyte	<a href="#">H01M 6/14</a>

## H01G 9/2027

[N: comprising an oxide semiconductor electrode]

### Definition statement

*This subclass/group covers:*

Photo electrochemical cells having an oxide semiconductor as working electrode or having oxide semiconductor particles dispersed in the electrolyte;

examples of oxide semiconductors are: zinc oxide [ZnO], tungsten trioxide [WO<sub>3</sub>], copper oxide [CuO], niobium pent oxide [Nb<sub>2</sub>O<sub>5</sub>]

### Informative references

Attention is drawn to the following places, which may be of interest for search:

Zinc oxides	<a href="#">C01G 9/02</a>
Tungsten oxides	<a href="#">C01G 41/02</a>

## H01G 9/2031

[N: comprising titanium oxide, e.g. TiO<sub>2</sub>] ([H01G 9/2036](#) takes precedence)]

### Definition statement

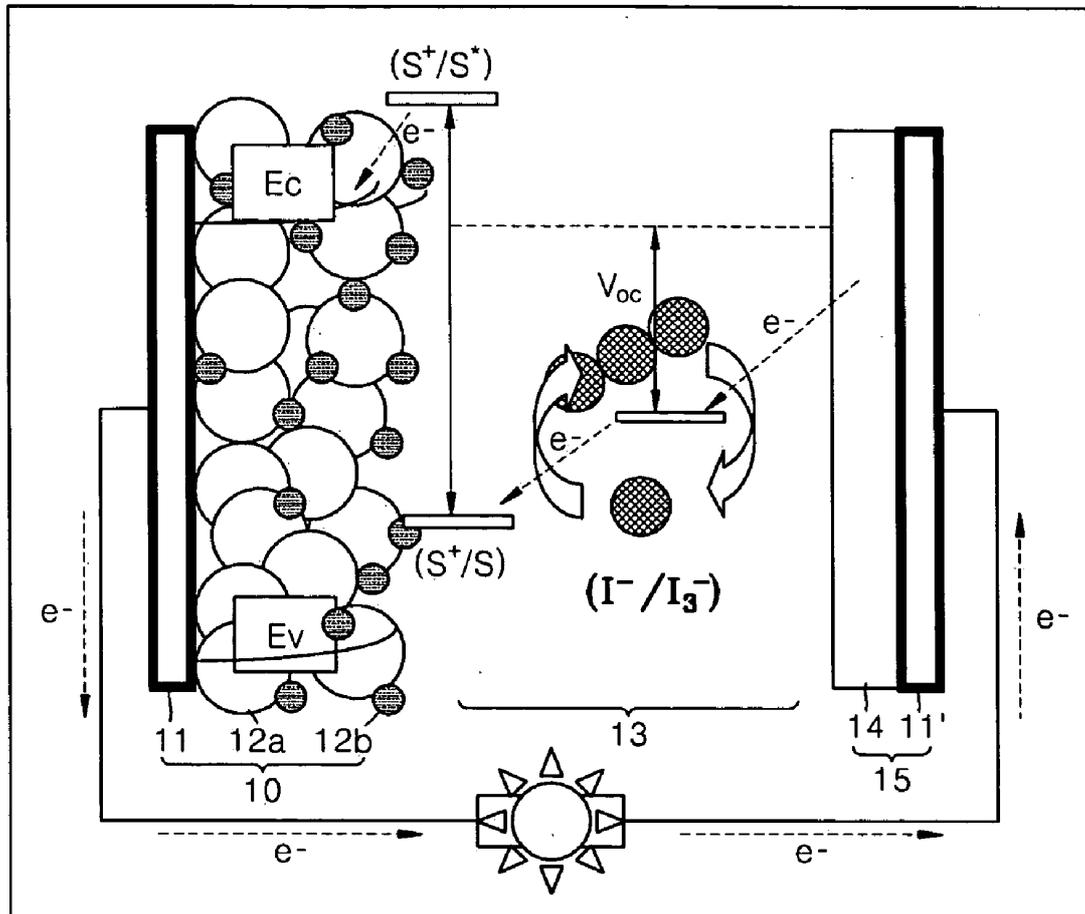
*This subclass/group covers:*

Dye sensitized solar cells; the sensitizer may be a dye (organic) or an

inorganic pigment, e.g. PbSe nano particles.

Working principle of a dye sensitized solar cell

Illustrative example of subject matter classified in this group.



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### Informative references

Attention is drawn to the following places, which may be of interest for search:

Titanium oxides	<a href="#">C01G 23/04</a>
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### H01G 9/2054

[N: comprising a semiconductor electrode comprising All-BVI compounds, e.g. CdTe, CdSe, ZnTe, ZnSe, with or without impurities, e.g. doping materials] ([H01G 9/2027](#) takes precedence)]

## References relevant to classification in this group

*This subclass/group does not cover:*

Light sensitive devices comprising an oxide semiconductor electrode	<a href="#">H01G 9/2027</a>
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## H01G 9/2068

**[N: Panels or arrays of photoelectrochemical cells, e.g. photovoltaic modules based on photoelectrochemical cells]**

### Definition statement

*This subclass/group covers:*

- Serial interconnection of photoelectrochemical cells;
- sealing of photoelectrochemical cells;
- dye sensitized solar cells in form of a fibre;
- special provisions for filling the photoelectrochemical cell with the electrolyte or dyeing solution.

## H01G 11/00

**Hybrid capacitors, i.e. capacitors having different positive and negative electrodes; Electric double-layer [EDL] capacitors [EDLCs]; Processes specially adapted for the manufacture thereof or of parts thereof**

## H01G 13/00

**Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in groups [H01G 4/00](#) to [H01G 11/00](#)**

## H01G 15/00

**Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with each other (involving at least one hybrid or EDL capacitor as main component [H01G 11/08](#) )**

## H01G 17/00

**Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with other electric elements, not covered by this subclass, e.g. RC combinations (thin- or thick-film circuits [H01L 27/00](#) ; RC-filters [H03H](#))**