

vertical incline and onto the base at a location above the supply bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428.15, for a process of coating a base utilizing a roller applicator supplied with coating material by a transfer roller and using a doctor or roller for distributing coating material on the roller applicator but without opposed, counter, or reverse surface movement at contact between the roller applicator and the base.

428.2, for a process of coating a base utilizing a roller applicator in direct contact with a coating material supply bath but without opposed, counter, or reverse surface movement at contact between the roller applicator and the base and without using a doctor or roller for distributing coating material on the roller applicator.

428.13 And roller end dams used:

This subclass is indented under subclass 428.01. Process which includes use of barriers to inhibit flow of coating material from ends of a roller.

- (1) Note. End dams help to result in a more uniform coating on the base by restraining bulking, dripping, or splattering of coating material at ends of a roller (e.g., to prevent excess deposition of coating on the base at points of contact with the edges of the roller applicator, etc.).

428.14 And doctor or roller used to distribute coating material on roller applicator:

This subclass is indented under subclass 428.01. Process which includes use of a doctor or roller to spread coating material on the roller applicator.

- (1) Note. This subclass and the subclasses indented hereunder are intended to provide for use of a solid member (e.g., doctor blade, doctor roller, etc.) to control distribution (e.g., thickness, uniformity, etc.) of coating material on the roller applicator prior to contact with the base. The intended result is usually to form a more uniform coating on the base.

428.15 And using transfer roller to feed coating material to roller applicator:

This subclass is indented under subclass 428.14. Process which includes use of an additional roller adjacent to the roller applicator which transfers coating material from a supply to the roller applicator.

- (1) Note. This subclass is intended to provide for use of a battery of rollers to transfer coating material from a supply bath over plural transfer rollers onto the roller applicator and then onto the base. This arrangement allows transfer of coating material from a supply bath up a vertical incline and onto the base at a location above the supply bath.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428.12, for a process of coating a base utilizing a roller applicator supplied with coating material by a transfer roller with opposed, counter, or reverse surface movement at contact between the roller applicator and the base.

428.2, for a process of coating a base utilizing a roller applicator in direct contact with a coating material supply bath but without opposed, counter, or reverse surface movement at contact between the roller applicator and the base and without using a doctor or roller for distributing coating material on the roller applicator.

428.16 And guiding base to follow surface curvature of roller applicator:

This subclass is indented under subclass 428.14. Process which includes directing the base to follow the surface curvature of the roller applicator.

- (1) Note. This subclass is intended to provide for use of sliding or rolling contact of two or more backup-style members to bend a flexible base to follow an obvious portion of curvature of the roller applicator (e.g., to increase the surface contact between the roller applicator and the base during coating, etc.).

428.17 Including using roller backup support for base:

This subclass is indented under subclass 428.14. Process which includes use of an additional roller as backup to support the base.

- (1) Note. The roller applicator and additional backup roller are usually positioned adjacent to each other on either side of the base to hold the base in moving contact with both rollers while inhibiting unwanted displacement of the base by the roller applicator. Additional rollers may also be used during coating as long as the two required by this definition are positioned and used as described above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428.1, for a process of coating a base utilizing a roller applicator and a roller backup support for the base, including using a resilient (e.g., rubber, etc.) surface roller with or without a doctor or roller for distributing coating material on the roller applicator.

428.21, for a process of coating a base utilizing a roller applicator and a roller backup support for the base but without using a doctor or roller for distributing coating material on the roller applicator and without including a resilient (e.g., rubber, etc.) surface roller.

428.18 Including using force to supply coating material to roller applicator:

This subclass is indented under subclass 428.01. Process which includes use of force to supply the coating material to the roller applicator.

- (1) Note. This subclass and the subclass indented hereunder are intended to include application of force to project or distribute the coating material toward the roller applicator prior to contact with the base (e.g., spraying the roller applicator without directly spraying the base, etc.). See the See or Search This Class, Subclass note shown below for a process of coating a base by forced projection of

coating material toward the base (i.e., spraying).

SEE OR SEARCH THIS CLASS, SUBCLASS:

421.1 through 427.7, for a process of spraying a base in which coating material is projected by mechanical force toward the base.

428.19 Through nozzle or projector:

This subclass is indented under subclass 428.18. Process in which the coating material is forced through a nozzle or projector.

SEE OR SEARCH THIS CLASS, SUBCLASS:

421.1 through 427.7, for a process of coating a base in which coating material is projected by mechanical force toward the base.

428.2 Direct contact of roller applicator with coating material supply bath used:

This subclass is indented under subclass 428.01. Process in which the roller applicator is brought into direct contact with a coating material supply bath.

- (1) Note. This subclass is intended to include partial immersion of the roller applicator in a coating material supply bath for direct contact supply of coating material to the roller applicator before coating the base by the roller applicator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428.12, for a process of coating a base utilizing a roller applicator combined with a transfer roller to feed coating material to the roller applicator and involving opposed, counter, or reverse surface movement at contact between the roller applicator and the base.

428.15, for a process of coating a base utilizing a roller applicator combined with a transfer roller to feed coating material to the roller applicator and using a doctor or roller to distribute coating material on the roller applicator.

428.21 Including using roller backup support for base:

This subclass is indented under subclass 428.01. Process which includes use of an additional roller as backup to support the base.

- (1) Note. The roller applicator and additional backup roller are usually positioned adjacent to each other on either side of the base to hold the base in moving contact with both rollers while inhibiting unwanted displacement of the base by the roller applicator. Additional rollers may also be used during coating as long as the two required by this definition are positioned and used as described above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

428.1, for a process of coating a base utilizing a roller applicator, a roller backup support for the base, and including a resilient (e.g., rubber, etc.) surface roller with or without using a doctor or roller for distributing coating material on the roller applicator.

428.17, for a process of coating a base utilizing a roller applicator, a roller backup support for the base, and a doctor or roller for distributing coating material on the roller applicator but without including a resilient (e.g., rubber, etc.) surface roller.

429 This subclass is indented under the class definition. Processes wherein the coating member comprises (1) bristles secured to a support or (2) a member capable of soaking up coating material.

- (1) Note. Absorbent applicators include wicks, webs, sponges, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

260, for applying a nonuniform coating with a brush or absorbent applicator.

368, for a coating process which includes brushing the coating after it has been applied to the base.

430.1 IMMERSION OR PARTIAL IMMERSION:

This subclass is indented under the class definition. Processes wherein the coating is applied by submerging at least a portion of the base in a pool of coating material.

- (1) Note. Reference to the use of a "bath" coating process is considered immersion.

SEE OR SEARCH THIS CLASS, SUBCLASS:

169, for coating a glass base by immersion to produce an optical element.

185, for coating an article with particles by immersing it in a fluidized bed of particles.

431 This subclass is indented under subclass 430.1. Processes wherein the coating bath contains molten metal or a fused metallic compound.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 939 for a metallic composite made by a process of this subclass.

432 This subclass is indented under subclass 431. Processes wherein an inert gas or a nonoxidizing atmosphere is employed adjacent the coating bath.

433 This subclass is indented under subclass 431. Processes wherein the coating contains lead, zinc, or tin in elemental form.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclasses 643+, 645, 646, and 658+ for metallic composites in which a component has a tin, lead, or zinc base.

434.2 Running lengths:

This subclass is indented under subclass 430.1. Processes wherein the base is a piece of material handled at points intermediate its ends whereby the length is immaterial to the manner of handling.

434.3 Coating applied at surface of bath only:

This subclass is indented under subclass 434.2. Processes wherein only the surface of the bath is utilized to coat the base.

- (1) Note. This subclass provides for floating the base on the surface of the coating material to be applied, etc.

434.4 Base treated by solid member in bath (e.g., scraped, squeezed, etc.):

This subclass is indented under subclass 434.2. Processes wherein the base being coated is contacted and actively treated by a solid member while immersed or partially immersed in the coating bath.

- (1) Note. For classification here the base must specifically be treated (e.g., squeezed, scraped, etc.) and not merely conveyed by a contacting member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

335+, for processes wherein the treating member contacts the coated base after removal from the immersion bath.

434.5 Coating material moved (e.g., agitated, circulated, etc.):

This subclass is indented under subclass 434.2. Processes wherein the coating material is caused to move in a defined manner during the coating operation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

345, for treatment of the coating material after it leaves the coating bath.

434.6 Cord, thread, yarn, wire, or rod:

This subclass is indented under subclass 434.2. Processes wherein the running length is in the form of a wire, rod, filament, cord, or strand.

434.7 Extending through bath-containing wall:

This subclass is indented under subclass 434.6. Processes wherein the running length being coated enters the immersion bath directly through an opening in a wall of the container, which opening is below the surface of the bath.

435 This subclass is indented under subclass 430.1. Processes wherein the base is metal in elemental form.

436 This subclass is indented under subclass 435. Processes wherein a coating which contains metal in elemental form is applied.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclasses 615+ for a metallic composite defined in terms of the compositions of its components.

437 This subclass is indented under subclass 436. Processes which include utilizing a reducing agent which is a chemical compound.

- (1) Note. Usually the bath contains a metallic compound which is reduced to deposit a metal coating on the immersed base.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96.9, for a process of coating both sides of a substrate to make an integrated or printed circuit or circuit board (excluding processes where all coating is by immersion)(e.g., electroless plating of one side of a circuit board followed by spraying both sides, etc.).

97.9 through 98.1, for substrate hole wall coating by immersion metal plating from solution with pretreatment of the substrate to produce an integrated or printed circuit or circuit board.

99.5, for other immersion metal plating to produce an integrated or printed circuit or circuit board.

304+, for an electroless deposition process which includes pretreating the base.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, subclass 936 for a metallic composite made by a process of this subclass.

438 This subclass is indented under subclass 437. Processes wherein the coating is free nickel.

- 439 This subclass is indented under subclass 430.1. Processes wherein the base is a carbohydrate material derived from the structural matter of plant life.
- 440 This subclass is indented under subclass 439. Processes wherein the base material is derived from the trunks or branches of trees or bushes.
- (1) Note. Wood particles or fibers which have been chemically changed, e.g., regenerated cellulose etc., or water layed to form a paper, are not considered to be wood.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
291, for injecting coating material into wood wherein a hole is made in the wood base.
- 441 This subclass is indented under subclass 440. Processes wherein the coating contains creosote, wax, oil, asphalt, pitch, tar, or bitumen.
- (1) Note. Included herein are any heavy oil or tar like material with properties similar to those materials specifically set out.
- 442 This subclass is indented under subclass 439. Processes wherein the coating contains creosote, wax, oil, asphalt, pitch, tar, or bitumen.
- (1) Note. Included herein are any heavy oil or tar like material with properties similar to those materials specifically set out.
- 443 This subclass is indented under subclass 430.1. Processes wherein the coating contains creosote, wax, oil, asphalt, pitch, tar, or bitumen.
- (1) Note. Included herein are any heavy oil or tar like material with properties similar to those materials specifically set out.
- 443.1 Chemical compound reducing agent utilized (i.e., electroless deposition):**
This subclass is indented under subclass 430.1. Processes which includes utilizing a reducing agent which is a chemical compound.
- (1) Note. Usually the bath contains a metallic compound which is reduced to deposit a metal coating on the immersed base.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
96.9, for a process of coating both sides of a substrate to make an integrated or printed circuit or circuit board (excluding processes where all coating is by immersion) (e.g., electroless plating of one side of a circuit board followed by spraying both sides, etc.).
97.9, and 98.1, for substrate hole wall coating by immersion metal plating from solution with pretreatment of the substrate to produce an integrated or printed circuit or circuit board.
99.5, for other immersion metal plating to produce an integrated or printed circuit or circuit board.
304+, for an electroless deposition process which includes pretreating the base.
437, for an electroless deposition process wherein the base comprises free metal.
- 443.2 Inorganic base:**
This subclass is indented under subclass 430.1. Processes wherein the base comprises inorganic material.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
435+, for similar processes wherein the base comprises free metal.
- 444** This subclass is indented under the class definition. Processes for treating a base in preparation for coating it or treating an applied coating, wherein a coating step is not claimed and wherein the process is not provided for in another class.
- SEE OR SEARCH CLASS:
8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclasses 137+, and see the notes thereto for certain cleaning process.
510, Cleaning Compositions for Solid Surfaces, Auxiliary Compositions Therefor, or Processes of Preparing the Compositions, for mere methods of use of such compositions claimed

along with the cleaning composition, per se.

445 This subclass is indented under the class definition. Processes not provided for in any other subclass.

- (1) Note. Patents which contain claims to significant coating processes for this class, are placed in the appropriate subclasses above based on total disclosure if the claimed disclosure is not provided for in one of the above subclasses.

446 **SPRAY COATING UTILIZING FLAME OR PLASMA HEAT (E.G., FLAME SPRAYING, ETC.):**

This subclass is indented under the class definition. Processes wherein (1) a gaseous flame is used to heat and project a coating material toward a substrate or (2) a coating material is converted to or engulfed by a highly ionized gas composed of ions, electrons and neutral particles in which the positive ions and negative electrons are roughly equal in number, and projected on to a substrate

- (1) Note. Torch spraying is considered a form of flame spraying and is included in this and indented subclasses.
- (2) Note. Electric arc metal spraying is properly classified in this and indented subclasses.
- (3) Note. Explosive or detonation spray vaporization, wherein the vaporized coating is applied in the form of a spray is properly classified in this and indented subclasses.
- (4) Note. Thermal spraying is properly classified in this and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

596, for coating processes utilizing laser heat transfer, which are often referred to as explosive vaporization.

SEE OR SEARCH CLASS:

204, Chemistry: Electrical and Wave Energy, subclass 192.38 for vacuum arc discharge coating, utilizing pro-

cesses for the deposition of a coating onto a substrate within a vacuum environment by the action of an arc discharge between an anode and a cathode wherein the source material is the cathode, per se, or the source material is on the cathode.

219, Electric Heating, particularly subclasses 73.11, 73.21, and 76.1+ for coating operations that involve a buildup of metal coating on a metal workpiece and wherein an arc between an electrode and the work is utilized.

447 **Organic containing coating:**

This subclass is indented under subclass 446. Processes wherein the coating material applied has organic material in its composition.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."

448 **Nonuniform or patterned coating:**

This subclass is indented under subclass 446. Processes wherein the coating is applied (1) to only selected portions of a base (2) in such a manner as to produce uneven, discontinuous or nonuniform thickness or (3) so that it varies from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

256+, for nonuniform coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.

466+, for nonuniform or patterned coating processes utilizing electrostatic charge, field, or force.

504, for processes to polymerize an applied nonuniform or patterned coating utilizing high energy electromagnetic radiation or high energy particles.

510, for processes to polymerize an applied nonuniform or patterned coating utilizing low energy electromagnetic radiation.

526, for nonuniform or patterned coating processes utilizing ion plating or ion implantation.

- 552, for nonuniform or patterned coating processes involving pretreating a substrate or posttreating a coated substrate utilizing high energy electromagnetic radiation.
- 555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment of a substrate or a thermal posttreatment of a coated substrate.
- SEE OR SEARCH CLASS:
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for radiation imagery involving coating using electric or magnetic energy.
- 449 Continuous feed solid coating material (e.g., wire, rod, or filament, etc.):**
This subclass is indented under subclass 446. Processes wherein the coating material fed to the flame or plasma is in the form of long, continuous, slender, solid matter.
- (1) Note. Generally the coating material is in the form of a wire, rod, or filament.
- 450 Inorganic carbon containing coating, not as steel (e.g., carbide, etc.):**
This subclass is indented under subclass 446. Processes wherein the coating material, excluding steel, contains inorganic carbon.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."
- (2) Note. Metal compounds, excluding steel, containing more than 1.7 percent of inorganic carbon are properly classified in this subclass.
- (3) Note. Plasma or flame spraying processes utilizing inorganic carbon containing material to form diamondlike films are found here.
- SEE OR SEARCH CLASS:
- 117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, subclass 79 for processes for growing therein defined single-crystal of diamond and subclass 929 for the art collection of carbon single-crystal references. Class 423, subclass 446, is a mandatory search and cross-reference for patents directed to forming a free-standing single-crystal diamond even though properly placed in Class 117 as an original.
- 423, Chemistry of Inorganic Compounds, subclass 446, for diamonds and methods of making, which does not result in a coated product.
- 451 Additionally containing nickel, cobalt, or iron as free metal or alloy:**
This subclass is indented under subclass 450. Processes wherein the inorganic carbon containing coating also contains nickel, cobalt, or iron as an alloy or free metal.
- 452 Silicon containing coating:**
This subclass is indented under subclass 446. Processes wherein the coating material applied contains silicon.
- 453 Metal oxide containing coating:**
This subclass is indented under subclass 446. Processes wherein the coating material applied contains metal oxide.
- (1) Note. For classification purposes in this subclass, ceramic is considered metal oxide.
- 454 Superposed diverse or multilayer similar coatings applied:**
This subclass is indented under subclass 453. Processes which include sequentially applying a plurality of dissimilar coating materials in superposed relationship on a substrate or applying a plurality of layers of similar coating materials in superposed relationship on a substrate or previously coated substrate.
- 455 Metal or metal alloy coating:**
This subclass is indented under subclass 446. Processes wherein the coating material is composed of pure metal or metal alloy.
- (1) Note. Metals and metal alloys containing less than one percent carbon are properly classified in this and indented subclasses.

456 Aluminum, nickel, cobalt, or iron metal or alloy containing coating:

This subclass is indented under subclass 455. Processes wherein the metal or metal alloy coating contains aluminum, nickel, cobalt, or iron.

457 DIRECT APPLICATION OF ELECTRICAL, MAGNETIC, WAVE, OR PARTICULATE ENERGY:

This subclass is indented under the class definition. Processes wherein a substrate, coated substrate or coating material is treated at any stage in a coating process with electrical, magnetic, particulate, or electromagnetic wave energy or heat produced therefrom.

- (1) Note. The energy employed must be applied directly to the substrate, the coated substrate or the coating material as part of the total coating process (including pretreatment or post-treatment).
- (2) Note. Where the electrical energy is not applied directly to the base or coating, but is used to generate heat energy that is transferred to the base before, during, or after the coating operation, see other subclasses of this class or other appropriate heating or heat treatment classes.
- (3) Note. Utilization of radiant heat or infrared energy to vaporize the coating material in a vapor deposition process is not basis for classification in this and indented subclasses.
- (4) Note. The wave energy applied to the work may be light, sonic, supersonic, ultrasonic, gamma rays, infrared rays, X-rays, etc. Particulate energy includes charged particles and atomic emissions, such as alpha rays, beta rays, and neutrons.
- (5) Note. The mere sprinkling of particles is not considered coating for these and indented subclasses. There has to be some attractive or adhesive force between the base and the particles that would tend to hold said particles fixed to the base.

- (6) Note. This and indented subclasses are proper for processes involving coating utilizing the combination of neutral and charged particles.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1, 2.1+, 4, 5+, 7, 8+, and 11 for subject matter of this and indented subclasses (457+) when also meeting the subclass definitions therein.
- 8+, for processes wherein the electrical, magnetic, wave, or particulate energy is used for measuring, testing, or indicating.
- 248.1, for coating processes utilizing molecular beam, also for processes utilizing radiant heat or infrared energy to vaporize the coating material in a vapor deposition process.

SEE OR SEARCH CLASS:

- 8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclass 444 for dyeing processes utilizing wave energy; and subclass 103 for bleaching processes involving the use of corona irradiation.
- 34, Drying and Gas or Vapor Contact With Solids, subclasses 245+ and 266+ for processes involving the use of corona radiation.
- 99, Foods and Beverages: Apparatus, subclasses 358 and 451 for apparatus for subjecting foods and beverages to wave, radiant, and electrical energy.
- 117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, for processes for growing therein-defined single-crystal of all types of materials, including inorganic or organic, and by all techniques, especially subclasses 84+ for vapor or gas phase epitaxy.
- 128, Surgery, for electrical or wave energy treatment of the living human body and apparatus specialized therefor.
- 148, Metal Treatment, for coating a metal base combined with a Class 148 treatment of the base (e.g., annealing, microstructure change, etc.) Class 427 is proper for simultaneous ion implan-

- tation and diffusion. However, inclusion of a separate step which by itself would be classifiable in Class 148 is enough to place the combination in Class 148. See subclass 239 for ion implantation with a subsequent Class 148 treatment. If diffusion is involved in a coating operation involving metal, and the diffusion involves the microstructure of the metal (i.e., other than reactive coating operations) the original will be placed in Class 427 if the specified diffusion occurs during the coating step. However, if there is a heat treatment step independent of the coating step, which causes diffusion to affect the microstructure of the metal the original goes to Class 148.
- 204, Chemistry: Electrical and Wave Energy, subclasses 155+, 157.15+, and 164+ for processes wherein electrical or wave energy is used to effect chemical reaction. Treating a substrate or a coated substrate by electrical discharge, electrostatic charge, field, or force, lacking a coating step of externally supplied coating material is provided for in Class 204, subclasses 164+. However, if there is a coating step present, supplying an external source of coating material (i.e., complete or in part) placement is proper in Class 427 even if there is a post treatment operation involving electrical discharge, electrostatic charge, field, or force. See subclasses 192.1+ for methods specialized for coating or forming objects within a gaseous medium by the action of cathode sputtering. Subclasses 450+ provide for electrophoretic or electro-osmotic processes, in general; and subclasses 471+ provide for electrophoretic or electro-osmotic coating or forming of an object.
- 205, Electrolysis: Processes, Compositions Used Therein, and Methods of Preparing the Compositions, subclasses 80+ for electrolytic coating processes and subclasses 183+, 188+, 191+, and 198+ for processes involving plural coating steps, at least one but not all of which is electrolytic. Combinations of preparatory electro-lytic processes, other than coating, with processes of coating falling within the scope of Class 427 are classified in Class 427. A patent with a claim to a coating process classifiable in Class 427 and a claim to a coating process classifiable in Class 205 will be placed as an original in Class 427 and cross-referenced to Class 205.
- 219, Electric Heating, subclasses 600+ for induction, electrostatic, or electromagnetic wave energy for heating, per se, employing this energy.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 3 for electrostatically charging material in order to obtain a desired spray, wherein the intent is not to coat.
- 250, Radiant Energy, all noncoating methods and apparatus for using, generating, controlling, or detecting radiant energy, particularly subclasses 492.1+ for methods of irradiation, per se, of a material with ions.
- 376, Induced Nuclear Reactions: Processes, Systems, and Elements, subclasses 103+ for patents directed to processes involving induced nuclear reactions and structures which implement such processes.
- 378, X-Ray or Gamma Ray Systems or Devices, subclasses 28+ for xeroradiography.
- 399, Electrophotography, subclass 57 for liquid control developing, subclasses 58+ for concentration control of developing material, subclasses 168+ for charging, subclasses 246+ for sprayed liquid developing, subclass 248 for immersion, and subclasses 265+ for application of dry developing.
- 422, Chemical Apparatus and Process Disinfecting, Deodorizing, Preserving, or Sterilizing, especially subclasses 22+ for processes of disinfecting, deodorizing, preserving, or sterilizing non-foods; and subclasses 129+, especially subclass 185 for apparatus using corona discharge or radiation for effecting chemical reactions.

- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery (e.g. xerography, etc.).
- 438, Semiconductor Device Manufacturing: Process, for methods of making a semiconductor device or coating a semiconductor substrate.
- 445, Electric Lamp or Space Discharge Component or Device Manufacturing, subclasses 10 through 14, for coating electric lamps or electric space discharge devices wherein a combined process is intended to perform multiple processes are classified here (445), when one of the operations is specifically provided for in this class (445).
- 505, Superconductor Technology: Apparatus, Material, Process, for making or coating superconductors or superconductor material.
- 522, Synthetic Resins or Natural Rubbers, for processes of preparing or treating a synthetic resin or natural rubber involving a chemical reaction brought about by the application of wave energy.
- 458 Electrostatic charge, field, or force utilized:**
This subclass is indented under subclass 457. Processes utilizing static electricity, that is an electrical charge at rest, to effect deposition or orientation of an externally supplied coating material.
- (1) Note. Electrostatic energy is a form of electrical energy which has the capability of attracting and holding small particles having an opposite electrical charge.
 - (2) Note. An electrostatic charge is an electric charge stored in a capacitor or on the surface of an insulated object.
 - (3) Note. An electrostatic field is the vector force field set up in the vicinity of non-moving electrical charges.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
180, for processes of applying particles or fibers to a substrate without the use of an electrostatic force.
- SEE OR SEARCH CLASS:
75, Specialized Metallurgical Processes, Compositions for use Therein, Consolidated Metal Powder Compositions, etc., subclass 255 for a loose mixture containing metal particles. Subclass 10.67 for electromagnetic or electrostatic processes.
- 118, Coating Apparatus, subclasses 620+ for coating apparatus utilizing an electrostatic charge, force, or field.
- 219, Electric Heating, subclasses 600+ for electrostatic heating, per se. If there is a subsequent step of coating involved the original is classified in Class 427. If there is other subsequent treatment involved the original is classified with the art to which the other subsequent treatment pertains.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 3 for processes of spraying wherein an electrostatic charge is employed and the intent of the sprinkling, spraying, and diffusing is not to coat.
- 361, Electricity: Electrical Systems and Devices, subclasses 225+ and 230+ for apparatus used to apply an electrical charge to materials, per se.
- 399, Electrophotography, subclass 57 for liquid control developing, subclasses 58+ for concentration control of developing material, subclasses 168+ for charging, subclasses 246+ for sprayed liquid developing, subclass 248 for immersion, and subclasses 265+ for application of dry developing.
- 459 Fluidized bed utilized:**
This subclass is indented under subclass 458. Processes wherein a bed or mass of solid coating particles is maintained in a state of fluidization by passing a gas in a generally upward direction through the particles which remain in a confined volume and is utilized in the coating of an article or substrate.

460 Ionization or corona discharge utilized:

This subclass is indented under subclass 459. Processes wherein (1) the dissociation of an atom or molecule into electrons and ions, which facilitates the passage of current, or (2) the phenomena that occurs when an electric field is sufficiently strong to ionize the gas between electrodes and cause conduction, is used to assist in the deposition of the fluidized coating material.

461 Heating or fusing applied coating:

This subclass is indented under subclass 459. Processes wherein the temperature of the applied coating is raised above ambient or the applied coating is liquified or reduced to a plastic state by heating.

462 Flock or fiber applied:

This subclass is indented under subclass 458. Processes wherein the coating applied is in the form of finely powdered wool, cotton, or cloth material or relatively short, slender, flexible elements of finite length and having a width and thickness of the same order of magnitude.

SEE OR SEARCH THIS CLASS, SUBCLASS:

206, for applying flock or fiber to a substrate without the use of electrical or wave energy.

463 Pile or napped surface formed:

This subclass is indented under subclass 462. Processes wherein the coating applied to a substrate, web, sheet, layer, or element, results in a bristly, fuzzy, or resilient surface, with extended looped or free ended filamentary material.

464 Heating, drying, or cooling adhesive surface:

This subclass is indented under subclass 463. Processes wherein the temperature of an adhesive coating is raised above or lowered below the ambient or the moisture content of the adhesive coating is reduced.

(1) Note. Heating or drying often causes curing or hardening of the coating.

465 Organic substrate specified (e.g., fabric, etc.):

This subclass is indented under subclass 463. Processes wherein the designated base or surface onto which the adhesive coating is applied is organic.

(1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."

(2) Note. For classification in this subclass the adhesive layer is not considered to be the base.

466 Nonuniform or patterned coating (e.g., ink jet printing, etc.):

This subclass is indented under subclass 458. Processes wherein the coating utilizing electrostatic charge, field, or force is (1) applied only to selected portions of a base (2) applied in such a manner as to produce a coating of uneven, discontinuous, or nonuniform thickness, or (3) varied from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.

448, for nonuniform or patterned spray coating processes utilizing flame or plasma heat.

504, for processes to polymerize an applied nonuniform or patterned coating utilizing high energy electromagnetic radiation or high energy particles.

510, for processes to polymerize an applied nonuniform or patterned coating utilizing low energy electromagnetic radiation.

526, for nonuniform or patterned coating processes utilizing ion plating or ion implantation.

552, for nonuniform or patterned coating processes involving pretreating a substrate or posttreating a coated substrate utilizing high energy electromagnetic radiation or high energy particles.

555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment of a substrate or a thermal posttreatment of a coated substrate.

SEE OR SEARCH CLASS:

399, Electrophotography, subclass 57 for liquid control developing, subclasses 58+ for concentration control of developing material, subclasses 168+ for charging, subclasses 246+ for sprayed liquid developing, subclass 248 for immersion, and subclasses 265+ for application of dry developing.

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery.

467 Edging or striping:

This subclass is indented under subclass 466. Processes wherein (1) only the edge or border of a substrate is coated or (2) wherein the coating is applied in long narrow lines.

(1) Note. The stripes are not required to be parallel or straight.

SEE OR SEARCH THIS CLASS, SUBCLASS:

137, for the striping of roads or the earth.

SEE OR SEARCH CLASS:

156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclass 107 for processes for sealing the edges of laminated glass.

468 Mask or stencil utilized:

This subclass is indented under subclass 466. Processes in which the substrate treated has applied to portions thereof a coating or layer which masks or shields the portions so coated during further treatment of the exposed portions of the substrate.

(1) Note. The masking coat may be applied to selected areas or the entire substrate may be coated with a maskforming composition and selected portions of the coating, thus formed, removed.

469 Coating material consists of charged particles (e.g., paint, pigment, dye, etc.):

This subclass is indented under subclass 466. Processes wherein the nonuniform coating is formed by deposition of charged particles to a substrate by utilization of electrostatic charge, field, or force to form a nonimaged coating on the base.

(1) Note. The charged particles may be loose, free falling or suspended in a fluid for deposition thereof.

SEE OR SEARCH CLASS:

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31 through 38, particularly subclasses 117.1-119.6 and 120.1-123.58, for processes of electrostatically coating (a) if radiation is utilized to form an image or (b) for finishing an image produced by radiation utilizing electrostatic deposition to complete the image.

470 Superposed diverse or multilayer similar coatings applied:

This subclass is indented under subclass 458. Processes which include sequentially applying a plurality of dissimilar coating materials in superposed relationship on a substrate or applying a plurality of layers of similar coating materials in superposed relationship on a substrate or previously coated substrate, utilizing electrostatic charge, field, or force.

SEE OR SEARCH THIS CLASS, SUBCLASS:

258, for processes wherein at least one of the superimposed coating layers are nonuniform and need not be applied with the use of electrical or wave energy.

471 Applying coatings to opposite sides of a substrate (excluding processes where all coating is by immersion):

This subclass is indented under subclass 458. Processes wherein the coating material is applied to opposing surfaces of a base or substrate.

- (1) Note. The opposite sides may be coated with the same or different coating materials.
- (2) Note. This subclass does not provide for merely immersing a substrate to coat both sides, but does provide for such an operation combined with additionally coating at least one side of the substrate by another method, such as spraying, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

206, for coating both sides of a substrate (web or workpiece) with flock or fiber without the use of electrical or wave energy.

SEE OR SEARCH CLASS:

399, Electrophotography, subclass 57 for liquid control developing, subclasses 58+ for concentration control of developing material, subclasses 168+ for charging, subclasses 246+ for sprayed liquid developing, subclass 248 for immersion, and subclasses 265+ for application of dry developing.

472 Positioning, orientation, or application of nonsprayed, nonatomized coating material solely by electrostatic charge, field, or force: This subclass is indented under subclass 458. Processes wherein a coating material, which may be fluid or discrete particles, is caused to move from a container or support surface to a substrate or have its relative alignment or placement influenced by using electrostatic charge, field, or force as the sole or principal source of energy.

- (1) Note. Mechanical projection is a form of spraying and thus excluded.
- (2) Note. Atomized refers to breaking up a liquid into a fine spray or fog.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 690+ for sprinkling or spraying material solely by use of electrostatic charge, field, or

force with the expressed intent to distribute a material, not to coat.
 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclass 437 for shaping or treating processes in which electrical or wave energy is applied directly to fibers or other particulate material to move, align, or effect deposition of said fibers or particles.

473 Inorganic substrate:

This subclass is indented under subclass 472. Processes wherein the substrate or base is inorganic.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term “organic” and “inorganic.”

474 Solid particles applied:

This subclass is indented under subclass 472. Processes wherein discrete solid particles are applied to a substrate.

SEE OR SEARCH CLASS:

51, Abrasive Tool Making Process, Material, or Composition, for a process of making an abrasive tool by coating. Note that a generic process for coating material, generally (which material may comprise an abrasive tool) is found in Class 427.

475 Solid particles or atomized liquid applied:

This subclass is indented under subclass 458. Processes wherein solid particles are sprayed or liquid particles are atomized and sprayed into the vicinity of the substrate and are electrostatically attracted thereto.

- (1) Note. The particles may form the coating, or become part of a coating as when applied over a layer of adhesive.

SEE OR SEARCH CLASS:

239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 690+ for claims drawn to processes for utilizing electrostatic spray devices (especially electrodynamic generators) to sprinkle, spray, or diffuse fluid mate-

rial wherein the expressed intent is not to coat.

476 Inside hollow articles:

This subclass is indented under subclass 475. Processes wherein the coating material is applied to an inner or concave surface of a cavity, bore, depression, or hole in the work.

- (1) Note. Materials such as fabrics, foams, felts, etc. are not considered hollow for purposes of this subclass even though they may contain voids.

477 Articles or substrates sequentially moved past atomizing source:

This subclass is indented under subclass 475. Processes wherein individually supported objects to be coated are transported past a source of atomized coating material.

478 Collection of offtarget or fugitive coating material:

This subclass is indented under subclass 477. Processes wherein means is provided to recover (1) coating material which misses the target substrate or (2) elusive or runaway coating overflow.

479 Utilizing multiple spray sources (e.g., atomizers):

This subclass is indented under subclass 477. Processes wherein a substrate is coated by using multiple atomizers or spray sources.

480 Movable atomizer or spray source (e.g., spray source or atomizer rotates, reciprocates, oscillates, etc.):

This subclass is indented under subclass 477. Processes wherein the atomizer or spray source has a mobile mounting.

- (1) Note. Processes of utilizing mechanically mobile coating projectors capable of moving across the surface of the work to insure uniform deposition of a coating are provided for in this subclass.

481 Rotatable base or support for substrate:

This subclass is indented under subclass 477. Processes wherein mechanical means are provided to convey the work (substrate or article) to be coated about a specified axis of rotation

in which the path of every point of the moving work is an arc or circle, centered on that axis.

482 Running or indefinite length substrate:

This subclass is indented under subclass 475. Processes wherein a base or web to be coated travels longitudinally of itself, the length of which is continuous or uninterrupted.

- (1) Note. Processes of coating running length substrates are distinguished from processes which coat the work as discrete units.

483 Utilizing apparatus to atomize and electrostatically charge liquid coating material (e.g., charging electrode adjacent spray source, etc.):

This subclass is indented under subclass 475. Processes wherein an electrostatic charge, field, or force is used to assist in causing a liquid material to be reduced to small particles or fine droplets and deposited on a substrate.

- (1) Note. In this subclass processes may be found wherein a charging electrode stationed adjacent the spray source or coating projector causes the coating liquid to be charged and reduced to fine liquid particles.

484 Rotatable atomizer or spray source:

This subclass is indented under subclass 483. Processes wherein the motion of the atomizer or spray source is in a path in which every point of movement is a circle or circular arc centered on its own axis.

485 Coating contains organic material:

This subclass is indented under subclass 475. Processes wherein the coating material applied includes organic material in its composition.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."

486 Inorganic substrate:

This subclass is indented under subclass 485. Processes wherein the substrate upon which the coating is applied is inorganic.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term “organic” and “inorganic.”
- 487 Polymerization of coating utilizing direct application of electrical, magnetic, wave, or particulate energy (i.e., including cross-linking, curing, and hardening of organics):**
This subclass is indented under subclass 457. Processes wherein polymerization of the applied coating material (i.e., not the substrate) occurs as a result of direct application of electrical, magnetic, particulate, electromagnetic, wave energy or heat produced therefrom and at any stage in the coating process.
- (1) Note. The applied energy, most often in the form of heat or light, must be used in the polymerization step.
- (2) Note. For the purpose of classification here and in indented subclasses, the following terms will be understood to denote some form of polymerization: a. crosslinking; b. curing; c. hardening of organic; d. addition polymerization; e. condensation polymerization; f. grafting.
- (3) Note. A claim drawn to a process of irradiating an applied coating composition with or without a reaction promoter being present, where some form of polymerization reaction takes place is proper for this and indented subclasses.
- (4) Note. Processes involving coating utilizing neutral and charged particles is proper for this and indented subclasses.
- 488 Plasma initiated polymerization:**
This subclass is indented under subclass 487. Processes wherein polymerization of a coated substrate is induced by utilizing a plasma.
- 489 Organosilicon containing coating:**
This subclass is indented under subclass 488. Processes wherein an organic silicon compound is part of the applied coating composition.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term “organic” and “inorganic.”
- 490 Fluorocarbon containing coating:**
This subclass is indented under subclass 488. Processes wherein fluorocarbon compounds are part of the composition of the applied coating material.
- 491 Organic substrate:**
This subclass is indented under subclass 488. Processes wherein the composition of the base or substrate is organic.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term “organic” and “inorganic.”
- 492 Multiple applications of identical radiation energy source to polymerize (e.g., pulse, flash lamp, etc.):**
This subclass is indented under subclass 487. Processes wherein the polymerization of the coating is influenced by the duration of intermittently applied identical radiation energy.
- (1) Note. For the purpose of classification here and indented subclasses, the term “radiation energy” includes: a. Electromagnetic Radiation (radio wave, microwave, visible, ultraviolet, X rays, gamma ray, actinic) b. Acoustic Radiation (infrasonic, sonic, ultrasonic) c. Particle Radiation (alpha ray (helium atom, 2 protons + 2 neutrons), beta ray (electrons), electron (accelerated beam), neutron). This list is not intended to be exhaustive and is not limited to the above examples.
- (2) Note. Processes for using pulsed discharge devices or flash lamps to achieve polymerization of the applied coating may be found here.
- 493 Application of plural diverse energy sources to polymerize (e.g., electromagnetic wave**

plus resistance heat, ultraviolet wave plus infrared wave, etc.):

This subclass is indented under subclass 487. Processes wherein more than one type of energy source is utilized to influence the polymerization of the applied coating.

- (1) Note. The multiple energy applications may be used simultaneously or sequentially.
- (2) Note. The following is an example of the type of claimed subject matter which is proper for this subclass. a. A claim drawn to a process of polymerizing a coating by employing (1) a form of radiation and (2) resistance heat or (1) ultraviolet radiation and (2) infrared radiation.

494 Gloss control (e.g., light scattering, etc.):

This subclass is indented under subclass 487. Processes wherein the degree of specular reflection (e.g., high, medium, or low gloss, etc.) of the coating is influenced.

495 Polymerization involving the control of oxygen containing gas as an inhibitor (e.g., air, etc.):

This subclass is indented under subclass 487. Processes wherein means are provided to (1) alter or regulate the quantity of oxygen containing gas present including exclusion thereof or (2) purposely inhibit the polymerization step by the presence of oxygen containing gas.

- (1) Note. Processes utilizing a wax layer or some other barrier to prevent or control the oxygen containing gas from entering the polymerization area are properly classified here.

496 High energy electromagnetic radiation or high energy particles utilized (e.g., gamma rays, Xrays, atomic particles, i.e., alpha rays, beta rays, electrons, etc.):

This subclass is indented under subclass 487. Processes wherein the energy used to effect the polymerization of the coating is high energy electromagnetic radiation or high energy particles.

- (1) Note. The term "high energy electromagnetic radiation or high energy parti-

cles", as employed here and in indented subclasses includes; e.g., Xrays, gamma rays, atomic particles, i.e., alpha particles, beta particles, and high energy electrons. Electromagnetic wave energy measured below wavelengths of 100 Angstroms (10 to the minus 8 meters) will be considered "high energy electromagnetic radiation or high energy particle." This subject matter is often referred to as "high energy ionizing radiation." a. gamma ray (.000 1.40 A); b. Xray (0.1 100 A); c. atomic particle alpha ray; beta ray; d. high energy electrons accelerated (This list is not intended to be exhaustive and is not limited to the above examples.)

497 Vapor deposition utilized:

This subclass is indented under subclass 496. Processes wherein a coating material is deposited as a gas, mist, smoke, or vapor.

498 Immersion, partial immersion, spraying, or spin coating utilized (e.g., dipping, etc.):

This subclass is indented under subclass 496. Processes wherein the article or substrate to be coated is (1) dipped or submerged, either partially or wholly, in the coating material, (2) positioned to have the coating material projected by mechanical means thereon or (3) conveyed about an axis of rotation, thus moving it in an arc or circle which spreads the coating material by centrifugal force.

SEE OR SEARCH CLASS:

148, Metal Treatment, for processes wherein reactive coating occurs on the substrate and not externally thereof. Class 427 provides for coating a metal substrate with a resin composition in an immersion bath, wherein metal ions leaching from the metal substrate enter the immersion medium and react or complex externally of the metal substrate to deposit a coating containing an element from the metal substrate.

499 Natural cellulose substrate:

This subclass is indented under subclass 498. Processes wherein the coated article, base, or substrate is composed of natural cellulose, e.g., wood or cellulosic fibers.

- (1) Note. Paper is not considered proper for this subclass, as paper is a chemically treated unnatural product.
- 500 Coating material includes colorant or pigment:**
This subclass is indented under subclass 496. Processes wherein the applied coating material includes any dye, ink, paint, or coloring matter that inputs or modifies color.
- SEE OR SEARCH CLASS:
399, Electrophotography, subclass 54 for color control developing, subclasses 168+ for charging, and subclasses 223+ for plural color developing.
- 501 Textile, fiber, or wire coated or impregnated:**
This subclass is indented under subclass 496. Processes wherein the coated or impregnated substrate is (1) formed by a textile operation, (2) a solid or stranded group of slender, flexible rodlike materials of indefinite length or (3) of relatively short, slender, flexible elements of finite length.
- 502 Magnetic recording medium formed:**
This subclass is indented under subclass 496. Processes which result in a device or material being produced which is used to store or record information by a magnetic means.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
500, for processes forming magnetic recording media utilizing colorant or pigment.
548, for processes forming magnetic recording media which utilize magnetic field or force to treat a substrate prior to coating or to treat a previously coated substrate.
599, for processes forming magnetic recording media which utilize magnetic field or force for the direct application of the coating material.
- 503 Organosilicon containing coating material:**
This subclass is indented under subclass 496. Processes wherein the applied coating composition includes an organic silicon compound.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."
- 504 Nonuniform or patterned coating (e.g., mask, printing, etc.):**
This subclass is indented under subclass 496. Processes wherein the coating (1) is applied only to selected portions of a base (2) is applied in such a manner as to produce a coating of uneven, discontinuous, or nonuniform thickness, or (3) varies from area to area as to physical or chemical properties.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.
448, for nonuniform or patterned spray coating processes utilizing flame or plasma heat.
466, for nonuniform or patterned coating processes utilizing electrostatic charge, field, or force.
500, for nonuniform or patterned coating processes utilizing colorant or pigment.
510, for processes to polymerize an applied nonuniform or patterned coating utilizing low energy electromagnetic radiation.
526, for nonuniform or patterned coating processes utilizing ion plating or ion implantation.
552, for nonuniform or patterned coating processes involving pretreating a substrate or posttreating a coated substrate utilizing high energy electromagnetic radiation or high energy particles.
555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment of a substrate or a thermal posttreatment of a coated substrate.

SEE OR SEARCH CLASS:

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery.

505 Coating is adhesive or intended to be made adhesive (e.g., release sheet or coating, etc.):

This subclass is indented under subclass 496. Processes which result in an applied coating having adhesive properties for adhering a base to another surface.

- (1) Note. The coating material may become adhesive when it is contacted by high energy electromagnetic radiation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

503, for adhesive coating compositions containing organosilicon.

506 Benzene ring or nitrogen containing coating material:

This subclass is indented under subclass 496. Processes wherein the applied coating material contains at least one benzene ring or nitrogen.

- (1) Note. The term "benzene ring" includes in all cases except where there are explicit limitations to the contrary, substituted benzene rings, including substitution in the form of an additional fused or bridged ring or ring system.

507 Styrene or carboxamide group containing coating material (e.g., urea, urethane, etc.):

This subclass is indented under subclass 506. Processes wherein the applied coating material contains styrene or carboxamide group.

508 Low energy electromagnetic radiation utilized (e.g., UV, visible, IR, microwave, radio wave, actinic, laser, etc.):

This subclass is indented under subclass 487. Processes wherein the energy used to effect the polymerization of the applied coating is low energy electromagnetic radiation.

- (1) Note. The term "low energy electromagnetic radiation" as employed here and indented subclasses includes, e.g., ultra-

violet, infrared, visible light, actinic, microwave, and radio waves. Electromagnetic wave energy measured above wavelengths of 100 Angstroms (10 to the minus 8 meters) will be considered low energy electromagnetic radiation. a. ultraviolet (101 4000 A); b. actinic light includes both UV & visible; c. visible (4000 A 7000 A); d. infrared (above 7000 A) e. microwave (1 mm 1 m (includes 2.45 GHz)); f. radio wave (13.56 MHz is permitted frequency); g. laser. This list is not intended to be exhaustive and is not limited to the above examples.

509 Vapor deposition utilized:

This subclass is indented under subclass 508. Processes wherein the coating material is deposited as a gas, mist, smoke, or vapor.

510 Nonuniform or patterned coating (e.g., mask, printing, textured, etc.):

This subclass is indented under subclass 508. Processes wherein the coating (1) is applied only to selected portions of a base (2) is applied in such a manner as to produce a coating of uneven, discontinuous, or nonuniform thickness or (3) varies from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.

448, for nonuniform or patterned spray coating processes utilizing flame or plasma heat.

466, for nonuniform or patterned coating processes utilizing electrostatic charge, field, or force.

504, for processes to polymerize an applied nonuniform or patterned coating utilizing high energy electromagnetic radiation or high energy particles.

526, for nonuniform or patterned coating processes utilizing ion plating or ion implantation.

552, for nonuniform or patterned coating processes involving pretreating a substrate or posttreating a coated sub-

- strate utilizing high energy ionizing radiation.
- 555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment of a substrate or a thermal posttreatment of a coated substrate.
- SEE OR SEARCH CLASS:**
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery.
- 511 Printing ink utilized:**
This subclass is indented under subclass 510. Processes wherein a coating composition applied to a substrate, specially designed for use as ink, to be used for producing characters or designs by means of writing, printing, or marking is cured by using low energy electromagnetic radiation.
- (1) Note. This class includes processes wherein printing ink is used to print patterns as in circuit designs or floor plans.
- SEE OR SEARCH CLASS:**
- 8, Bleaching and Dyeing; Fluid Treatment and Chemical Modification of Textiles and Fibers, subclasses 445+ for textile printing pastes.
- 206, Special Receptacle or Package, subclass .5 for infusion packages or receptacles containing ink.
- 401, Coating Implements With Material Supply, subclasses 209+ for the combination of ballpoint pen and ink particularly suitable for such an implement. (e.g., viscous ink).
- 520, Synthetic Resins or Natural Rubbers, appropriate subclasses, particularly Class 523, subclass 160 for a composition containing a synthetic resin or natural rubber having utility as an ink for glass or for ceramic substrates, subclass 161 for a ballpoint pen ink or a typewriter ink composition or to processes of preparing said composition.
- 512 Immersion, partial immersion, spraying, or spin coating utilized (e.g., dipping, etc.):**
This subclass is indented under subclass 508. Processes wherein the article or substrate to be coated is (1) submerged or dipped, either partially or wholly, in the coating material (2) positioned to have the coating material projected by mechanical force thereon or (3) conveyed about an axis of rotation, which axis is external of the article or substrate, thus moving in an arc or circle which spreads coating material by centrifugal force.
- SEE OR SEARCH CLASS:**
- 148, Metal Treatment, for processes wherein reactive coating occurs on the substrate and not externally thereof. Class 427 provides for coating a metal substrate with a resin composition in an immersion bath, wherein metal ions leaching from the metal substrate enter the immersion medium and react or complex externally of the metal substrate to deposit a coating containing an element from the metal substrate.
- 513 Textile or fiber coated or impregnated:**
This subclass is indented under subclass 508. Processes wherein the coated or impregnated base is (1) formed by a textile operation, (2) a solid or stranded group of slender, flexible rod-like materials of indefinite length or (3) of relatively short, slender, flexible elements of finite length.
- 514 Coating material includes colorant or pigment:**
This subclass is indented under subclass 508. Processes wherein the applied coating material includes any dye, ink, paint, or coloring matter that inputs or modifies color.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 510, for processes of applying nonuniform or patterned coating utilizing colorant or pigment.
- 515 Organosilicon containing coating material:**
This subclass is indented under subclass 508. Processes wherein the coating composition contains an organic silicon compound.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."
- 516 Coating is adhesive or is intended to be made adhesive (e.g., release sheet or coating, etc.):**
This subclass is indented under subclass 508. Processes which result in an applied coating having adhesive properties for adhering a substrate to another surface.
- (1) Note. The applied coating material may become adhesive when it is contacted by low energy electromagnetic radiation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
515, for adhesive coating compositions containing organosilicon.
- 517 Coating includes specified rate affecting material:**
This subclass is indented under subclass 508. Processes wherein the applied coating composition includes a stipulated material which affects the rate of the polymerization.
- (1) Note. A rateaffecting material is a material which either affects the rate of reaction, permits reduced amounts of wave energy, increases or decreases the degree of polymerization, cure, crosslinking, grafting, or inhibits reaction. Included are photo initiators, photosensitizers, activators, accelerators, inhibitors, initiators, retarders, sensitizing auxiliaries, generators, or curing catalysts.
- (2) Note. The mere mention or recitation of use of an accelerator or rate affecting material with no specific type designated is not proper for this and indented subclasses.
- (3) Note. Search subclass 514 for subject matter containing colorant or pigment.
- 518 Inorganic substrate:**
This subclass is indented under subclass 517. Processes wherein the substrate is composed of inorganic material.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."
- 519 Keto or aldehyde containing group is part of the rate affecting coating material (e.g., benzoin, benzophenone, acetaldehyde, etc.):**
This subclass is indented under subclass 517. Processes wherein a keto or aldehyde group is part of the rate affecting coating material.
- (1) Note. The following is a list of some keto or aldehyde group containing compounds that are found in this subclass. a. benzophenone, b. acetaldehyde, c. benzoin isobutyl, d. camphor quinone, e. methyl isoamyl ketone. This list is not intended to be exhaustive and is not limited to the above examples.
- 520 Benzene ring or nitrogen containing coating material:**
This subclass is indented under subclass 508. Processes wherein the applied coating material contains at least one benzene ring or nitrogen.
- (1) Note. The term "benzene ring" includes in all cases except where there are explicit limitations to the contrary, substituted benzene rings, including substitution in the form of an additional fused or bridged ring or ring systems.
- 521 Radiation as heat source (e.g., radiant energy, etc.):**
This subclass is indented under subclass 508. Processes wherein the heat energy utilized for polymerization of the applied coating is the result of or is assisted by radiation.
- (1) Note. This subclass excludes processes wherein infrared or radiant heat is used to vaporize the coating material in a vapor deposition process.
- SEE OR SEARCH CLASS:
430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for imaging using radiant energy.

522 Resistance or induction heatinitiated polymerization:

This subclass is indented under subclass 487. Processes wherein the polymerization step involving the applied coating is effected by using the applied coating or the substrate as the electrical energy conductor as in resistance or inductance heating, such that a current flows there through.

- (1) Note. This subclass does not include processes wherein the electric current is passed through a heating filament, coil, susceptor, etc., which is not the substrate.
- (2) Note. Induction heating involves subjecting a conductive body to a variable electromagnetic field, usually at a frequency lower than that used for dielectric heating. Internal resistance in the conductive body then causes the conductive body to heat up.
- (3) Note. Processes wherein an electrical discharge is caused to pass through a coated substrate to initiate polymerization are found here and indented subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

540, wherein an arc or electrical discharge is produced in resistance heating to pretreat a substrate or posttreat a coated substrate.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 73.11, 73.21, and 76.1+ for metal coating buildup with the use of resistance heating. Electric welding, has to have two preforms being joined, wherein coating is ancillary to the joining of the preforms.

523 Ion plating or implantation:

This subclass is indented under subclass 457. Processes wherein (1) evaporating a coating material in the presence of an electrical discharge (arc, beam, etc.) in an energetic gaseous medium, which forms or is associated with a cathode polarized by a high negative voltage

relative to the source of the coating material, and depositing the coating material onto the substrate, with simultaneous bombardment by ions which cause momentum transfer (sputtering) on the substrate to occur or (2) coating material is introduced into or penetrates the nearsurface region of a substrate by directing an accelerated beam or stream of energetic (charged) ions including the coating material, toward the substrate.

- (1) Note. The term "ion plating" is applied to a combination of process steps that include: (a) sputtering of the surface of a substrate due to momentum transfer, and; (b) simultaneously or subsequently depositing a coating on the substrate from a flux of ionic coating material (i.e., usually considered to be a high energy plasma with a small flux of ions and a much larger number of energetic neutrals).
- (2) Note. Ion implantation of the near surface region of a substrate to create a distinguishable layer differing in composition from the substrate will be proper for this Class 427, regardless of whether the implantation of this layer is limited to the microstructure or not.
- (3) Note. Ion plating, wherein the target material and the substrate are one and the same is proper for this subclass and indented subclasses.
- (4) Note. Processes utilizing ion bombardment or ion treating, that specifies neither implanting, etching, plating, etc., but merely recites some change as in the materials characteristic properties will be classified in this and indented subclasses with the proper crosses in Classes 156 or 204 as needed; however processes utilizing ion bombardment or ion treatment merely to treat a substrate surface, either before or after coating are found below, in this class, in the pretreatment and posttreatment area.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

532+, for pretreatment of a substrate or post-treatment of a coated substrate utilizing ion bombardment or ion treating.

SEE OR SEARCH CLASS:

118, Coating Apparatus, subclasses 715+ for ion plating apparatus utilizing means other than sputtering for providing the material to be deposited onto the substrate.

148, Metal Treatment, for microstructural change throughout a metal substrate involving the use of ion implantation to effect this change. Placement of the document in this class (427) is proper only when ion implantation is used to coat with incidental surface impregnation.

204, Chemistry: Electrical and Wave Energy, for coating, forming, or etching by sputtering. Class 427 is not proper for sputter etching, per se, which subject matter is classified in Class 204, however the combination of a 427 coating step combined with a 204 etching operation solely to perfect the coating is proper for this class (427). In Class 204 see subclass 192.11 for ion beam sputter deposition, subclass 192.3 for sputter etching, subclass 192.34 for ion beam sputter etching, and subclass 192.12 for glow discharge sputter deposition (e.g., Cathode sputtering, etc.); see subclass 298.02 for apparatus including target means for providing coating material to be deposited onto the substrate by sputtering said target which additionally includes means for ionizing at least a portion of the coating material and applying a potential to the substrate whereby the substrate is simultaneously subjected to electrostatically aided deposition and sputter etching due to ionic bombardment.

250, Radiant Energy, subclasses 492.1+ for methods of irradiation, per se, of a material with ions.

438, Semiconductor Device Manufacturing: Process, for processes utilizing ion implantation in the manufacture of

semiconductor devices, particularly to form a PN junction.

524 With simultaneous sputter etching of substrate:

This subclass is indented under subclass 523. Processes wherein the sputter etching of the substrate is executed at the same time the coating is being applied to the substrate, which etching serves only to perfect the coating.

(1) Note. This class (427) is not proper for sputter etching, per se, which subject matter is classified in Class 204, however the combination of a 427 coating step combined with a 204 etching operation solely to perfect the coating is proper for this subclass.

(2) Note. In a Class 204 sputter etching process, the coating material is the target.

525 Organic material present in substrate, plating, or implanted layer:

This subclass is indented under subclass 523. Processes wherein (1) the plating or implanted material contains organic matter or (2) the substrate which is plated or implanted contains organic matter.

(1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the terms "organic" and "inorganic."

526 Nonuniform or patterned ion plating or ion implanting (e.g. mask, etc.):

This subclass is indented under subclass 523. Processes wherein the ion plating or ion implanting (1) is applied only to selected portions of a substrate (2) is applied in such a manner as to produce a coating of uneven, discontinuous, or nonuniform thickness or (3) varies from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.

- 448, for nonuniform or patterned spray coating processes utilizing flame or plasma heat.
- 466, for nonuniform or patterned coating processes utilizing electrostatic charge, field or force.
- 504, for processes to polymerize an applied nonuniform coating utilizing high energy electromagnetic radiation or high energy particles.
- 510, for processes to polymerize an applied nonuniform coating utilizing low energy electromagnetic radiation.
- 552, for nonuniform or patterned processes involving pretreating a substrate or posttreating a coated substrate utilizing high energy electromagnetic radiation or high energy particles.
- 555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment of a substrate or a thermal posttreatment of a coated substrate.
- SEE OR SEARCH CLASS:
- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery.
- 527 Silicon present in substrate, plating, or implanted layer:**
This subclass is indented under subclass 523. Processes, wherein (1) the plating or implanted material contains silicon or (2) the substrate which is plated or implanted contains silicon.
- 528 Metal or metal alloy substrate:**
This subclass is indented under subclass 523. Processes wherein the substrate (base or workpiece) which is plated or implanted is a pure metal or metal alloy.
- 529 Inorganic oxide containing plating or implanted material:**
This subclass is indented under subclass 523. Processes wherein the plating material or the resulting implanted material contains inorganic oxide.
- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon
- Compounds, for the distinction between the terms “organic” and “inorganic”.
- 530 Inorganic metal compound present in plating or implanted material (e.g., nitrides, carbides, borides, etc.):**
This subclass is indented under subclass 523. Processes wherein the plating or the resulting implanted material contains inorganic metal compounds.
- (1) Note. Coating materials containing inorganic metal nitrides, carbides, and borides are some of the metal compounds found in this subclass.
- (2) Note. Processes wherein the implanting material may be a mixture of metals, nitrogen, carbon, or boron which may react in or on a base to form a distinct metal nitride, carbide, or boride layer are found here.
- (3) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the terms “organic” and “inorganic.”
- 531 Metal or metal alloy as plating or implanted material:**
This subclass is indented under subclass 523. Processes wherein the plating or implanting material is pure metal or metal alloy.
- 532 Pretreatment of substrate or posttreatment of coated substrate:**
This subclass is indented under subclass 457. Processes wherein (1) prior to a coating a substrate is chemically or physically modified or (2) after a coating is applied there is modification of the chemical or physical characteristics of the coated substrate utilizing electrical, magnetic, electromagnetic, or wave energy.
- SEE OR SEARCH CLASS:
- 65, Glass Manufacturing, for processes involving coating glass plus subsequent treatment thereof (e.g., including patents claiming the step of coating a glass substrate and reacting the coating with a constituent of the glass substrate).

533 Ionized gas utilized (e.g., electrically powered source, corona discharge, plasma, glow discharge, etc.):

This subclass is indented under subclass 532. Processes wherein an energetic (charged) gaseous medium is utilized in the pretreatment of a substrate or the posttreatment of a substrate.

- (1) Note. Alpha rays (particles) are identical to the helium atom, and for classification purposes will not be considered as an ionized gas since, they are not in a naturally occurring ionization state under any normal earth conditions, except in nuclear processes.

534 Cleaning or removing part of substrate (e.g., etching with plasma, glow discharge, etc.):

This subclass is indented under subclass 533. Processes wherein, prior to the coating, etching influenced by electrical, magnetic, electromagnetic, or wave energy, is utilized to clean or remove part of the substrate.

- (1) Note. Plasma, glow discharge, and electron beam etching are some of the processes used to clean that are found here.
- (2) Note. In processes involving plural coating steps wherein electrical, magnetic, electromagnetic, or wave energy etching is used to clean a previously deposited coating with the intent to perfect a subsequent deposited coating will be considered proper for this class (427).

SEE OR SEARCH CLASS:

216, Etching a Substrate: Processes, especially subclasses 63+ for posttreatment etching utilizing high energy techniques. Pretreatment etching of a substrate utilizing electric, electromagnetic, magnetic, or wave energy is proper for Class 427.

535 Plasma (e.g., cold plasma, corona, glow discharge, etc.):

This subclass is indented under subclass 533. Processes wherein an ionized gas used is a plasma, having a concentration of negatively and positively charged carriers which are approximately equal.

- (1) Note. A plasma consists of a wholly or partially ionized gas composed of ions, electrons, and neutral particles.

536 Organic substrate:

This subclass is indented under subclass 535. Processes wherein the composition of the base is organic.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."

537 Metal containing coating:

This subclass is indented under subclass 536. Processes wherein the coating material contains a pure metal or metal alloy.

538 Textile or fiber coated or impregnated:

This subclass is indented under subclass 536. Processes wherein the coated or impregnated substrate is (1) formed by a textile operation or (2) in the form of relatively short, slender, flexible elements of finite length (3) a solid or stranded group of slender, flexible rodlike material of indefinite length.

539 Oxygen containing atmosphere:

This subclass is indented under subclass 535. Processes wherein plasma treatment of the base is conducted in a gaseous surrounding or environment which includes oxygen.

540 Arc or electrical discharge:

This subclass is indented under subclass 532. Processes wherein a luminous discharge of electricity, through a gas or vapor is applied directly to the substrate, which may be in the form of an electrode.

- (1) Note. The arc discharge is a type of electrical conduction in gases characterized by high current density and low potential drop. It is closely related to the glow discharge, but has a much lower potential drop in the cathode region, as well as a greater current density. No sustained plasma is formed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

446, for the use of an arc to plasma spray.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 73.11, 73.21, and 76.14 for coating operations that involve a buildup of a metal coating on a metal workpiece and wherein an arc between an electrode and the work is utilized.

541 Drying:

This subclass is indented under subclass 532. Processes wherein the electrical, magnetic, electromagnetic or wave energy is used to effect the extraction or the elimination of moisture or liquids from the substrate or coating.

SEE OR SEARCH CLASS:

34, Drying and Gas or Vapor Contact With Solids, subclasses 266+, 418, 419+, and 519+ for processes utilizing radiant energy to dry, per se. Combinations of coating processes and drying operations are proper however for Class 427.

542 Infrared or radiant heating:

This subclass is indented under subclass 541. Processes wherein the drying is directly influenced by electromagnetic waves longer than those of visible light and shorter than those of radio waves or by infrared radiation; e.g., black body radiation, from a body not hot enough to emit visible radiation.

- (1) Note. This subclass provides for coating processes utilizing radiant heat only when "radiant heat" is specifically set forth.
- (2) Note. This subclass excludes processes wherein the infrared energy or radiant heat is utilized to vaporize the coating material in a vapor deposition process.
- (3) Note. Radiant rays pass through gases without warming them appreciably, but the rays increase the sensible temperature of a solid or liquid upon which they impinge.

SEE OR SEARCH THIS CLASS, SUBCLASS:

248.1, for coating processes utilizing vaporized coating materials in vapor deposition processes.

543 Induction or dielectric heating:

This subclass is indented under subclass 532. Processes which utilize induction or dielectric heating in treating a substrate before it is coated or treating a coated substrate.

- (1) Note. Induction heating involves subjecting a conductive body to a variable electromagnetic field, usually at a frequency lower than that used for dielectric heating. Internal resistance in the conductive body then cause the conductive body to heat up
- (2) Note. Dielectric heating involves the method of raising the temperature of a nominally insulating material by sandwiching it between two plates to which an rf voltage is applied. The material acts as a dielectric and its internal resistance causes it to heat up.

544 Organic coating containing material:

This subclass is indented under subclass 543. Processes wherein a posttreated substrate has organic material in its coating composition.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the term "organic" and "inorganic."

545 Resistance heating:

This subclass is indented under subclass 532. Processes wherein an electrical current is passed through a substrate before it is coated or an electrical current is passed through a coated substrate to produce heat by means of internal resistance.

- (1) Note. This subclass does not include processes wherein the electric current is passed through a heating filament, coil, susceptor, etc., which is not the substrate.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

540, wherein an arc or electrical discharge is produced in resistance heating.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 73.11, 73.21, and 76.1+ for metal coating buildup with the use of resistance heating. Electric welding has to have two preforms being joined, wherein coating is ancillary to the joining of the preforms.

546 Metal or metal alloy containing coating:

This subclass is indented under subclass 545. Processes wherein the coating material contains a pure metal or metal alloy.

547 Magnetic field or force utilized:

This subclass is indented under subclass 532. Processes wherein a magnetic field or force is used to treat a substrate before it is coated or to treat a coated substrate.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

543, for the use of a magnetic field or force to produce induction heating.

548 Magnetic recording medium or device formed:

This subclass is indented under subclass 547. Processes wherein a device or tape is produced to store information by a magnetic means.

- (1) Note. For this and indented subclasses it is understood that magnetic recording media usually contain magnetizable particles, hence need not be subsequently crossed to the pertaining subclass of equal or lesser indentation below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

128, for methods of forming magnetic devices in general, not provided for above.

502, for magnetic recording medium formed using high energy ionizing radiation.

SEE OR SEARCH CLASS:

520, Synthetic Resins or Natural Rubbers, appropriate subclasses, particularly Class 523, subclass 181 for a composition for magnetic purposes, but which is devoid of magnetic material or to processes or preparing said compositions.

549 Running length substrate:

This subclass is indented under subclass 548. Processes wherein the magnetic medium to be coated travels longitudinally of itself, the length of which is continuous or uninterrupted.

550 Magnetizable powder, flakes, or particles utilized:

This subclass is indented under subclass 547. Processes wherein the coating material containing powder, flakes, or particles are influenced by the magnetic field or force during the pretreatment of a substrate or the posttreatment of a coated substrate.

551 High energy electromagnetic radiation or high energy particles utilized (e.g., gamma ray, Xray, atomic particle, i.e., alpha ray, beta ray, high energy electron, etc.):

This subclass is indented under subclass 532. Processes wherein the substrate prior to coating or the coated substrate is treated with high energy electromagnetic radiation or high energy particles.

- (1) Note. The term "high energy electromagnetic radiation or high energy particles," as employed here and in indented subclasses includes; e.g., Xrays, gamma rays, atomic particles; i.e., alpha particles, beta particles, and high energy electrons. Electromagnetic wave energy measured below wavelengths of 100 Angstroms (10 to the minus 8 meters) will be considered "high energy electromagnetic radiation or high energy particle." This subject matter is often referred to as "high energy ionizing radiation." a. gamma ray (.000 1.40 A); b. Xray (0.1 100 A); c. atomic particle alpha ray; beta ray; d. high energy electrons accelerated. This list is not intended to be exhaustive and is not limited to the above examples.

- (2) Note. Alpha rays are helium, and for classification purposes will not be considered as an ionized gas since, except in nuclear processes, they are not a naturally occurring ionization state under any normal earth conditions.

552 Nonuniform or patterned coating:

This subclass is indented under subclass 551. Processes wherein the coating utilized in the pretreatment of a substrate or the posttreatment of a coated substrate (1) is applied only to selected portions of a substrate, (2) is applied in such a manner as to produce a coating of uneven, discontinuous, or nonuniform thickness or (3) varies from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.
- 448, nonuniform or patterned spray coating processes utilizing flame or plasma heat.
- 466, for nonuniform or patterned coating processes utilizing electrostatic charge, field, or force.
- 504, for processes to polymerize an applied nonuniform or patterned coating utilizing high energy electromagnetic radiation or high energy particles.
- 510, for processes to polymerize an applied nonuniform or patterned coating utilizing low energy electromagnetic radiation.
- 526, for nonuniform or patterned coating processes utilizing ion plating or implantation.
- 555, for nonuniform or patterned coating processes utilizing laser radiation in a thermal pretreatment or a thermal posttreatment of a coated substrate.

SEE OR SEARCH CLASS:

- 430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving electric or magnetic imagery.

553 Low energy electromagnetic radiation (e.g., microwave, radio wave, IR, UV, visible, actinic, laser, etc.):

This subclass is indented under subclass 532. Processes wherein the substrate prior to coating or the coated substrate is treated with low energy electromagnetic radiation.

- (1) Note. The term "low energy electromagnetic radiation" as employed here and indented subclasses includes, e.g., ultraviolet, infrared, visible light, actinic, microwave, and radio waves. Electromagnetic wave energy measured above wavelengths of 100 Angstroms (10 to the minus 8 meters) will be considered low energy electromagnetic radiation. a. ultraviolet (101 4000 A); b. actinic light includes both UV & visible; c. visible (4000 A 7000 A); d. infrared (above 7000 A); e. microwave (1mm 1m (includes 2.45 GHz)); f. radio wave 13.56 MHz is permitted frequency; g. laser. This list is not intended to be exhaustive and is not limited to the above examples.

554 Laser:

This subclass is indented under subclass 553. Processes wherein a narrow beam of coherent light (light amplification by simulated emissions of radiation) is utilized to treat the substrate or coated substrate.

SEE OR SEARCH CLASS:

- 219, Electric Heating, subclasses 121.11+ for processes utilizing electric heat energy, per se, wherein the heat source is an electron beam, plasma, arc, laser, etc. Documents should be placed in Class 427 as originals if a coating operation is claimed in combination with an electric heating step to treat a substrate before or after coating.

555 Nonuniform or patterned coating:

This subclass is indented under subclass 554. Processes wherein the coating utilized in the pretreatment of a substrate or the posttreatment of a coated substrate (1) is applied only to selected portions of a base, (2) is applied in such a manner as to produce a coating of

uneven, discontinuous, or nonuniform thickness or (3) varies from area to area as to physical or chemical properties.

SEE OR SEARCH THIS CLASS, SUBCLASS:

256+, for nonuniform or patterned coating processes without the use of electrical, magnetic, electromagnetic, or wave energy.

448, nonuniform or patterned spray coating processes utilizing flame or plasma heat.

466, for nonuniform or patterned coating processes utilizing electrostatic charge, field, or force.

504, for processes to polymerize an applied nonuniform or patterned plasma coating utilizing high energy electromagnetic radiation or high energy particles.

510, for processes to polymerize an applied nonuniform or patterned coating utilizing low energy electromagnetic radiation.

526, for nonuniform or patterned coating processes utilizing ion plating or implantation.

SEE OR SEARCH CLASS:

430, Radiation Imagery Chemistry: Process, Composition, or Product Thereof, subclasses 31+ for coating processes involving radiation imagery.

556 Metal or metal alloy substrate:

This subclass is indented under subclass 555. Processes wherein the nonuniform coating is applied to a pure metal or metal alloy substrate.

557 Thermal processes (e.g., radiant heat, infrared, etc.):

This subclass is indented under subclass 553. Processes wherein the energy utilized to treat a substrate prior to coating or a coated substrate is heat producing wave energy.

558 Ultraviolet light:

This subclass is indented under subclass 557. Processes wherein the wave energy utilized to produce the heat which treats the substrate or the coated substrate is ultraviolet light.

559 Fusing, curing, or annealing (e.g., ceramics, etc.):

This subclass is indented under subclass 557. Processes wherein wave energy is utilized to produce heat which will fuse, cure, or anneal the coating in a posttreatment process.

(1) Note. Annealing of metals is not classified here. Search the appropriate metal working and metal treating classes.

560 Sonic or ultrasonic (e.g., cleaning or removing material from substrate, etc.):

This subclass is indented under subclass 532. Processes wherein sonic or ultrasonic energy is utilized to pretreat a substrate or to posttreat a coated substrate.

(1) Note. Ultrasonic has a frequency above sonic; i.e., frequencies above 16,000 hertz and below radio waves.

561 Pretreatment of coating supply or source outside of primary deposition zone or off site:

This subclass is indented under subclass 457. Processes wherein a coating material supply which is offsite or outside of the primary deposition region, zone, or chamber is treated with electrical, magnetic, electromagnetic, or wave energy and subsequently directed or reflected to the substrate to which it is applied.

(1) Note. Included herein are processes of producing a vapor for use in vapor deposition processes.

(2) Note. Processes utilizing plural chambers, shutters, shields, or noncontiguous masks and some guides or separators are used to direct the pretreated coating supply found in this subclass.

562 Electric discharge (e.g., corona, glow discharge, etc.):

This subclass is indented under subclass 561. Processes wherein an electric discharge is used to treat the coating material before it is applied.

(1) Note. The arc discharge is a type of electrical conduction in gases characterized by high current density and low potential drop. It is closely related to the

glow discharge, but has a much lower potential drop in the cathode region, as well as a greater current density.

563 Silicon containing coating material:
This subclass is indented under subclass 562. Processes wherein coating material applied to the substrate contains silicon.

SEE OR SEARCH CLASS:

438, Semiconductor Device Manufacturing: Process, particularly subclasses 788+ and 792+ for deposition of silicon oxide or silicon nitride, respectively, on a semiconductor substrate utilizing electromagnetic or wave energy.

564 Metal, metal alloy, or metal oxide containing coating material:
Processes under 562 wherein the coating material supply contains a pure metal, metal alloy, or metal oxide.

565 Sonic or ultrasonic (e.g., vibratory energy, etc.):
This subclass is indented under subclass 561. Processes wherein sonic or ultrasonic wave energy is used to cause a continuously reversing change in the magnitude of waves (vibrations) to treat the coating material supply.

566 Electron irradiation (e.g., ebeam evaporation, etc.):
This subclass is indented under subclass 561. Processes wherein the direct application of electrons is employed to treat the coating material supply.

567 Silicon or metal oxide coating (e.g., glass, etc.):
This subclass is indented under subclass 566. Processes wherein the coating material contains metal oxide or silicon.

568 Silicon containing coating supply or source:
This subclass is indented under subclass 561. Processes wherein the coating supply or source contains silicon.

569 Plasma (e.g., corona, glow discharge, cold plasma, etc.):

This subclass is indented under subclass 457. Processes wherein a wholly or partially ionized gas, which has an activating source, is responsible for the deposition of the coating material.

(1) Note. A plasma consists of a wholly or partially ionized gas composed of ions, electrons, and neutral particles. The concentration of negatively and positively charged carriers are approximately equal.

(2) Note. Processes utilizing corona, glow discharge, and cold plasma are found here, when utilized to cause disassociation or ionization of the vaporous reactants allowing a coating material (reaction product) to deposit on a substrate.

(3) Note. In a cold plasma the temperature of the electrons is high wherein the temperature of the ions is relatively low, possibly room temperature.

570 Utilizing plasma with other nonionizing energy sources:

This subclass is indented under subclass 569. Processes which utilize (1) a plasma and (2) a secondary energy source at any stage in the plasma coating process for any reason, other than initiating or generating the plasma.

(1) Note. This subclass includes subject matter with dual activation (reaction energized sites) wherein one of the energy sources must be plasma (e.g., plasma plus infrared heat energy, etc.).

(2) Note. Lacking an indication to the contrary, it will be assumed that a disclosed energy source is the plasma initiating source, unless it is specified that the energy source is utilized for a purpose other than initiating the plasma.

571 With magnetic enhancement:

This subclass is indented under subclass 570. Processes wherein a plasma utilized having an activating energy source is confined or shaped by a magnetic field or force.

572 Light as energy source:

This subclass is indented under subclass 570. Processes wherein the secondary energy used in conjunction with a plasma is electromagnetic wave energy.

573 With heated substrate:

This subclass is indented under subclass 570. Processes wherein a substrate is heated using electrical or electromagnetic wave energy, including indirect heat as in the form of a susceptor.

574 Silicon containing coating:

This subclass is indented under subclass 570. Processes wherein the coating material contains silicon.

575 Generated by microwave (i.e., 1mm to 1m):

This subclass is indented under subclass 569. Processes wherein microwave energy is utilized to activate or initiate the plasma.

(1) Note. The wavelength of microwave is measured as 1mm to 1m and its FCC allowed frequency is 2.45 GHz.

(2) Note. Microwave is a term applied to electromagnetic waves which occupy a region in the electromagnetic spectrum which is bounded by radio waves on the side of longer wavelengths and by infrared waves on the side of shorter wavelengths.

576 Metal, metal alloy, or metal oxide coating:

This subclass is indented under subclass 569. Processes wherein the coating material applied contains a pure metal, metal alloy, or metal oxide.

577 Inorganic carbon containing coating material, not as steel (e.g., carbide, etc.):

This subclass is indented under subclass 569. Processes wherein the coating material, excluding steel, contains inorganic carbon.

(1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the terms "organic" and "inorganic."

(2) Note. Metal compounds, excluding steel, containing more than 1.7 percent of inorganic carbon are properly classified in this subclass.

578 Silicon containing coating material:

This subclass is indented under subclass 569. Processes wherein a coating material applied contains silicon.

579 Silicon oxides or nitrides:

This subclass is indented under subclass 578. Processes wherein the silicon utilized in the coating material is silicon oxide or silicon nitride.

SEE OR SEARCH THIS CLASS, SUBCLASS:

577, for coating material containing silicon carbide.

SEE OR SEARCH CLASS:

438, Semiconductor Device Manufacturing: Process, particularly subclasses 788+ and 792+ for deposition of silicon oxide or silicon nitride, respectively, on a semiconductor substrate utilizing electromagnetic or wave energy.

580 Electrical discharge (e.g., arcs, sparks, etc.):

This subclass is indented under subclass 457. Processes wherein the deposition of the coating material involves the use a luminous discharge of electricity, through a gas or vapor, between two electrodes of which one may be the substrate.

(1) Note. An arc discharge is a type of electrical conduction in gases characterized by high current density and low potential drop. It is closely related to the glow discharge, but has a much lower potential drop in the cathode region, as well as a greater current density, wherein no sustained plasma is formed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

446, for the use of an arc to coat with plasma spray.

562, for the use of an arc to pretreat the coating supply or source.

- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclasses 73.11, 73.21, and 76.1+ for coating operations that involve a buildup of metal coating on a metal workpiece and wherein an arc between an electrode and the work is utilized.
- 581 Chemical deposition from liquid contiguous with substrate via electron beam or light (e.g., photochemical liquid deposition, etc.):**
This subclass is indented under subclass 457. Processes wherein the deposition of a liquid coating is driven by either light energy or an electron beam. The liquid coating material must be contiguous with the substrate during the energy application.
- 582 Photoinitiated chemical vapor deposition (i.e., photo CVD):**
This subclass is indented under subclass 457. Processes wherein a chemical vapor reaction driven by the absorption of light occurs and a reaction product is deposited on a substrate.
- (1) Note. In processes involving photo initiated chemical vapor deposition, the wave length or the specific energy level of a photon are generally identified.
- 583 Silicon containing coating:**
This subclass is indented under subclass 582. Processes wherein an applied coating contains silicon.
- 584 Metal, metal alloy, or metal oxide coating:**
This subclass is indented under subclass 582. Processes wherein an applied coating material contains pure metal, metal alloy, or metal oxide.
- 585 Chemical vapor deposition (e.g., electron beam or heating using IR, inductance, resistance, etc.):**
This subclass is indented under subclass 457. Processes wherein a vapor phase precursor decomposes either in a gas or on a substrate, which reaction is effected by electromagnetic, electrical, magnetic, or wave energy which results in a coated substrate.
- (1) Note. Thermal chemical vapor deposition processes using infrared heating to effect or assist in effecting the chemical reaction are found here.
- (2) Note. This subclass excludes processes wherein an infrared energy is utilized merely to vaporize the coating material, e.g., where no chemical reaction takes place, in a vapor deposition process.
- (3) Note. Indirect heat transfer to a substrate as via convection is excluded from this and indented subclasses as a heat energy source.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 69, and 70, for producing an electrical product by vapor deposition coating of a fluorescent or phosphorescent base which may include utilization of radiant heat.
- 78, for a process of vapor deposition which may include utilization of radiant heat to make an electrical product which is electron emissive or suppressive (excluding electrode for arc).
- 96.7, for a process of using a mist or aerosol for coating a substrate which may include utilization of radiant heat to produce an integrated or printed circuit or circuit board.
- 96.8, for a process of coating vapor or gas phase material (other than a mist or aerosol) onto a substrate which may include utilization of radiant heat to produce an integrated or printed circuit or circuit board.
- 124, for a process of metal coating by vapor deposition or utilizing vacuum which may include utilization of radiant heat to make an electrical product, in general.
- 166, and 167, for a process of making an optical element by vapor deposition onto a transparent glass base which may include utilization of radiant heat.
- 248.1 through 255.7, for other processes of coating by vapor, gas, or smoke which may include utilization of radiant heat.
- 497, 509, 582-584, and 593, for other vapor deposition processes involving direct application of electrical, mag-

netic, wave, or particulate energy to a substrate, coated substrate, or coating material.

SEE OR SEARCH CLASS:

117, Single-Crystal, Oriented-Crystal, and Epitaxy Growth Processes; Non-Coating Apparatus Therefor, appropriate subclasses for a process for growing therein-defined single crystal of all types of materials, including inorganic or organic, and by all techniques, especially subclasses 84 through 109 for vapor or gas phase epitaxy.

586 Pyrolytic use of laser or focused light (e.g., IR, UV lasers to heat, etc.):

This subclass is indented under subclass 585. Processes in which a chemical vapor deposition process utilizes heat generated by laser (UV, IR, or focused beam) radiation to drive the chemical reaction.

587 Resistance or induction heating:

Processes under 585 wherein resistance or induction heat is employed to effect the coating.

- (1) Note. Induction heating involves subjecting a conductive body to a variable electromagnetic field, usually at a frequency lower than that used for dielectric heating. Internal resistance in the conductive body then cause the conductive body to heat up.
- (2) Note. Resistance heating involves passing an electric current through a conductive body to produce heat by means of internal resistance.
- (3) Note. This subclass does not include processes wherein the electric current is passed through a heating filament, coil, susceptor, etc., which is not the substrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

540, wherein an arc or electrical discharge is produced in resistance heating.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 73.11, 73.21, and 76.1+ for metal coating buildup with the use of resistance heating. Electric welding, has to have two preforms being joined, wherein coating is ancillary to the joining of the preforms.

588 Silicon or semiconductor material containing coating:

This subclass is indented under subclass 587. Processes wherein coating matter applied to a substrate contains silicon or semiconductor material.

SEE OR SEARCH CLASS:

438, Semiconductor Device Manufacturing: Process, particularly subclasses 788+ and 792+ for deposition of silicon oxide or silicon nitride, respectively, on a semiconductor substrate utilizing electromagnetic or wave energy.

589 Silicon carbide:

This subclass is indented under subclass 588. Processes wherein the silicon utilized in the coating is silicon carbide.

590 Boron, nitrogen, or inorganic carbon containing coating:

This subclass is indented under subclass 587. Processes wherein the coating material contains boron, nitrogen, or inorganic carbon included in its composition.

- (1) Note. Attention is directed to the definition of Class 260, Chemistry of Carbon Compounds, for the distinction between the terms "organic" and "inorganic."

591 Induction or dielectric heating:

This subclass is indented under subclass 457. Processes which utilize induction or dielectric heating.

- (1) Note. Induction heating involves subjecting a conductive body to a variable electromagnetic field, usually at a frequency lower than that used for dielectric heating. Internal resistance in the

conductive body then cause the conductive body to heat up.

- (2) Note. Dielectric heating involves the method of raising the temperature of a nominally insulating material by sandwiching it between two plates to which an rf voltage is applied. The material acts as a dielectric and its internal resistance causes it to heat up.

592 Resistance heating:

This subclass is indented under subclass 457. Processes wherein an electrical current is passed through the coating material or substrate to produce heat by means of internal resistance.

- (1) Note. This subclass does not include processes wherein the electric current is passed through a heating filament, coil, susceptor, etc., which is not the substrate or the coating material.
- (2) Note. This subclass excludes indirect heat transfer to the substrate or coating material as via convection heat.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 248.1, for processes involving direct heating of an evaporation pot, boat, or crucible containing coating material using resistance energy with the intent to vaporize said coating for application to a substrate.
- 540, wherein an arc or electrical discharge is produced in resistance heating to effect coating.
- 580, wherein an arc or electrical discharge is produced in resistance heating to effect coating.

SEE OR SEARCH CLASS:

- 219, Electric Heating, subclasses 73.11, 73.21, and 76.1+ for metal coating buildup with the use of resistance heating. Electric welding has to have two preforms being joined, wherein coating is ancillary to the joining of the preforms.

593 Vapor deposition employing resistance heating of substrate or coating material:

This subclass is indented under subclass 592. Processes wherein a substrate is resistively heated and a coating material is applied as a vapor or gas, or a source material for vapor deposition is resistively heated.

- (1) Note. Processes utilizing consumable electrodes to apply coating as vapor or gas, by resistance electrical energy are proper for this and indented subclasses.
- (2) Note. Explosive or detonation vaporization for deposition, via resistance heating is properly classified here.
- (3) Note. Processes wherein a rod, wire, or filament is wholly or partially vaporized and deposited on a substrate is proper for this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 446, for explosive or detonation flame or plasma spray vaporization.
- 587, wherein a chemical vapor reaction occurs.

594 Immersion or partial immersion:

This subclass is indented under subclass 592. Processes wherein the coating is applied by submerging at least part of the base in a pool or bath of coating material.

- (1) Note. Reference to the use of a "bath" coating process is considered immersion and proper for this subclass.
- (2) Note. Fluidized bed processes will not be considered immersion for this subclass. Processes utilizing fluidized beds of solid particles or powder using resistance heating is found in this class, subclass 592.

595 Electromagnetic or particulate radiation utilized (e.g., IR, UV, Xray, gamma ray, actinic, microwave, radio wave, atomic particle; i.e., alpha ray, beta ray, electron, etc.):

This subclass is indented under subclass 457. Processes wherein the deposition of the coating material is assisted by electromagnetic or par-

ticular radiation, the propagation of energy through space or material.

- (1) Note. For the purpose of classification here and in indented subclasses, the term "electromagnetic or particulate radiation" includes the following: a. Electromagnetic Radiation; (radio wave, microwave, visible, ultraviolet, X rays, gamma ray, actinic) b. Particulate Radiation (alpha ray (2 protons + 2 neutrons); beta ray (electrons), electron (accelerated beam) neutron)

This list is not intended to be exhaustive and is not limited to the above examples.

596 Laser or electron beam (e.g., heat source, etc.):

This subclass is indented under subclass 595. Processes wherein laser or electron beam is utilized as a heat source to assist in the deposition of the coating material.

- (1) Note. Processes wherein a narrow beam of coherent light (light amplification by simulated emissions of radiation) is utilized to assist in the deposition of the coating material are found here.
- (2) Note. Processes wherein a narrow stream of electrons moving in the same direction under the influence of an electric or magnetic field is utilized as a heat source to assist in the deposition of the coating are found here.

597 Metal or metal alloy containing coating material applied:

This subclass is indented under subclass 596. Processes wherein the coating material applied contains a pure metal or a metal alloy.

598 Magnetic field or force utilized:

This subclass is indented under subclass 457. Processes wherein a magnetic field or force is used to treat or coat or assist in the treatment or coating of a substrate or coated substrate.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 543, for the use of a magnetic field or force to produce induction heating.

- 547, for the use of magnetic field or force to pretreat or posttreat the substrate.

599 Magnetic recording medium or device formed:

This subclass is indented under subclass 598. Processes wherein a device or tape is produced to store information by magnetic means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 128, for methods of forming magnetic devices in general, not provided for above.
- 502, for magnetic recording medium formed using high energy ionizing radiation.
- 548, for the formation of a magnetic medium which utilizes magnetic field or force to pretreat or posttreat the substrate.

600 Sonic or ultrasonic:

This subclass is indented under subclass 457. Processes wherein the wave energy used to cause deposition of the applied coating is sonic or ultrasonic.

- (1) Note. Ultrasonic waves vibrate at frequencies beyond the hearing power of human beings (above 16,000 hertz). Sonic frequencies are vibrations which can be heard by the human ear (from about 15 hertz to approximately 20,000 hertz).

601 Immersion bath utilized:

This subclass is indented under subclass 600. Processes wherein the coating is applied by wholly or partially submerging the base in a coating material and simultaneously applying sonic or ultrasonic energy to the base or the coating material supply.

CROSS-REFERENCE ART COLLECTIONS

900 CHEMICAL VAPOR INFILTRATION (i.e., CVI):

This subclass is indented under the class definition. Process in which chemical reactants in vapor phase penetrate a porous substrate wherein a vapor phase reaction subsequently occurs to form a coating that deposits in said substrate.

901 LIQUID SOURCE CHEMICAL VAPOR DEPOSITION (i.e., LSCVD) OR AEROSOL CHEMICAL VAPOR DEPOSITION (i.e., ACVD):

This subclass is indented under the class definition. Process which includes vaporizing a liquid material within a chemical vapor deposition chamber or reactor, wherein the vaporized liquid (per se or in aerosol form) contacts a heated substrate to thermally decompose, thereby forming a coating (film, layer, etc.) on the substrate surface.

- (1) Note. This subclass is proper for heat decomposition of liquid, vapor, or gas to form a coating on a base

SEE OR SEARCH THIS CLASS, SUBCLASS:

226, for using heat to decompose an existing coating on a base.

902 DIAMOND-LIKE CARBON COATING (i.e., DLC):

This subclass is indented under the class definition. Process wherein the resulting coating consists primarily of metastable amorphous carbon which contains both hybridized tetragonal sp³ and trigonal sp² bonds.

- (1) Note. The diamond-like carbon may contain, in addition to the primary amorphous phase, very small crystals ranging in diameter from 2nm to 20nm.

903 FULLERENE TYPE BASE OR COATING:

This subclass is indented under the class definition. Process wherein the coating or base consists of carbon (generally carbon with 20 to 1000 atoms) having pentagonal or hexagonal faces.

904 Utilizing low energy electromagnetic radiation (e.g., microwave, radio wave, IR, UV, visible, actinic, laser, etc.):

This subclass is indented under subclass 902. Process wherein low energy electromagnetic radiation is used during any stage of the coating operation to deposit a diamond-like coating.

- (1) Note. The term low energy electromagnetic radiation, as employed here,

includes, e.g., ultraviolet, infrared, visible light, actinic, microwave, and radio waves. Electromagnetic wave energy measured above wavelengths of 100 Angstroms (10 to the minus 8 meters) will be considered low energy electromagnetic radiation.

905 Utilizing ion plating or ion implantation:

This subclass is indented under subclass 902. Process wherein ion plating or ion implantation is used during any stage of the coating operation to deposit a diamond-like coating.

- (1) Note. Ion plating or implantation is considered to be a process of (a) evaporating coating material in the presence of an electrical discharge (arc, beam, etc.) in an energetic gaseous medium, which forms or is associated with a cathode polarized by a high negative voltage relative to the source of the coating material, and depositing the coating material onto the substrate, with simultaneous bombardment by ions which cause momentum transfer (sputtering) on the substrate to occur or (b) coating material is introduced into or penetrates the near-surface region of a substrate by directing an accelerated beam or stream of energetic (charged) ions including the coating material, toward the substrate.

- (2) Note. The term ion plating is applied to a combination of process steps that include: (a) sputtering of the surface of a substrate due to momentum transfer, and (b) simultaneously or subsequently depositing a coating on the substrate from a flux of ionic coating material (i.e., usually considered to be a high energy plasma with a small flux of ions and a much larger number of energetic neutrals).

- (3) Note. Ion implantation of the near surface region of a substrate to create a distinguishable layer differing in composition from the substrate will be proper for this class, regardless of whether the implantation of this layer is limited to the microstructure or not.

- (4) Note. Ion plating, wherein the target material and the substrate are one and the same is proper for this subclass and indented subclasses.
- (5) Note. Processes utilizing ion bombardment or ion treating that specifies neither implanting, etching, plating, etc., but merely recites some change as in the materials characteristic properties will be classified in this subclass.

906 Utilizing plasma (e.g., corona, glow discharge, cold plasma, etc.):

This subclass is indented under subclass 902. Process wherein plasma is used during any stage of the coating operation to deposit a diamond-like coating.

- (1) Note. A plasma consists of a wholly or partially ionized gas composed of ions, electrons, and neutral particles. The concentrations of negatively and positively charged carriers are approximately equal.
- (2) Note. Processes utilizing corona, glow discharge, and cold plasma are found here, when utilized to cause disassociation or ionization of the vaporous reactants allowing a coating material (reaction product) to deposit on a substrate.
- (3) Note. In a cold plasma the temperature of the electrons is high whereas the temperature of the ions is relatively low, possibly room temperature.

FOREIGN ART COLLECTIONS

The definitions of the Foreign Patent/NPL Art Collections below correspond to the definitions of the abolished subclasses from which these collections were formed. See the Foreign Patent/NPL Art Collection schedule for specific correspondences. [Note: the titles and definitions for indented art collections include all the details of the one(s) that are hierarchically superior.]

FOR 100 Carbon on carbide coating (427/249):

Foreign art collections including processes that result in a carbon or carbide coated base.

FOR 101 Base includes inorganic silicon or metal containing compound (e.g., glass, ceramic, brick, etc.) (427/255):

Foreign art collections including processes wherein the base includes an inorganic silicon containing com or an inorganic metal containing com.

FOR 102 Mixture of vapors or gases utilized:

Foreign art collections including processes wherein a mix of gases or vapors is contacted with the base to form a coating.

FOR 103 The resultant coating is a mixture or a com formed from the mixture utilized:

Foreign art collections including processes wherein the resultant coating after application to the base comprises (a) a mixture of coating components from different sources or (b) a compound formed from components supplied by different sources.

FOR 104 The mixture utilized contains oxygen:

Foreign art collections including processes wherein at least one of the gases in the mixture of gases or vapors includes oxygen.

FOR 105 Integrated circuit, printed circuit, or circuit board:

Foreign art collection including processes for coating producing an integrated circuit, printed circuit, or circuit board (i.e., circuits in which conductive wire has been replaced by a conductive coating or a combination of interconnected circuit elements produced by coating).

FOR 106 Coating hole walls:

Foreign art collection including processes wherein a coating is applied to the sides of a hole in a circuit board.

- (1) Note. Such coatings are generally for the purpose of providing a conductive path from one side of a circuit board to the other.

FOR 107 Immersion metal plating from solution (e.g., electroless plating, etc.):

Foreign art collection including processes wherein a metal coating is applied by immersing the base in a metal salt solution.

FOR 108 Vapor deposition:

Foreign art collection including processes wherein the coating is produced on a base by adsorption or condensation of, or reaction with, a vapor or gas.

FOR 109 SPRAYING:

Foreign art collection including processes wherein the coating material is projected by mechanical force toward the base.

FOR 110 ROLLER APPLICATOR UTILIZED (E.G., PADDING, ETC.):

Foreign art collection including processes wherein coating material is applied to the base from the curved outer surface of a cylindrical applicator while said applicator is rotating about an internal axis.

- (1) Note. Padding coating material onto a base is assumed to involve using a roller and is provided for in this subclass.

END