CPC COOPERATIVE PATENT CLASSIFICATION

H01G CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES OR LIGHT-SENSITIVE DEVICES, OF THE ELECTROLYTIC TYPE (selection of specified materials as dielectric H01B 3/00; { ceramics C04B })

H01G 2/00 **Details of capacitors not covered by a single one of groups H01G 4/00-H01G 11/00**

H01G 2/02 . Mountings
H01G 2/04 . . specially adapted for mounting on a chassis
H01G 2/06 . . specially adapted for mounting on a printed-circuit support
H01G 2/065 . . . { for surface mounting, e.g. chip capacitors }

H01G 2/08 . Cooling arrangements; Heating arrangements; Ventilating arrangements

H01G 2/10 . Housing; Encapsulation { WARNING: Not complete, see also H01G 4/224 }
H01G 2/103 . . { Sealings, e.g. for lead-in wires; Covers }
H01G 2/106 . . { Fixing the capacitor in a housing }

H01G 2/12 . Protection against corrosion (H01G 2/10 takes precedence)

H01G 2/14 . Protection against electric or thermal overload (by cooling H01G 2/08)
H01G 2/16 . . with fusing elements
H01G 2/18 . . with breakable contacts

H01G 2/20 . Arrangements for preventing discharge from edges of electrodes

H01G 2/22 . Electrostatic or magnetic shielding

H01G 2/24 . Distinguishing marks, e.g. colour coding

H01G 4/00 **Fixed capacitors; Processes of their manufacture** (electrolytic capacitors H01G 9/00)

H01G 4/002 . Details
H01G 4/005 . . Electrodes
H01G 4/008 . . . Selection of materials
H01G 4/0085 . . . . { Fried electrodes }
H01G 4/01 . . . Form of self-supporting electrodes
H01G 4/012 . . . Form of non-self-supporting electrodes
H01G 4/015 . . . Special provisions for self-healing
H01G 4/018 . . Dielectrics
H01G 4/02 . . . Gas or vapour dielectrics

H01G 4/04 . . . Liquid dielectrics

H01G 4/06 . . . Solid dielectrics

H01G 4/08 . . . . Inorganic dielectrics

H01G 4/085 . . . . . { Vapour deposited }

H01G 4/10 . . . . . Metal-oxide dielectrics {(H01G 4/085 takes precedence)}

H01G 4/105 . . . . . { Glass dielectric }

H01G 4/12 . . . . . Ceramic dielectrics {(H01G 4/085 takes precedence; ceramic materials per se C04B 35/00)}

H01G 4/1209 . . . . . { characterised by the ceramic dielectric material (H01G 4/1272, H01G 4/1281 take precedence)}

H01G 4/1218 . . . . . { based on titanium oxides or titanates (H01G 4/1245 takes precedence)}

H01G 4/1227 . . . . . { based on alkaline earth titanates }

H01G 4/1236 . . . . . { based on zirconium oxides or zirconates (H01G 4/1263 takes precedence)}

H01G 4/1245 . . . . . { containing also titanates }

H01G 4/1254 . . . . . { based on niobium or tungsteen, tantalum oxides or niobates, tantalates }

H01G 4/1263 . . . . . { containing also zirconium oxides or zirconates }

H01G 4/1272 . . . . . { Semiconductive ceramic capacitors }

H01G 4/1281 . . . . . { with grain boundary layer }

H01G 4/129 . . . . . { containing a glassy phase, e.g. glass ceramic }

H01G 4/14 . . . . Organic dielectrics

H01G 4/145 . . . . . { vapour deposited }

H01G 4/16 . . . . . of fibrous material, e.g. paper

H01G 4/18 . . . . . of synthetic material, e.g. derivatives of cellulose (H01G 4/16 takes precedence)

H01G 4/183 . . . . . { Derivatives of cellulose (H01G 4/145 takes precedence)}

H01G 4/186 . . . . . { halogenated (H01G 4/145 takes precedence)}

H01G 4/20 . . . using combinations of dielectrics from more than one of groups H01G 4/02 to H01G 4/06 (H01G 4/12 takes precedence)

H01G 4/203 . . . . { Fibrous material or synthetic material }

H01G 4/206 . . . . { inorganic and synthetic material }

H01G 4/22 . . . . impregnated

H01G 4/221 . . . . . { characterised by the composition of the impregnant }

H01G 4/222 . . . . . { halogenated }

H01G 4/224 . . Housing; Encapsulation

H01G 4/228 . . Terminals

H01G 4/232 . . . electrically connecting two or more layers of a stacked or rolled capacitor

H01G 4/2325 . . . . { characterised by the material of the terminals }

H01G 4/236 . . . leading through the housing, i.e. lead-through

H01G 4/242 . . . the capacitive element surrounding the terminal

H01G 4/245 . . . . Tabs between the layers of a rolled electrode

H01G 4/248 . . . the terminals embracing or surrounding the capacitive element, e.g. caps (H01G 4/252 takes precedence)

H01G 4/252 . . . the terminals being coated on the capacitive element (H01G 4/232 takes precedence)

H01G 4/255 . . Means for correcting the capacitance value

H01G 4/258 . . Temperature compensation means

H01G 4/26 . Folded capacitors

H01G 4/28 . Tubular capacitors

H01G 4/30 . Stacked capacitors (H01G 4/33 takes precedence)

H01G 4/302 . . { obtained by injection of metal in cavities formed in a ceramic body }

H01G 4/304 . . { obtained from a another capacitor }

H01G 4/306 . . { made by thin film techniques }

H01G 4/308 . . { made by transfer techniques }

H01G 4/32 . Wound capacitors

H01G 4/33 . Thin- or thick-film capacitors (thin- or thick-film circuits H01L 27/00 { capacitors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor H01L 28/40 })

H01G 4/35 . Feed-through capacitors or anti-noise capacitors

H01G 4/38 . Multiple capacitors, i.e. structural combinations of fixed capacitors

H01G 4/385 . . { Single unit multiple capacitors, e.g. dual capacitor in one coil }

H01G 4/40 . Structural combinations of fixed capacitors with other electric elements, the structure mainly consisting of a capacitor, e.g. RC combinations (thin or thick film circuits H01L 27/00; { capacitors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor H01L 28/40 })

H01G 5/00 Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture

H01G 5/01 . Details

H01G 5/011 . . Electrodes

H01G 5/012 . . . at least one of the electrodes being a displaceable liquid or powder

H01G 5/013 . . Dielectrics

H01G 5/0132 . . . { Liquid dielectrics }

H01G 5/0134 . . . { Solid dielectrics }

H01G 5/0136 . . . . { with movable electrodes }

H01G 5/0138 . . . . { with movable dielectrics }

H01G 5/014 . . Housing; Encapsulation

H01G 5/015 . . Current collectors

H01G 5/017 . . Temperature compensation

H01G 5/019 . . Means for correcting the capacitance characteristics

H01G 2005/02 . { IPC5 having air, gas, or vacuum as the dielectric }

H01G 5/04 . using variation of effective area of electrode

H01G 5/06 . . due to rotation of flat or substantially flat electrodes

H01G 5/08 . . . becoming active in succession

H01G 5/10 . . due to rotation of helical electrodes

H01G 5/12 . . due to rotation of part-cylindrical, conical, or spherical electrodes

H01G 5/14 . . due to longitudinal movement of electrodes

H01G 5/145 . . . { with profiled electrodes }

H01G 5/16 . using variation of distance between electrodes

H01G 5/18 . . due to change in inclination, e.g. by flexing, by spiral wrapping

H01G 5/38 . Multiple capacitors, e.g. ganged

H01G 5/40 . Structural combinations of variable capacitors with other electric elements not covered by this subclass, the structure mainly consisting of a capacitor, e.g. RC combinations (RC-filters H03H)

H01G 7/00 **Capacitors in which the capacitance is varied by non-mechanical means; Processes of their manufacture** (capacitors with potential jump or surface barrier H01L 29/00)

H01G 7/02 . Electrets, i.e. having a permanently-polarised dielectric

H01G 7/021 . . { having an organic dielectric }

H01G 7/023 . . . { of macromolecular compounds }

H01G 7/025 . . { having an inorganic dielectric }

H01G 7/026 . . . { with ceramic dielectric }

H01G 7/028 . . { having a heterogeneous dielectric }

H01G 7/04 . having a dielectric selected for the variation of its permittivity with applied temperature

H01G 7/06 . having a dielectric selected for the variation of its permittivity with applied voltage, i.e. ferroelectric capacitors (electrets H01G 7/02)

H01G 9/00 **Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture**

H01G 9/0003 . { Protection against electric or thermal overload; cooling arrangements; means for avoiding the formation of cathode films (H01G 9/12 takes precedence)}

H01G 2009/0007 . { Double layer capacitors }

H01G 2009/001 . { Temperature sensitive devices }

H01G 2009/0014 . { Solid electrolytic capacitors }
H01G 2009/0018 .. { with wound foil electrodes }
H01G 2009/0021 .. { Skin fibre }

H01G 2009/0025 . { Liquid electrolytic capacitors }

H01G 9/0029 . { Processes of manufacture }
H01G 9/0032 .. { formation of the dielectric layer (anodisation in general C25D)}
H01G 9/0036 .. { Formation of the solid electrolyte layer }

H01G 9/004 . Details
H01G 9/008 .. Terminals
H01G 9/012 ... specially adapted for solid capacitors
H01G 9/016 ... specially adapted for double-layer capacitors
H01G 9/02 .. Diaphragms; Separators
H01G 9/022 .. Electrolytes, absorbents (electrolytic or electrophoretic processes, apparatus therefor C25; for primary, secondary or fuel cells H01M)
H01G 9/025 ... Solid electrolytes (H01G 11/54 takes precedence)
H01G 9/028 .... Organic semiconducting electrolytes, e.g. TCNQ
H01G 9/032 .... Inorganic semiconducting electrolytes, e.g. MnO_2
H01G 9/035 ... Liquid electrolytes, e.g. impregnating materials (H01G 11/54 takes precedence)
H01G 9/038 ... Electrolytes specially adapted for double-layer capacitors

WARNING

This group is no longer used for classification of new documents as from October 1, 2012. The backfile is being continuously reclassified to group H01G 11/54

H01G 9/04 .. Electrodes { or formation of dielectric layers thereon }
H01G 2009/0404 ... { characterised by the material (alloys in general see C22C)}
H01G 2009/0408 .... { on Al basis }
H01G 2009/0412 ... { characterised by the structure }
H01G 2009/0416 .... { Etched foil electrodes (etching of metal in general C23F; electro-etching of metal in general C25F)}
H01G 9/042 ... characterised by the material (H01G 11/22 takes precedence)
H01G 9/0425 .... { specially adapted for cathode }
H01G 9/045 .... based on aluminium
H01G 9/048 ... characterised by their structure (H01G 11/22 takes precedence)

H01G 2009/05 . . . . { IPC5 consisting of tantalum, niobium, or sintered material; Combinations of such electrodes with solid semiconductive electrolytes, e.g. manganese dioxide not used, see subgroups and **H01G 9/00F**, **H01G 9/04B** }

H01G 9/052 . . . . Sintered electrodes

H01G 9/0525 . . . . . { Powder therefor (metallic powder in general B22F)}

H01G 9/055 . . . . Etched foil electrodes

H01G 9/058 . . . specially adapted for double-layer capacitors

WARNING

This group is no longer used for classification of new documents as from October 1, 2012. The backfile is being continuously reclassified to group H01G 11/22

H01G 9/06 . . . Mounting in containers

WARNING

This group is no longer used for classification of new documents as from October 1, 2012. The backfile is being continuously reclassified to groups H01G 11/66 - H01G 11/74

H01G 9/07 . . Dielectric layers

H01G 9/08 . . Housing; Encapsulation

H01G 9/10 . . . Sealing, e.g. of lead-in wires

H01G 9/12 . . . Vents or other means allowing expansion

H01G 9/14 . . Structural combinations { or circuits } for modifying, or compensating for, electric characteristics of electrolytic capacitors (impedance networks H03H)

H01G 9/145 . Liquid electrolytic capacitors (H01G 11/00 takes precedence)

H01G 9/15 . Solid electrolytic capacitors (H01G 11/00 takes precedence)

H01G 9/151 . . { with wound foil electrodes }

H01G 9/153 . . { Skin fibre }

H01G 9/155 . Double-layer capacitors

WARNING

This group is no longer used for classification of new documents as from October 1, 2012.The backfile is being continuously reclassified to group H01G 11/00 and its subgroups

H01G 9/16 . specially for use as rectifiers or detectors (H01G 9/22 takes precedence)

H01G 9/18 . Self-interrupters

H01G 9/20 . Light-sensitive devices

H01G 9/2004 . . { characterised by the electrolyte, e.g. comprising an organic electrolyte }

H01G 9/2009 . . . { Solid electrolytes }

H01G 9/2013 . . . { the electrolyte comprising ionic liquids, e.g. alkyl imidazolium iodide }

H01G 9/2018 . . . { characterised by the ionic charge transport species, e.g. redox shuttles }

H01G 9/2022 . . { characterized by he counter electrode }

H01G 9/2027 . . { comprising an oxide semiconductor electrode }

H01G 9/2031 . . . { comprising titanium oxide, e.g. TiO_2 (H01G 9/2036 takes precedence)}

H01G 9/2036 . . . { comprising mixed oxides, e.g. ZnO covered TiO_2 particles }

H01G 9/204 . . . { comprising zinc oxides, e.g. ZnO (H01G 9/2036 takes precedence)}

H01G 9/2045 . . { comprising a semiconductor electrode comprising elements of the fourth group of the Periodic System (C, Si, Ge, Sn, Pb) with or without impurities, e.g. doping materials }

H01G 9/205 . . { comprising a semiconductor electrode comprising AIII-BV compounds with or without impurities, e.g. doping materials }

H01G 9/2054 . . { comprising a semiconductor electrode comprising AII-BVI compounds, e.g. CdTe, CdSe, ZnTe, ZnSe, with or without impurities, e.g doping materials (H01G 9/2027 takes precedence)}

H01G 9/2059 . . { comprising an organic dye as the active light absorbing material, e.g. adsorbed on an electrode or dissolved in solution }

H01G 9/2063 . . . { comprising a mixture of two or more dyes }

H01G 9/2068 . . { Panels or arrays of photoelectrochemical cells, e.g. photovoltaic modules based on photoelectrochemical cells }

H01G 9/2072 . . . { comprising two or more photoelectrodes sensible to different parts of the solar spectrum, e.g. tandem cells }

H01G 9/2077 . . . { Sealing arrangements, e.g. to prevent the leakage of the electrolyte }

H01G 9/2081 . . . { Serial interconnection of cells }

H01G 9/2086 . . . { Photoelectrochemical cells in the form of a fiber }

H01G 9/209 . . { Light trapping arrangements }

H01G 9/2095 . . { comprising a flexible sustrate }

H01G 9/21 . Temperature-sensitive devices

H01G 9/22 . Devices using combined reduction and oxidation, e.g. redox arrangement or solion

H01G 9/26 . Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices with each other

H01G 9/28 . Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices with other electric components not covered by this subclass

H01G 11/00 **Hybrid capacitors, i.e. capacitors having different positive and negative electrodes; Electric double-layer [EDL] capacitors [EDLCs]; Processes specially adapted for the manufacture thereof or of parts thereof**

NOTE

Group H01G 11/02 takes precedence over groups H01G 11/04 - H01G 11/14

WARNING

Groups H01G 11/00 to H01G 11/86 correspond to IPC 2013.01. Concordance CPC - IPC 2012.01 for these groups is as follows: - H01G 11/00 : H01G 9/155 - H01G 11/02 : H01G 9/28; - H01G 11/04 - H01G 11/20: H01G 9/155; - H01G 11/22 - H01G 11/50: H01G 9/058; - H01G 11/52 : H01G 9/155; - H01G 11/54 - H01G 11/64 : H01G 9/038; - H01G 11/66 - H01G 11/76 : H01G 9/016; - H01G 11/78 - H01G 11/84 : H01G 9/155; - H01G 11/86 : H01G 9/058

H01G 11/02 . using combined reduction-oxidation reactions, e.g. redox arrangement or solion

H01G 11/04 . Hybrid capacitors

H01G 11/06 . . with one of the electrodes allowing ions or anions to be reversibly doped thereinto, e.g. lithium-ion capacitors [LICs]

H01G 11/08 . Structural combinations, e.g. assembly or connection, of hybrid or EDL capacitors with other electric components, at least one hybrid or EDL capacitor being the main component

H01G 11/10 . Multiple hybrid or EDL capacitors, e.g. arrays or modules (housings, cases or mountings thereof H01G 11/78)

H01G 11/12 . . Stacked hybrid or EDL capacitors

H01G 11/14 . Arrangements or processes for adjusting or protecting hybrid or EDL capacitors (emergency protective circuit arrangements specially adapted for capacitors, and effecting automatic switching in the event of an undesired change from normal working conditions H02H 7/16; emergency protective circuit arrangements for limiting excess current or voltages without disconnection H02H 9/00)

H01G 11/16 . . against electric overloads, e.g. including fuses

H01G 11/18 . . against thermal overloads, e.g. heating, cooling or ventilating

H01G 11/20 . . Reformation or processes for removal of impurities, e.g. scavenging

H01G 11/22 . Electrodes

H01G 11/24 . . characterised by structural features, e.g. forms, shapes, surface areas, porosities or dimensions, of the materials making up or comprised in the electrodes; characterised by the structural features of powders or particles used therefor

H01G 11/26 . . characterised by the structures of the electrodes, e.g. multi-layered, shapes, dimensions, porosities or surface features

H01G 11/28 . . . arranged or disposed on a current collector; Layers or phases between electrodes and current collectors,e.g. adhesives

H01G 11/30 . . characterised by their materials

H01G 11/32 . . . Carbon-based, e.g. activated carbon materials

H01G 11/34 . . . . characterised by carbonisation or activation of carbon

H01G 11/36 . . . . Nanostructures, e.g. nanofibres, nanotubes or fullerenes

H01G 11/38 . . . . Carbon pastes or blends; Binders or additives therein

H01G 11/40 . . . . Fibres

H01G 11/42 .... Powders or particles, e.g. composition thereof

H01G 11/44 .... Raw materials therefor, e.g. resins or coal

H01G 11/46 ... Metal oxides, e.g. ruthenium oxide

H01G 11/48 ... Conductive polymers

H01G 11/50 ... specially adapted for lithium-ion capacitors, e.g. for lithium-doping or for intercalation

H01G 11/52 . Separators

H01G 11/54 . Electrolytes

H01G 11/56 .. Solid electrolytes, e.g. gel; Additives therein

H01G 11/58 .. Liquid electrolytes

H01G 11/60 ... characterised by the solvent

H01G 11/62 ... characterised by the solute, e.g. salts, anions or cations therein

H01G 11/64 ... characterised by additives

H01G 11/66 . Current collectors

H01G 11/68 .. characterised by their materials

H01G 11/70 .. characterised by their structures

H01G 11/72 .. specially adapted for integration in multiple or stacked hybrid or EDL capacitors

H01G 11/74 . Terminals, e.g. extensions of current collectors

H01G 11/76 .. specially adapted for integration in multiple or stacked hybrid or EDL capacitors

H01G 11/78 . Cases; Housings; Encapsulations; Mountings

H01G 11/80 .. Gaskets; Sealings

H01G 11/82 .. Fixing or assembling a capacitive element in a housing, e.g. mounting electrodes, current collectors or terminals in containers or encapsulations

H01G 11/84 . Processes for the manufacture of hybrid or EDL capacitors, or components thereof

H01G 11/86 .. specially adapted for electrodes (carbonization or activation of carbon for the manufacture of electrodes H01G 11/34)

H01G 13/00 **Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in groups H01G 4/00 to H01G 11/00**

H01G 13/003 . { Apparatus or processes for encapsulating capacitors }

H01G 13/006 . { Apparatus or processes for applying terminals }

H01G 13/02 . Machines for winding capacitors (winding in general B65H)

H01G 13/04 . Drying (in general F26B); Impregnating

H01G 13/06 . with provision of removing metal surfaces

H01G 15/00 **Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with each other** (involving at least one hybrid or electric double-layer [EDL] capacitor as main component H01G 11/08)

H01G 17/00 **Structural combinations of capacitors or other devices covered by at least two different main groups of this subclass with other electric elements, not covered by this subclass, e.g. RC combinations** (thin- or thick-film circuits H01L 27/00; RC-filters H03H)