

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H01 BASIC ELECTRIC ELEMENTS

(NOTE omitted)

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](#)})

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

2/00	Details of capacitors not covered by a single one of groups H01G 4/00-H01G 11/00	4/105	. . . . . {Glass dielectric}
2/02	. Mountings	4/12	. . . . . Ceramic dielectrics {(H01G 4/085 takes precedence; ceramic materials per se C04B 35/00)}
2/04	. . specially adapted for mounting on a chassis		
2/06	. . specially adapted for mounting on a printed-circuit support	4/1209	. . . . . {characterised by the ceramic dielectric material (H01G 4/1272 , H01G 4/1281 take precedence)}
2/065	. . . {for surface mounting, e.g. chip capacitors}		
2/08	. Cooling arrangements; Heating arrangements; Ventilating arrangements	4/1218	. . . . . {based on titanium oxides or titanates (H01G 4/1245 takes precedence)}
2/10	. Housing; Encapsulation	4/1227	. . . . . {based on alkaline earth titanates}
	WARNING	4/1236	. . . . . {based on zirconium oxides or zirconates (H01G 4/1263 takes precedence)}
	Not complete, see also H01G 4/224		
2/103	. . {Sealings, e.g. for lead-in wires; Covers}	4/1245	. . . . . {containing also titanates}
2/106	. . {Fixing the capacitor in a housing}	4/1254	. . . . . {based on niobium or tungsten, tantalum oxides or niobates, tantalates}
2/12	. Protection against corrosion (H01G 2/10 takes precedence)	4/1263	. . . . . {containing also zirconium oxides or zirconates}
2/14	. Protection against electric or thermal overload (by cooling H01G 2/08)	4/1272	. . . . . {Semiconductive ceramic capacitors}
2/16	. . with fusing elements	4/1281	. . . . . {with grain boundary layer}
2/18	. . with breakable contacts	4/129	. . . . . {containing a glassy phase, e.g. glass ceramic}
2/20	. Arrangements for preventing discharge from edges of electrodes	4/14	. . . . . Organic dielectrics
2/22	. Electrostatic or magnetic shielding	4/145	. . . . . {vapour deposited}
2/24	. Distinguishing marks, e.g. colour coding	4/16	. . . . . of fibrous material, e.g. paper
4/00	Fixed capacitors; Processes of their manufacture (electrolytic capacitors H01G 9/00)	4/18	. . . . . of synthetic material, e.g. derivatives of cellulose (H01G 4/16 takes precedence)
4/002	. Details	4/183	. . . . . {Derivatives of cellulose (H01G 4/145 takes precedence)}
4/005	. . Electrodes	4/186	. . . . . {halogenated (H01G 4/145 takes precedence)}
4/008	. . . Selection of materials		
4/0085	. . . . {Fried electrodes}	4/20	. . . using combinations of dielectrics from more than one of groups H01G 4/02 - H01G 4/06 (H01G 4/12 takes precedence)
4/01	. . . Form of self-supporting electrodes	4/203	. . . . . {Fibrous material or synthetic material}
4/012	. . . Form of non-self-supporting electrodes	4/206	. . . . . {inorganic and synthetic material}
4/015	. . . Special provisions for self-healing	4/22	. . . . . impregnated
4/018	. . Dielectrics	4/221	. . . . . {characterised by the composition of the impregnant}
4/02	. . . Gas or vapour dielectrics	4/222	. . . . . {halogenated}
4/04	. . . Liquid dielectrics	4/224	. . Housing; Encapsulation
4/06	. . . Solid dielectrics	4/228	. . Terminals
4/08	. . . . Inorganic dielectrics		
4/085	. . . . . {Vapour deposited}		
4/10	. . . . . Metal-oxide dielectrics {(H01G 4/085 takes precedence)}		

4/232	. . . electrically connecting two or more layers of a stacked or rolled capacitor	5/10	. . . due to rotation of helical electrodes
4/2325	. . . . {characterised by the material of the terminals}	5/12	. . . due to rotation of part-cylindrical, conical, or spherical electrodes
4/236	. . . leading through the housing, i.e. lead-through	5/14	. . . due to longitudinal movement of electrodes
4/242	. . . the capacitive element surrounding the terminal	5/145	. . . {with profiled electrodes}
4/245	. . . . Tabs between the layers of a rolled electrode	5/16	. . . using variation of distance between electrodes
4/248	. . . the terminals embracing or surrounding the capacitive element, e.g. caps (H01G 4/252 takes precedence)	5/18	. . . due to change in inclination, e.g. by flexing, by spiral wrapping
4/252	. . . the terminals being coated on the capacitive element (H01G 4/232 takes precedence)	5/38	. . . Multiple capacitors, e.g. ganged
4/255	. . Means for correcting the capacitance value	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)
4/258	. . Temperature compensation means	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)
4/26	. . Folded capacitors	7/02	. . Electrets, i.e. having a permanently-polarised dielectric
4/28	. . Tubular capacitors	7/021	. . . {having an organic dielectric}
4/30	. . Stacked capacitors (H01G 4/33 takes precedence)	7/023	. . . . {of macromolecular compounds}
4/302	. . . {obtained by injection of metal in cavities formed in a ceramic body}	7/025	. . . {having an inorganic dielectric}
4/304	. . . {obtained from another capacitor}	7/026	. . . . {with ceramic dielectric}
4/306	. . . {made by thin film techniques}	7/028	. . . {having a heterogeneous dielectric}
4/308	. . . {made by transfer techniques}	7/04	. . . having a dielectric selected for the variation of its permittivity with applied temperature
4/32	. . Wound capacitors	7/06	. . . having a dielectric selected for the variation of its permittivity with applied voltage, i.e. ferroelectric capacitors (electrets H01G 7/02)
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})	9/00	Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture
4/35	. . Feed-through capacitors or anti-noise capacitors	9/0003	. . {Protection against electric or thermal overload; cooling arrangements; means for avoiding the formation of cathode films (H01G 9/12 takes precedence)}
4/38	. . Multiple capacitors, i.e. structural combinations of fixed capacitors	2009/0007	. . {Double layer capacitors}
4/385	. . . {Single unit multiple capacitors, e.g. dual capacitor in one coil}	2009/001	. . {Temperature sensitive devices}
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})	2009/0014	. . {Solid electrolytic capacitors}
5/00	Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture	2009/0018	. . . {with wound foil electrodes}
5/01	. . Details	2009/0021	. . . {Skin fibre}
5/011	. . . Electrodes	2009/0025	. . {Liquid electrolytic capacitors}
5/012	. . . . at least one of the electrodes being a displaceable liquid or powder	9/0029	. . {Processes of manufacture}
5/013	. . Dielectrics	9/0032	. . . {formation of the dielectric layer (anodisation in general C25D)}
5/0132	. . . . {Liquid dielectrics}	9/0036	. . . {Formation of the solid electrolyte layer}
5/0134	. . . . {Solid dielectrics}	9/004	. . Details
5/0136	. . . . . {with movable electrodes}	9/008	. . Terminals
5/0138	. . . . . {with movable dielectrics}	9/012	. . . specially adapted for solid capacitors
5/014	. . Housing; Encapsulation	9/016	. . . . {specially adapted for double-layer capacitors}
5/015	. . Current collectors	9/02	. . Diaphragms; Separators
5/017	. . Temperature compensation	9/022	. . Electrolytes, absorbents (electrolytic or electrophoretic processes, apparatus therefor C25; for primary, secondary or fuel cells H01M)
5/019	. . Means for correcting the capacitance characteristics	9/025	. . . Solid electrolytes (H01G 11/54 takes precedence)
2005/02	. . {IPC5 having air, gas, or vacuum as the dielectric}	9/028	. . . . Organic semiconducting electrolytes, e.g. TCNQ
5/04	. . using variation of effective area of electrode	9/032	. . . . Inorganic semiconducting electrolytes, e.g. MnO ₂
5/06	. . . due to rotation of flat or substantially flat electrodes	9/035	. . . Liquid electrolytes, e.g. impregnating materials (H01G 11/54 takes precedence)
5/08	. . . becoming active in succession		

9/038	. . . {Electrolytes specially adapted for double-layer capacitors}	9/155	. {Double-layer capacitors}
	WARNING		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		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
9/04	. . Electrodes {or formation of dielectric layers thereon}	9/16	. specially for use as rectifiers or detectors (H01G 9/22 takes precedence)
2009/0404	. . . {characterised by the material (alloys in general see C22C)}	9/18	. Self-interrupters
2009/0408	. . . . {on Al basis}	9/20	. Light-sensitive devices
2009/0412	. . . {characterised by the structure}	9/2004	. . {characterised by the electrolyte, e.g. comprising an organic electrolyte}
2009/0416	. . . . {Etched foil electrodes (etching of metal in general C23F ; electro-etching of metal in general C25F)}	9/2009	. . . {Solid electrolytes}
9/042	. . . characterised by the material (H01G 11/22 takes precedence)	9/2013	. . . {the electrolyte comprising ionic liquids, e.g. alkyl imidazolium iodide}
9/0425	. . . . {specially adapted for cathode}	9/2018	. . . {characterised by the ionic charge transport species, e.g. redox shuttles}
9/045	. . . . based on aluminium	9/2022	. . {characterized by he counter electrode}
9/048	. . . characterised by their structure (H01G 11/22 takes precedence)	9/2027	. . {comprising an oxide semiconductor electrode}
2009/05	. . . . {consisting of tantalum, niobium, or sintered material; Combinations of such electrodes with solid semiconductive electrolytes, e.g. manganese dioxide}	9/2031	. . . {comprising titanium oxide, e.g. TiO ₂ (H01G 9/2036 takes precedence)}
9/052	. . . . Sintered electrodes	9/2036	. . . {comprising mixed oxides, e.g. ZnO covered TiO ₂ particles}
9/0525	. . . . {Powder therefor (metallic powder in general B22F)}	9/204	. . . {comprising zinc oxides, e.g. ZnO (H01G 9/2036 takes precedence)}
9/055	. . . . Etched foil electrodes	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}
9/058	. . . {specially adapted for double-layer capacitors}	9/205	. . {comprising a semiconductor electrode comprising AIII-BV compounds with or without impurities, e.g. doping materials}
	WARNING	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 9/2072 takes precedence)}
	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	9/2059	. . {comprising an organic dye as the active light absorbing material, e.g. adsorbed on an electrode or dissolved in solution}
9/06	. . . Mounting in containers	9/2063	. . . {comprising a mixture of two or more dyes}
	WARNING	9/2068	. . {Panels or arrays of photoelectrochemical cells, e.g. photovoltaic modules based on photoelectrochemical cells}
	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	9/2072	. . . {comprising two or more photoelectrodes sensible to different parts of the solar spectrum, e.g. tandem cells}
9/07	. . Dielectric layers	9/2077	. . . {Sealing arrangements, e.g. to prevent the leakage of the electrolyte}
9/08	. . Housing; Encapsulation	9/2081	. . . {Serial interconnection of cells}
9/10	. . . Sealing, e.g. of lead-in wires	9/2086	. . . {Photoelectrochemical cells in the form of a fiber}
9/12	. . . Vents or other means allowing expansion	9/209	. . {Light trapping arrangements}
9/14	. . Structural combinations {or circuits} for modifying, or compensating for, electric characteristics of electrolytic capacitors (impedance networks H03H)	9/2095	. . {comprising a flexible sustrate}
9/145	. Liquid electrolytic capacitors (H01G 11/00 takes precedence)	9/21	. Temperature-sensitive devices
9/15	. Solid electrolytic capacitors (H01G 11/00 takes precedence)	9/22	. Devices using combined reduction and oxidation, e.g. redox arrangement or solion
9/151	. . {with wound foil electrodes}	9/26	. Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices with each other
9/153	. . {Skin fibre}		

- 9/28 . Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices with other electric components not covered by this subclass
- 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](#) - [H01G 11/86](#) are incomplete pending reclassification of documents from groups [H01M 12/00](#) and [H01M 12/005](#).
- All groups listed in this Warning should be considered in order to perform a complete search.
- 11/02 . using combined reduction-oxidation reactions, e.g. redox arrangement or solion
- 11/04 . Hybrid capacitors
- 11/06 . . with one of the electrodes allowing ions or anions to be reversibly doped thereinto, e.g. lithium-ion capacitors [LICs]
- 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
- 11/10 . Multiple hybrid or EDL capacitors, e.g. arrays or modules ([housings, cases or mountings thereof H01G 11/78](#))
- 11/12 . . Stacked hybrid or EDL capacitors
- 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](#))
- 11/16 . . against electric overloads, e.g. including fuses
- 11/18 . . against thermal overloads, e.g. heating, cooling or ventilating
- 11/20 . . Reformation or processes for removal of impurities, e.g. scavenging
- 11/22 . Electrodes
- 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
- 11/26 . . characterised by the structures of the electrodes, e.g. multi-layered, shapes, dimensions, porosities or surface features
- 11/28 . . . arranged or disposed on a current collector; Layers or phases between electrodes and current collectors, e.g. adhesives
- 11/30 . . characterised by their materials
- 11/32 . . . Carbon-based, e.g. activated carbon materials
- 11/34 . . . characterised by carbonisation or activation of carbon
- 11/36 . . . Nanostructures, e.g. nanofibres, nanotubes or fullerenes
- 11/38 Carbon pastes or blends; Binders or additives therein
- 11/40 Fibres
- 11/42 Powders or particles, e.g. composition thereof
- 11/44 Raw materials therefor, e.g. resins or coal
- 11/46 . . . Metal oxides, e.g. ruthenium oxide
- 11/48 . . . Conductive polymers
- 11/50 . . . specially adapted for lithium-ion capacitors, e.g. for lithium-doping or for intercalation
- 11/52 . Separators
- 11/54 . Electrolytes
- 11/56 . . Solid electrolytes, e.g. gels; Additives therein
- 11/58 . . Liquid electrolytes
- 11/60 . . . characterised by the solvent
- 11/62 . . . characterised by the solute, e.g. salts, anions or cations therein
- 11/64 . . . characterised by additives
- 11/66 . Current collectors
- 11/68 . . characterised by their materials
- 11/70 . . characterised by their structures
- 11/72 . . specially adapted for integration in multiple or stacked hybrid or EDL capacitors
- 11/74 . Terminals, e.g. extensions of current collectors
- 11/76 . . specially adapted for integration in multiple or stacked hybrid or EDL capacitors
- 11/78 . Cases; Housings; Encapsulations; Mountings
- 11/80 . . Gaskets; Sealings
- 11/82 . . Fixing or assembling a capacitive element in a housing, e.g. mounting electrodes, current collectors or terminals in containers or encapsulations
- 11/84 . Processes for the manufacture of hybrid or EDL capacitors, or components thereof
- 11/86 . . specially adapted for electrodes ([carbonisation or activation of carbon for the manufacture of electrodes H01G 11/34](#))
- 13/00 Apparatus specially adapted for manufacturing capacitors; Processes specially adapted for manufacturing capacitors not provided for in groups [H01G 4/00](#) - [H01G 11/00](#)**
- 13/003 . { [Apparatus or processes for encapsulating capacitors](#) }
- 13/006 . { [Apparatus or processes for applying terminals](#) }
- 13/02 . Machines for winding capacitors ([winding in general B65H](#))
- 13/04 . Drying ([in general F26B](#)); Impregnating
- 13/06 . with provision for removing metal surfaces
- 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](#))**
- 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](#))**