

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

### H01 ELECTRIC ELEMENTS

(NOTES omitted)

### H01G CAPACITORS; CAPACITORS, RECTIFIERS, DETECTORS, SWITCHING DEVICES, LIGHT-SENSITIVE OR TEMPERATURE-SENSITIVE DEVICES OF THE ELECTROLYTIC TYPE (selection of specified materials as dielectric [H01B 3/00](#); capacitors having potential barriers [H10D 1/62](#), [H10K 10/10](#))

#### NOTE

In this subclass, group [H01G 11/00](#) takes precedence over groups [H01G 4/00](#) and [H01G 9/00](#).

#### 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.

<b>2/00</b>	<b>Details of capacitors not covered by a single one of groups <a href="#">H01G 4/00</a>-<a href="#">H01G 11/00</a></b>	4/10	. . . . .	Metal-oxide dielectrics ( <a href="#">H01G 4/085</a> takes precedence)}
2/02	. Mountings	4/105	. . . . .	{Glass dielectric}
2/04	. . specially adapted for mounting on a chassis	4/12	. . . . .	Ceramic dielectrics ( <a href="#">H01G 4/085</a> takes precedence)}
2/06	. . specially adapted for mounting on a printed-circuit support	4/1209	. . . . .	{characterised by the ceramic dielectric material ( <a href="#">H01G 4/1272</a> , <a href="#">H01G 4/1281</a> take precedence)}
2/065	. . . {for surface mounting, e.g. chip capacitors}	4/1218	. . . . .	{based on titanium oxides or titanates ( <a href="#">H01G 4/1245</a> takes precedence)}
2/08	. Cooling arrangements; Heating arrangements; Ventilating arrangements	4/1227	. . . . .	{based on alkaline earth titanates}
2/10	. Housing; Encapsulation	4/1236	. . . . .	{based on zirconium oxides or zirconates ( <a href="#">H01G 4/1263</a> takes precedence)}
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 ( <a href="#">H01G 2/10</a> takes precedence)	4/1263	. . . . .	{containing also zirconium oxides or zirconates}
2/14	. Protection against electric or thermal overload (by cooling <a href="#">H01G 2/08</a> )	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
<b>4/00</b>	<b>Fixed capacitors; Processes of their manufacture (electrolytic capacitors <a href="#">H01G 9/00</a>)</b>	4/18	. . . . .	of synthetic material, e.g. derivatives of cellulose ( <a href="#">H01G 4/16</a> takes precedence)
4/002	. Details	4/183	. . . . .	{Derivatives of cellulose ( <a href="#">H01G 4/145</a> takes precedence)}
4/005	. . Electrodes	4/186	. . . . .	{halogenated ( <a href="#">H01G 4/145</a> takes precedence)}
4/008	. . . Selection of materials	4/20	. . . . .	using combinations of dielectrics from more than one of groups <a href="#">H01G 4/02</a> - <a href="#">H01G 4/06</a> ( <a href="#">H01G 4/12</a> takes precedence)
4/0085	. . . . {Fried electrodes}	4/203	. . . . .	{Fibrous material or synthetic material}
4/01	. . . Form of self-supporting electrodes	4/206	. . . . .	{inorganic and synthetic material}
4/012	. . . Form of non-self-supporting electrodes	4/22	. . . . .	impregnated
4/015	. . . Special provisions for self-healing			
4/018	. . Dielectrics			
4/02	. . . Gas or vapour dielectrics			
4/04	. . . Liquid dielectrics			
4/06	. . . Solid dielectrics			
4/08	. . . . Inorganic dielectrics			
4/085	. . . . . {Vapour deposited}			

- 4/221 . . . . . {characterised by the composition of the impregnant}
- 4/222 . . . . . {halogenated}
- 4/224 . . Housing; Encapsulation
- 4/228 . . Terminals
- 4/232 . . . electrically connecting two or more layers of a stacked or rolled capacitor
- 4/2325 . . . . . {characterised by the material of the terminals}
- 4/236 . . . leading through the housing, i.e. lead-through
- 4/242 . . . the capacitive element surrounding the terminal
- 4/245 . . . . . Tabs between the layers of a rolled electrode
- 4/248 . . . the terminals embracing or surrounding the capacitive element, e.g. caps ([H01G 4/252 takes precedence](#))
- 4/252 . . . the terminals being coated on the capacitive element ([H01G 4/232 takes precedence](#))
- 4/255 . . Means for correcting the capacitance value
- 4/258 . . Temperature compensation means
- 4/26 . . Folded capacitors
- 4/28 . . Tubular capacitors
- 4/30 . . Stacked capacitors ([H01G 4/33 takes precedence](#))
- 4/302 . . {obtained by injection of metal in cavities formed in a ceramic body}
- 4/304 . . {obtained from another capacitor}
- 4/306 . . {made by thin film techniques}
- 4/308 . . {made by transfer techniques}
- 4/32 . . Wound capacitors
- 4/33 . . Thin- or thick-film capacitors {(thin- or thick-film circuits; capacitors without a potential-jump or surface barrier specially adapted for integrated circuits, details thereof, multistep manufacturing processes therefor)}
- 4/35 . . Feed-through capacitors or anti-noise capacitors
- 4/38 . . Multiple capacitors, i.e. structural combinations of fixed capacitors
- 4/385 . . {Single unit multiple capacitors, e.g. dual capacitor in one coil}
- 4/40 . . Structural combinations of fixed capacitors with other electric elements, the structure mainly consisting of a capacitor, e.g. RC combinations
- 5/00 Capacitors in which the capacitance is varied by mechanical means, e.g. by turning a shaft; Processes of their manufacture**
- 5/01 . . Details
- 5/011 . . . Electrodes
- 5/012 . . . at least one of the electrodes being a displaceable liquid or powder
- 5/013 . . Dielectrics
- 5/0132 . . . {Liquid dielectrics}
- 5/0134 . . . {Solid dielectrics}
- 5/0136 . . . . . {with movable electrodes}
- 5/0138 . . . . . {with movable dielectrics}
- 5/014 . . Housing; Encapsulation
- 5/015 . . Current collectors
- 5/017 . . Temperature compensation
- 5/019 . . Means for correcting the capacitance characteristics
- 2005/02 . . {having air, gas, or vacuum as the dielectric}
- 5/04 . . using variation of effective area of electrode
- 5/06 . . due to rotation of flat or substantially flat electrodes
- 5/08 . . . becoming active in succession
- 5/10 . . due to rotation of helical electrodes
- 5/12 . . due to rotation of part-cylindrical, conical, or spherical electrodes
- 5/14 . . due to longitudinal movement of electrodes
- 5/145 . . . {with profiled electrodes}
- 5/16 . . using variation of distance between electrodes
- 5/18 . . due to change in inclination, e.g. by flexing, by spiral wrapping
- 5/38 . . Multiple capacitors, e.g. ganged
- 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
- 7/00 Capacitors in which the capacitance is varied by non-mechanical means; Processes of their manufacture**
- 7/02 . . Electrets, i.e. having a permanently-polarised dielectric
- 7/021 . . . {having an organic dielectric}
- 7/023 . . . . . {of macromolecular compounds}
- 7/025 . . . {having an inorganic dielectric}
- 7/026 . . . . . {with ceramic dielectric}
- 7/028 . . . {having a heterogeneous dielectric}
- 7/04 . . having a dielectric selected for the variation of its permittivity with applied temperature
- 7/06 . . having a dielectric selected for the variation of its permittivity with applied voltage, i.e. ferroelectric capacitors ([electrets H01G 7/02](#))
- 9/00 Electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices; Processes of their manufacture**
- 9/0003 . . {Protection against electric or thermal overload; cooling arrangements; means for avoiding the formation of cathode films ([H01G 9/12 takes precedence](#))}
- 9/0029 . . {Processes of manufacture}
- 9/0032 . . . {formation of the dielectric layer}
- 9/0036 . . . {Formation of the solid electrolyte layer}
- 9/004 . . Details
- 9/008 . . Terminals
- 9/012 . . . specially adapted for solid capacitors
- 9/02 . . Diaphragms; Separators
- 9/022 . . Electrolytes; Absorbents
- 9/025 . . . Solid electrolytes ([H01G 11/54 takes precedence](#))
- 9/028 . . . . . Organic semiconducting electrolytes, e.g. TCNQ
- 9/032 . . . . . Inorganic semiconducting electrolytes, e.g. MnO<sub>2</sub>
- 9/035 . . . Liquid electrolytes, e.g. impregnating materials ([H01G 11/54 takes precedence](#))
- 9/04 . . Electrodes {or formation of dielectric layers thereon}
- 9/042 . . . characterised by the material ([H01G 11/22 takes precedence](#))
- 9/0425 . . . . . {specially adapted for cathode}
- 9/045 . . . . . based on aluminium
- 9/048 . . . characterised by their structure ([H01G 11/22 takes precedence](#))

2009/05	. . . . {consisting of tantalum, niobium, or sintered material; Combinations of such electrodes with solid semiconductive electrolytes, e.g. manganese dioxide}	9/2081	. . . {Serial interconnection of cells}
9/052	. . . . Sintered electrodes	9/2086	. . . {Photoelectrochemical cells in the form of a fiber}
9/0525	. . . . {Powder therefor}	9/209	. . {Light trapping arrangements}
9/055	. . . . Etched foil electrodes	9/2095	. . {comprising a flexible substrate}
9/06	. . . Mounting in containers	9/21	. Temperature-sensitive devices
9/07	. . Dielectric layers	9/22	. Devices using combined reduction and oxidation, e.g. redox arrangement or solion
9/08	. . Housing; Encapsulation	9/26	. Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices, light-sensitive or temperature-sensitive devices with each other
9/10	. . . Sealing, e.g. of lead-in wires	9/28	. Structural combinations of electrolytic capacitors, rectifiers, detectors, switching devices with other electric components not covered by this subclass
9/12	. . . Vents or other means allowing expansion		
9/14	. . Structural combinations {or circuits} for modifying, or compensating for, electric characteristics of electrolytic capacitors		
9/145	. Liquid electrolytic capacitors ( <a href="#">H01G 11/00 takes precedence</a> )	11/00	<b>Hybrid capacitors, i.e. capacitors having different positive and negative electrodes; Electric double-layer [EDL] capacitors; Processes for the manufacture thereof or of parts thereof</b>
9/15	. Solid electrolytic capacitors ( <a href="#">H01G 11/00 takes precedence</a> )		<b>NOTE</b>
9/151	. . {with wound foil electrodes}		Group <a href="#">H01G 11/02</a> takes precedence over groups <a href="#">H01G 11/04</a> - <a href="#">H01G 11/14</a>
9/153	. . {Skin fibre}		
9/16	. specially for use as rectifiers or detectors ( <a href="#">H01G 9/22 takes precedence</a> )	11/02	. using combined reduction-oxidation reactions, e.g. redox arrangement or solion
9/18	. Self-interrupters	11/04	. Hybrid capacitors
9/20	. Light-sensitive devices	11/06	. . with one of the electrodes allowing ions to be reversibly doped therein, e.g. lithium ion capacitors [LIC]
9/2004	. . {characterised by the electrolyte, e.g. comprising an organic electrolyte}	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
9/2009	. . . {Solid electrolytes}	11/10	. Multiple hybrid or EDL capacitors, e.g. arrays or modules ( <a href="#"> housings, cases, encapsulations or mountings thereof H01G 11/78</a> )
9/2013	. . . {the electrolyte comprising ionic liquids, e.g. alkyl imidazolium iodide}	11/12	. . Stacked hybrid or EDL capacitors
9/2018	. . . {characterised by the ionic charge transport species, e.g. redox shuttles}	11/14	. Arrangements or processes for adjusting or protecting hybrid or EDL capacitors ( <a href="#">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</a> )
9/2022	. . {characterized by the counter electrode}	11/16	. . against electric overloads, e.g. including fuses
9/2027	. . {comprising an oxide semiconductor electrode}	11/18	. . against thermal overloads, e.g. heating, cooling or ventilating
9/2031	. . . {comprising titanium oxide, e.g. TiO <sub>2</sub> ( <a href="#">H01G 9/2036 takes precedence</a> )}	11/20	. . Reformation or processes for removal of impurities, e.g. scavenging
9/2036	. . . {comprising mixed oxides, e.g. ZnO covered TiO <sub>2</sub> particles}	11/22	. Electrodes
9/204	. . . {comprising zinc oxides, e.g. ZnO ( <a href="#">H01G 9/2036 takes precedence</a> )}	11/24	. . characterised by structural features of the materials making up or comprised in the electrodes, e.g. form, surface area or porosity; characterised by the structural features of powders or particles used therefor
9/2045	. . {comprising a semiconductor electrode comprising elements of the fourth group of the Periodic Table with or without impurities, e.g. doping materials}	11/26	. . characterised by their structure, e.g. multi-layered, porosity or surface features
9/205	. . {comprising a semiconductor electrode comprising AIII-BV compounds with or without impurities, e.g. doping materials}	11/28	. . . arranged or disposed on a current collector; Layers or phases between electrodes and current collectors, e.g. adhesives
9/2054	. . {comprising a semiconductor electrode comprising AII-BVI compounds, e.g. CdTe, CdSe, ZnTe, ZnSe, with or without impurities, e.g. doping materials ( <a href="#">H01G 9/2027 takes precedence</a> )}	11/30	. . characterised by their material
9/2059	. . {comprising an organic dye as the active light absorbing material, e.g. adsorbed on an electrode or dissolved in solution}	11/32	. . . Carbon-based
9/2063	. . . {comprising a mixture of two or more dyes}		
9/2068	. . {Panels or arrays of photoelectrochemical cells, e.g. photovoltaic modules based on photoelectrochemical cells}		
9/2072	. . . {comprising two or more photoelectrodes sensible to different parts of the solar spectrum, e.g. tandem cells}		
9/2077	. . . {Sealing arrangements, e.g. to prevent the leakage of the electrolyte}		

## H01G

- 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
- 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 material
- 11/70 . . characterised by their structure
- 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
- 13/04 . Drying; 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 the 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**