

CPC**COOPERATIVE PATENT CLASSIFICATION****H01M****PROCESSES OR MEANS, e.g. BATTERIES, FOR THE DIRECT CONVERSION OF CHEMICAL INTO ELECTRICAL ENERGY**

(electrochemical processes or apparatus in general C25; semiconductor or other solid state devices for converting light or heat into electrical energy H01L, e.g. [H01L 31/00](#), [H01L 35/00](#), [H01L 37/00](#))

NOTE

This subclass covers galvanic primary or secondary cells or batteries, fuel cells or batteries.

H01M 2/00**Constructional details or processes of manufacture of the non-active parts**

- H01M 2/02 . Cases, jackets or wrappings ([working of plastics or substances in plastic state](#)^{B29})
- H01M 2/0202 .. {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment ([H01M 2/025 takes precedence](#))}
- H01M 2/0207 ... { Flat-shaped cells or batteries of flat cells ([H01M 2/0222 takes precedence](#))}
- H01M 2/021 {with both terminals passing through the case or cover}
- H01M 2/0212 {with plate-like or sheet-like terminals ([H01M 2/0215 takes precedence](#))}
- H01M 2/0215 {with window-shaped terminals}
- H01M 2/0217 ... { Cases of prismatic shape}
- H01M 2/022 ... { Cases of cylindrical or round shape}
- H01M 2/0222 { Button or coin cell cases}
- H01M 2/0225 { with cup-shaped terminals }
- H01M 2/0227 { with both cup-shaped terminals}
- H01M 2/023 { with one cup-shaped terminal}
- H01M 2/0232 { with a passing-through terminal ([H01M 2/0235 takes precedence](#))}
- H01M 2/0235 { with a collector centrally disposed in the active mass, e.g. Leclanch cells}
- H01M 2/0237 .. {for large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries ([H01M 2/025 takes precedence](#))}
- H01M 2/024 ... {Details}
- H01M 2/0242 ... {Monobloc manufactured cases comprising multiple compartments}
- H01M 2/0245 ... {Assembly of different cases, i.e. modular battery or cases particularly provided with means for assembling}
- H01M 2/0247 {sealed to each other in a non-detachable manner}
- H01M 2/025 .. {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
- H01M 2/0252 ... {High- temperature cells or batteries, e.g. Na-S cells, Li-Cl₂ cells}
- H01M 2/0255 ... { Hybrid cells or batteries ([H01M 2/0222 takes precedence](#))}

H01M 2/0257	..	{characterised by the material}
H01M 2/026	...	{ for small-sized cells or batteries, batteries or cells for portable equipment}
H01M 2/0262	...	{ for large-sized cells or batteries, batteries or cells for traction or motive power or standby power}
H01M 2/0265	...	{for high-temperature cells}
H01M 2/0267	...	{ of wrappings, outside coatings, jackets around completely closed cell elements}
H01M 2/027	...	{ Casing material forming terminal of the cell}
H01M 2/0272	.....	{ characterized by the internal coating or internal conductive layer}
H01M 2/0275	...	{ of flexible envelopes or bags around open cell elements}
H01M 2/0277	...	{ Insulating material (H01M 2/029 takes precedence)}
H01M 2/028	.....	{ being one layer}
H01M 2/0282	.....	{ having particulate or reinforced material}
H01M 2/0285	...	{ Conductive material}
H01M 2/0287	...	{ comprising layers}
H01M 2/029	.....	{ consisting only of insulating material}
H01M 2/0292	.....	{ characterised by the external coating on the casing}
H01M 2/0295	...	{ Composite material consisting of mixed or dispersed phases}
H01M 2/04	..	Lids or covers
H01M 2/0404	...	{ for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/0443 takes precedence)}
H01M 2/0408	.....	{ Crimp-sealed cells or batteries; Cells or batteries with turned-over edges}
H01M 2/0413	.....	{ provided with an intermediary sealing member between the crimped or curled edges (H01M 2/0417 takes precedence)}
H01M 2/0417	.....	{ comprising an insulating cover provided with an axial bore for receiving a central current collector}
H01M 2/0421	.....	{ with an external conductive cover}
H01M 2/0426	...	{ with a metallic cover of which the borders are soldered or welded with the case}
H01M 2/043	...	{ for large-sized cells or batteries, e.g. LIS batteries, traction or motive power type or standby power batteries (H01M 2/0443 takes precedence)}
H01M 2/0434	.....	{ Methods for assembling case and cover}
H01M 2/0439	.....	{ without provisions for disassembling}
H01M 2/0443	...	{ for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
H01M 2/0447	.....	{ High-temperature cells or batteries}
H01M 2/0452	.....	{ Hybrid cells or batteries}
H01M 2/0456	...	{ characterised by the shape}
H01M 2/046	.....	{ Disk-like lids for cylindrical batteries}
H01M 2/0465	.....	{ Button cell lids}
H01M 2/0469	.....	{ Lids for flat or sheet-like batteries }
H01M 2/0473	.....	{ Lids for prismatic cells}
H01M 2/0478	...	{ characterised by the material}

- H01M 2/0482 { Insulating materials}
- H01M 2/0486 { Conducting materials}
- H01M 2/0491 { characterised by the coating}
- H01M 2/0495 { Conductive coating material}
- H01M 2/06 . . Arrangements for introducing electric connectors into or through cases
- H01M 2/065 . . . { using glass or ceramic sealing material}
- H01M 2/08 . . Sealing materials

- H01M 2/10 . Mountings; Suspension devices; Shock absorbers; Transport or carrying devices; Holders (structural combination of accumulators with charging apparatus [H01M 10/46](#))
- H01M 2/1005 . . {Carrying devices}
- H01M 2/1011 . . . {using the terminals or connecting links}
- H01M 2/1016 . . { Cabinets, cases, fixing devices, adapters, racks or battery packs}
- H01M 2/1022 . . . { for miniature batteries or batteries for portable equipment (batteries in portable systems [H01M 2220/30](#))}
- H01M 2/1027 { with the possibility of incorporating batteries of different sizes}
- H01M 2/1033 { providing adapters around the batteries}
- H01M 2/1038 {for button cells}
- H01M 2/1044 {forming a whole with or incorporated in or fixed to the electronic appliance}
- H01M 2/105 {for cells of cylindrical configuration}
- H01M 2/1055 {forming a whole with or incorporated in or fixed to the electronic appliance}
- H01M 2/1061 {for cells of prismatic configuration or for sheet-like batteries}
- H01M 2/1066 {forming a whole with or incorporated in or fixed to the electronic appliance}
- H01M 2/1072 . . . { for starting, lighting or ignition batteries; Vehicle traction batteries; Stationary or load leading batteries (batteries in stationary systems [H01M 2220/10](#), batteries in motive systems [H01M 2220/20](#))}
- H01M 2/1077 {Racks, groups of several batteries ([H01M 2/1088](#) takes precedence)}
- H01M 2/1083 {Fixing on vehicles}
- H01M 2/1088 {for accumulators working at high temperature}
- H01M 2/1094 . . {Particular characteristics of materials used to isolate the battery from its environment, e.g. thermal insulation, corrosion resistance, pressure resistance, electrolyte leakage}

- H01M 2/12 . Vent plugs or other mechanical arrangements for facilitating escape of gases
- H01M 2/1205 . . {Vent arrangements incorporated in vent plugs or multiplug systems detachable from the battery or cell}
- H01M 2/1211 . . . {Multiplug systems or arrangements; Plurality of plugs surrounded by a common cover}
- H01M 2/1217 {in the shape of a one-piece member}
- H01M 2/1223 . . { Vent arrangements of resealable design ([H01M 2/1205](#), [H01M 2/1247](#)-[H01M 2/1294](#) take precedence)}
- H01M 2/1229 . . . {comprising a deformable, elastic or flexible valve member}

- H01M 2/1235 .. { Emergency or safety arrangements of non-resealable design ([H01M 2/1205](#), [H01M 2/1247](#)-[H01M 2/1294](#) take precedence)}
- H01M 2/1241 ... {in the form of rupturable membranes or weakened parts, e.g. pierced with the aid of a sharp member}
- H01M 2/1247 .. {Explosion- or splash-preventing means contained in the head space of the battery, e.g. means floating on the electrolyte}
- H01M 2/1252 .. {comprising elongated, tortuous or labyrinth-shaped exhaust passages in the battery cover or case; Double cover vent systems}
- H01M 2/1258 .. { containing electrolyte neutralising or absorbing means}
- H01M 2/1264 .. { comprising gas-pervious parts or elements}
- H01M 2/127 ... { as flame arrester or ignition preventing means}
- H01M 2/1276 .. { Spring-loaded vent valves}
- H01M 2/1282 .. { Thermally responsive or sensitive vent means}
- H01M 2/1288 .. { Film- or sheet-like elastic valve members optionally coated with non-drying glue}
- H01M 2/1294 .. { Slit, perforated or punctured elastic valve members}

- H01M 2/14 . Separators; Membranes; Diaphragms; Spacing elements
- H01M 2/145 .. { Manufacturing processes}
- H01M 2/16 .. characterised by the material
- H01M 2/1606 ... {comprising fibrous material}
- H01M 2/1613 {Inorganic fibrous material}
- H01M 2/162 {Organic fibrous material}
- H01M 2/1626 {Natural fibres, e.g. cotton, cellulose}
- H01M 2/1633 {Mixtures of inorganic and organic fibres}
- H01M 2/164 ... {comprising non-fibrous material ([H01M 2/1606](#) takes precedence)}
- H01M 2/1646 {Inorganic non-fibrous material}
- H01M 2/1653 {Organic non-fibrous material}
- H01M 2/166 {Mixtures of inorganic and organic non-fibrous material}
- H01M 2/1666 ... {comprising a non-fibrous layer and a fibrous layer superimposed on one another}
- H01M 2/1673 ... {Electrode-separator combination}
- H01M 2/168 { with adhesive layers between electrodes and separators}
- H01M 2/1686 ... { Separators having two or more layers of either fibrous or non-fibrous materials}
- H01M 2/1693 ... {Wood}
- H01M 2/18 .. characterised by the shape
- H01M 2/185 ... { Separators made of one single microscopic fiber}

- H01M 2/20 . Current conducting connections for cells
- H01M 2/202 .. {Interconnectors for or interconnection of the terminals of adjacent or distinct batteries or cells}
- H01M 2/204 ... {of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- H01M 2/206 ... {of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries}

- H01M 2/208 . . . {for cells or batteries working under specific conditions such as high temperature, gas diffusion, external electrolyte circulation, external supply of reactants}
- H01M 2/22 .. Fixed connections, i.e. not intended for disconnection
- H01M 2/24 . . . Intercell connections through partitions, e.g. in a battery case
- H01M 2/26 . . . Electrode connections
- H01M 2/263 {Electrode connections overlying wounded or folded electrode stacks}
- H01M 2/266 {Interconnections of several platelike electrodes in parallel, e.g. electrode pole straps or bridges}
- H01M 2/28 for lead-acid accumulators
- H01M 2/30 .. Terminals
- H01M 2/302 . . . {Terminal post members on carbon electrodes; Machines or processes for applying said terminal post members, e.g. capping of carbon rods}
- H01M 2/305 . . . {Poles or terminals for L.I.S, traction or motive power type or standby power batteries}
- H01M 2/307 {the poles being connected and passing through hollow metallic terminals, e.g. terminal bushings}
- H01M 2/32 .. Methods or arrangements for affording protection against corrosion; Selection of materials therefor
- H01M 2/34 .. with provision for preventing undesired use or discharge, { e.g. complete cut of current (safety devices [H01M 2200/00](#))}
- H01M 2/341 . . . { Anti-theft provisions}
- H01M 2/342 . . . {Protection against polarity reversal}
- H01M 2/344 . . . {Guarantee labels or covers}
- H01M 2/345 . . . { in response to pressure}
- H01M 2/347 . . . { in response to shock}
- H01M 2/348 . . . { in response to temperature}

- H01M 2/36 . . arrangements for filling, topping-up or emptying cases with or of liquid, e.g. for filling with electrolytes, for washing-out
- H01M 2/361 .. {Filling of small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment}
- H01M 2/362 .. { Filling or topping up of large-sized cells or batteries, e.g. L.I.S. batteries, traction or motive power type or standby power batteries}
- H01M 2/364 .. {Removing or drainage of electrolyte; Cleaning battery or cell cases}
- H01M 2/365 .. { means or methods for closing or sealing the liquid supply hole}
- H01M 2/367 .. { with means for preventing spilling of liquid or electrolyte , e.g. when the battery is tilted or turned over}
- H01M 2/368 . . . { by closing the vent passages with a valve}

- H01M 2/38 . . Arrangements for moving electrolytes
- H01M 2/385 .. { Electrolyte stirring by action of gases on or in the electrolyte}
- H01M 2/40 .. with external circulating path ([H01M 8/04](#) takes precedence)

- H01M 4/00** **Electrodes** (electrodes for electrolytic processes C25, { electrodes for hybrid or electric double capacitor [H01G 11/22](#)})

- H01M 4/02 . Electrodes composed of or comprising active material
- H01M 4/04 .. Processes of manufacture in general
- H01M 4/0402 ... { Methods of deposition of the material}
- H01M 4/0404 { by coating on electrode collectors}
- H01M 4/0407 { by coating on an electrolyte layer}
- H01M 4/0409 { by a doctor blade method, slip-casting or roller coating}
- H01M 4/0411 { by extrusion}
- H01M 4/0414 { by screen printing}
- H01M 4/0416 { involving impregnation with a solution, dispersion, paste or dry powder
([H01M 4/0438](#) takes precedence)}
- H01M 4/0419 { involving spraying}
- H01M 4/0421 { involving vapour deposition}
- H01M 4/0423 { Physical vapour deposition}
- H01M 4/0426 { Sputtering}
- H01M 4/0428 { Chemical vapour deposition}
- H01M 4/043 ... { involving compressing or compaction}
- H01M 4/0433 { Molding}
- H01M 4/0435 { Rolling or calendering}
- H01M 4/0438 ... { by electrochemical processing ([electroless electrochemical plating C23C 18/54](#))}
- H01M 4/044 { Activating, forming or electrochemical attack of the supporting material}
- H01M 4/0442 { Anodisation, Oxidation ([electrolytic coating by anodisation C25D 9/00](#))}
- H01M 4/0445 { Forming after manufacture of the electrode, e.g. first charge, cycling}
- H01M 4/0447 { of complete cells or cells stacks}
- H01M 4/045 { Electrochemical coating; Electrochemical impregnation}
- H01M 4/0452 { from solutions}
- H01M 4/0454 { from melts}
- H01M 4/0457 { from dispersions or suspensions; Electrophoresis}
- H01M 4/0459 { Electrochemical doping, intercalation, occlusion or alloying}
- H01M 4/0461 { Electrochemical alloying}
- H01M 4/0464 { Electro organic synthesis}
- H01M 4/0466 { Electrochemical polymerisation}
- H01M 4/0469 { Electroforming a self-supporting electrode; Electroforming of powdered electrode material}
- H01M 4/0471 ... { involving thermal treatment, e.g. firing, sintering, backing particulate active material, thermal decomposition, pyrolysis}
- H01M 4/0473 ... { Filling tube-or-pockets type electrodes; Applying active mass in cup-shaped terminals}
- H01M 4/0476 { with molten material}
- H01M 4/0478 { with dispersions, suspensions or pastes}
- H01M 4/048 { with dry powder}
- H01M 4/0483 ... { by methods including the handling of a melt ([H01M 4/0438](#), take precedence)}
- H01M 4/0485 { Casting}

H01M 4/0488	....	{ Alloying}
H01M 4/049	...	{ Manufacturing of an active layer by chemical means}
H01M 4/0492	....	{ Chemical attack of the support material}
H01M 4/0495	....	{ Chemical alloying}
H01M 4/0497	....	{ Chemical precipitation}
H01M 4/06	..	Electrodes for primary cells
H01M 4/08	...	Processes of manufacture
H01M 4/10	....	of pressed electrodes with central core, i.e. dollies
H01M 4/12	....	of consumable metal or alloy electrodes (use of alloy compositions as active materials H01M 4/38)
H01M 4/13	..	Electrodes for accumulators with non-aqueous electrolyte, e.g. for lithium-accumulators; Processes of manufacture thereof

NOTE

This group does not cover electrodes for accumulators working at high temperatures, e.g. molten sodium electrodes, which subject matter is classified in group [H01M 10/39](#)

H01M 4/131	...	Electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
H01M 4/1315	....	containing halogen atoms, e.g. LiCoOxFy
H01M 4/133	...	Electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
H01M 4/134	...	Electrodes based on metals, Si or alloys
H01M 4/136	...	Electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
H01M 4/137	...	Electrodes based on electro-active polymers
H01M 4/139	...	Processes of manufacture
H01M 4/1391	....	of electrodes based on mixed oxides or hydroxides, or on mixtures of oxides or hydroxides, e.g. LiCoOx
H01M 4/13915	.....	containing halogen atoms, e.g. LiCoOxFy
H01M 4/1393	....	of electrodes based on carbonaceous material, e.g. graphite-intercalation compounds or CFx
H01M 4/1395	....	of electrodes based on metals, Si or alloys
H01M 4/1397	....	of electrodes based on inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoFy
H01M 4/1399	....	of electrodes based on electro-active polymers
H01M 4/14	..	Electrodes for lead-acid accumulators
H01M 4/16	...	Processes of manufacture
H01M 4/18	....	of Plantè electrodes
H01M 4/20	....	of pasted electrodes
H01M 4/21	.....	Drying of pasted electrodes
H01M 4/22	....	Forming of electrodes
H01M 4/23	.....	Drying or preserving electrodes after forming
H01M 4/24	..	Electrodes for alkaline accumulators

H01M 4/242	...	{Hydrogen storage electrodes}
H01M 4/244	...	{Zinc electrodes}
H01M 4/246	...	{Cadmium electrodes}
H01M 4/248	...	{Iron electrodes}
H01M 4/26	...	Processes of manufacture
H01M 4/28	....	Precipitating active material on the carrier
H01M 4/29	.....	by electrochemical methods
H01M 4/30	....	Pressing
H01M 4/32	...	Nickel oxide or hydroxide electrodes
H01M 4/34	...	Silver oxide or hydroxide electrodes
H01M 4/36	..	Selection of substances as active materials, active masses, active liquids {(electrode materials of hybrid or double layer capacitors H01G 11/30-H01G 11/50)}
H01M 4/362	...	{ Composites}
H01M 4/364	....	{ as mixtures}
H01M 4/366	....	{ as layered products}
H01M 4/368	...	{ Liquid depolarisers}
H01M 4/38	...	of elements or alloys
H01M 4/381	....	{ Alkaline or alkaline earth metals elements (H01M 4/40 takes precedence)}
H01M 4/382	.....	{ Lithium (H01M 4/405 takes precedence)}
H01M 4/383	....	{Hydrogen absorbing alloys}
H01M 4/385	.....	{ of the type LaNi ₅ }
H01M 4/386	....	{ Silicon or alloys based on silicon}
H01M 4/387	....	{ Tin or alloys based on tin}
H01M 4/388	....	{ Halogens}
H01M 4/40	....	Alloys based on alkali metals
H01M 4/405	.....	{ Alloys based on lithium}
H01M 4/42	....	Alloys based on zinc
H01M 4/44	....	Alloys based on cadmium
H01M 4/46	....	Alloys based on magnesium or aluminium
H01M 4/463	.....	{ Aluminium based}
H01M 4/466	.....	{ Magnesium based}
H01M 4/48	...	of inorganic oxides or hydroxides
H01M 4/481	....	{ of mercury}
H01M 4/483	....	{ for non-aqueous cells (H01M 4/485 takes precedence)}
H01M 4/485	....	of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. LiTi ₂ O ₄ or LiTi ₂ O _x F _y (H01M 4/505 , H01M 4/525 take precedence)
H01M 4/50	....	of manganese
H01M 4/502	.....	{ for non-aqueous cells (H01M 4/505 takes precedence)}
H01M 4/505	.....	of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. LiMn ₂ O ₄ or LiMn ₂ O _x F _y
H01M 4/52	....	of nickel, cobalt or iron
H01M 4/521	.....	{of iron for aqueous cells}

H01M 4/523	.....	{ for non-aqueous cells (H01M 4/525 takes precedence)}
H01M 4/525	.....	of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. LiNiO ₂ , LiCoO ₂ or LiCoO _x F _y
H01M 4/54	....	of silver
H01M 4/56	....	of lead
H01M 4/57	.....	of "Grey lead", i.e. powders containing lead and lead oxide
H01M 4/58	...	of inorganic compounds other than oxides or hydroxides, e.g. sulfides, selenides, tellurides, halogenides or LiCoF _y
H01M 4/5805	....	{ Phosphides}
H01M 4/581	....	{Chalcogenides or intercalation compounds thereof}
H01M 4/5815	.....	{ Sulfides}
H01M 4/582	....	{Halogenides}
H01M 4/5825	....	{ Oxygenated metallic slats or polyanionic structures, e.g. borates, phosphates, silicates, olivines}

NOTE

Polyanionic structures comprises elements not changing oxidation state during electrochemical reaction, e.g. P, Si, B

H01M 4/583	....	Carbonaceous material, e.g. graphite-intercalation compounds or CF _x
H01M 4/5835	.....	{ Comprising fluorine or fluoride salts}
H01M 4/587	.....	for inserting or intercalating light metals
H01M 4/60	...	of organic compounds
H01M 4/602	....	{ Polymers}
H01M 4/604	.....	{ containing aliphatic main chain polymers}
H01M 4/606	.....	{ containing aromatic main chain polymers}
H01M 4/608	.....	{ containing heterocyclic rings}
H01M 4/62	..	Selection of inactive substances as ingredients for active masses, e.g. binders, fillers
H01M 4/621	...	{Binders}
H01M 4/622	....	{ being polymers}
H01M 4/623	.....	{ fluorinated polymers}
H01M 4/624	...	{Electric conductive fillers}
H01M 4/625	....	{Carbon or graphite}
H01M 4/626	....	{ Metals}
H01M 4/627	...	{Expanders for lead-acid accumulators}
H01M 4/628	...	{ Inhibitors, e.g. gassing inhibitors, corrosion inhibitors}
H01M 4/64	..	Carriers or collectors {(current collector for hybrid or electric double layer capacitors H01G 11/66)}
H01M 4/66	...	Selection of materials
H01M 4/661	....	{ Metal or alloys, e.g. alloy coatings (H01M 4/669 take precedence)}
H01M 4/662	.....	{ Alloys (collectors of lead alloys H01M 4/685)}
H01M 4/663	....	{containing carbon or carbonaceous materials as conductive part, e.g. graphite, carbon fibres}

H01M 4/664	....	{Ceramic materials}
H01M 4/665	....	{ Composites}
H01M 4/666	.....	{ in the form of mixed materials (H01M 4/668 takes precedence)}
H01M 4/667	.....	{ in the form of layers, e.g. coatings}
H01M 4/668	....	{Composites of electroconductive material and synthetic resins}
H01M 4/669	....	{Steels}
H01M 4/68	....	for use in lead-acid accumulators
H01M 4/685	.....	{Lead alloys}
H01M 4/70	...	characterised by shape or form
H01M 4/72	....	Grids
H01M 4/73	.....	for lead-acid accumulators, e.g. frame plates
H01M 4/74	.....	Meshes or woven material; Expanded metal
H01M 4/742	.....	{ perforated material}
H01M 4/745	.....	{Expanded metal}
H01M 4/747	.....	{ Woven material}
H01M 4/75	....	Wires, rods or strips
H01M 4/76	....	Containers for holding the active material, e.g. tubes, capsules
H01M 4/762	.....	{Porous or perforated metallic containers}
H01M 4/765	.....	{Tubular type or pencil type electrodes; tubular or multitubular sheaths or covers of insulating material for said tubular-type electrodes}
H01M 4/767	.....	{ Multitubular sheaths or covers}
H01M 4/78	....	Shapes other than plane or cylindrical, e.g. helical
H01M 4/80	....	Porous plates, e.g. sintered carriers
H01M 4/801	.....	{ Sintered carriers}
H01M 4/803	.....	{ of only powdered material}
H01M 4/805	.....	{ of powdered and fibrous material}
H01M 4/806	.....	{ Nonwoven fibrous fabric containing only fibres}
H01M 4/808	.....	{Foamed, spongy materials}
H01M 4/82	...	Multi-step processes for manufacturing carriers for lead-acid accumulators (single step processes see the relevant subclasses, e.g. B21D ; B22D)
H01M 4/84	....	involving casting
H01M 4/86	.	Inert electrodes with catalytic activity, e.g. for fuel cells
H01M 4/8605	..	{Porous electrodes}
H01M 4/861	...	{ with a gradient in the porosity}
H01M 4/8615	...	{Bifunctional electrodes for rechargeable cells}
H01M 4/8621	...	{containing only metallic or ceramic material, e.g. made by sintering or sputtering}
H01M 4/8626	...	{characterised by the form}
H01M 4/8631	.....	{Bipolar electrodes}
H01M 4/8636	..	{ with a gradient in another property than porosity (H01M 4/861 takes precedence)}
H01M 4/8642	...	{ Gradient in composition}
H01M 4/8647	..	{ consisting of more than one material, e.g. consisting of composites}

H01M 4/8652	...	{ as mixture}
H01M 4/8657	...	{ layered}
H01M 4/8663	..	{ Selection of inactive substances as ingredients for catalytic active masses, e.g. binders, fillers}
H01M 4/8668	...	{ Binders}
H01M 4/8673	...	{ Electrically conductive fillers}
H01M 4/88	..	Processes of manufacture
H01M 4/8803	...	{ Supports for the deposition of the catalytic active composition (H01M 4/90 takes precedence)}

WARNING

Groups [H01M 4/8803](#) to [H01M 4/8896](#) are not complete, pending a reorganization. See also [H01M 4/88](#), [H01M 4/88F](#), **H01M 8/10B2A** and [H01M 8/1006](#)

H01M 4/8807	....	{ Gas diffusion layers}
H01M 4/881	....	{ Electrolytic membranes}
H01M 4/8814	....	{ Temporary supports, e.g. decal}
H01M 4/8817	...	{ Treatment of supports before application of the catalytic active composition (coated porous composites H01M 8/0245)}
H01M 4/8821	....	{ Wet proofing}
H01M 4/8825	...	{ Methods for deposition of the catalytic active composition}
H01M 4/8828	....	{ Coating with slurry or ink}
H01M 4/8832	.....	{ Ink jet printing}
H01M 4/8835	.....	{ Screen printing}
H01M 4/8839	.....	{ Painting}
H01M 4/8842	....	{ Coating using a catalyst salt precursor in solution followed by evaporation and reduction of the precursor}
H01M 4/8846	....	{ Impregnation}
H01M 4/885	.....	{ followed by reduction of the catalyst salt precursor}
H01M 4/8853	....	{ Electrodeposition}
H01M 4/8857	....	{ Casting, e.g. tape casting, vacuum slip casting}
H01M 4/886	....	{ Powder spraying, e.g. wet or dry powder spraying, plasma spraying}
H01M 4/8864	....	{ Extrusion}
H01M 4/8867	....	{ Vapour deposition}
H01M 4/8871	.....	{ Sputtering}
H01M 4/8875	...	{ Methods for shaping the electrode into free-standing bodies, like sheets, films or grids, e.g. moulding, hot-pressing, casting without support, extrusion without support}
H01M 4/8878	...	{ Treatment steps after deposition of the catalytic active composition or after shaping of the electrode being free-standing body}
H01M 4/8882	....	{ Heat treatment, e.g. drying, baking}
H01M 4/8885	.....	{ Sintering or firing}
H01M 4/8889	.....	{ Cosintering or cofiring of a catalytic active layer with another type of layer}

- H01M 4/8892 { Impregnation or coating of the catalyst layer, e.g. by an ionomer}
- H01M 4/8896 { Pressing, rolling, calendaring (**membrane electrode assemblies** [H01M 8/1004](#))}
- H01M 4/90 .. Selection of catalytic material
- H01M 4/9008 . . . {Organic or organo-metallic compounds}
- H01M 4/9016 . . . {Oxides, hydroxides or oxygenated metallic salts}
- H01M 4/9025 { Oxides specially used in fuel cell operating at high temperature, e.g. SOFC}
- H01M 4/9033 { Complex oxides, optionally doped, of the type M_1MeO_3 , M_1 being an alkaline earth metal or a rare earth, Me being a metal, e.g. perovskites}
- H01M 4/9041 . . . { Metals or alloys ([H01M 4/92](#) takes precedence)}
- H01M 4/905 { specially used in fuel cell operating at high temperature, e.g. SOFC}
- H01M 4/9058 { of noble metals or noble-metal based alloys}
- H01M 4/9066 { of metal-ceramic composites or mixtures, e.g. cermets}
- H01M 4/9075 . . . { Catalytic material supported on carriers, e.g. powder carriers ([H01M 4/8807](#), [H01M 4/881](#), [H01M 4/8814](#), [H01M 4/925](#) take precedence)}
- H01M 4/9083 { on carbon or graphite}
- H01M 4/9091 . . . { Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}
- H01M 4/92 . . . Metals of platinum group ([H01M 4/94](#), {[H01M 4/9058](#)} take precedence)
- H01M 4/921 {Alloys or mixtures with metallic elements}
- H01M 4/923 {Compounds thereof with non-metallic elements}
- H01M 4/925 { supported on carriers, e.g. powder carriers}
- H01M 4/926 { on carbon or graphite}
- H01M 4/928 { Unsupported catalytic particles; loose particulate catalytic materials, e.g. in fluidised state}
- H01M 4/94 .. Non-porous diffusion electrodes, e.g. palladium membranes, ion exchange membranes
- H01M 4/96 .. Carbon-based electrodes
- H01M 4/98 .. Raney-type electrodes

H01M 6/00 Primary cells; Manufacture thereof

NOTE

In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

- H01M 6/005 . { Devices for making primary cells}
- H01M 6/02 . Details (of non-active parts [H01M 2/00](#); of electrodes [H01M 4/00](#))
- H01M 6/04 . Cells with aqueous electrolyte
- H01M 6/045 .. { characterised by aqueous electrolyte}
- H01M 6/06 .. Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M 6/08 . . . with cup shaped electrodes

- H01M 6/085 { of the reversed type, i.e. anode in the centre}
- H01M 6/10 . . . with wound or folded electrodes
- H01M 6/103 { Cells with electrode of only one polarity being folded or wound}
- H01M 6/12 . . . with flat electrodes

- H01M 6/14 . Cells with non-aqueous electrolyte {**H01M 10/36C** takes precedence}
- H01M 6/145 . . {containing ammonia}
- H01M 6/16 . . with organic electrolyte ([H01M 6/18](#) ,{**H01M 10/40** take precedence})
- H01M 6/162 . . . {characterised by the electrolyte}
- H01M 6/164 { by the solvent (**organic electrolyte solvents** [H01M 2300/0028](#))}
- H01M 6/166 {by the solute}
- H01M 6/168 {by additives}
- H01M 6/18 . . with solid electrolyte
- H01M 6/181 . . . [N: with polymeric electrolytes (**organic polymers electrolytes** [H01M 2300/0082](#))
- H01M 6/182 . . . { with halogenide as solid electrolyte (**halide solid electrolytes** [H01M 2300/008](#))}
- H01M 6/183 {with fluoride as solid electrolyte}
- H01M 6/185 . . . { with oxides, hydroxides or oxysalts as solid electrolytes (**oxides solid electrolyte** [H01M 2300/0071](#))}
- H01M 6/186 { Only oxysalts-containing solid electrolytes}
- H01M 6/187 . . . { Solid electrolyte characterised by the form (**layered solid electrolytes** [H01M 2300/0094](#))}
- H01M 6/188 . . . {Processes of manufacture}
- H01M 6/20 . . . working at high temperature (**deferred-action thermal cells** [H01M 6/36](#))

- H01M 6/22 . Immobilising of electrolyte

- H01M 6/24 . Cells comprising two different electrolytes

- H01M 6/26 . Cells without oxidising active material, e.g. Volta cells

- H01M 6/28 . Standard cells, e.g. Weston cells

- H01M 6/30 . Deferred-action cells
- H01M 6/32 . . activated through external addition of electrolyte or of electrolyte components
- H01M 6/34 . . . Immersion cells, e.g. sea-water cells
- H01M 6/36 . . containing electrolyte and made operational by physical means, e.g. thermal cells (**thermoelectric solid state devices** [H01L 35/00](#), **H01M 37/00**)
- H01M 6/38 . . . by mechanical means
- H01M 6/385 { by insertion of electrodes}

- H01M 6/40 . Printed batteries, { e.g. thin film batteries}

- H01M 6/42 . Grouping of primary cells into batteries ([H01M 6/40](#) takes precedence)
- H01M 6/425 . . {Multimode batteries, batteries with "reserve cells"}
- H01M 6/44 . . of tubular or cup-shaped cells
- H01M 6/46 . . of flat cells

- H01M 6/48 . . . with bipolar electrodes
- H01M 6/485 { Side-by-side bipolar batteries}

- H01M 6/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature {(cells or batteries combined with safety devices [H01M 2200/00](#))}
- H01M 6/5005 . . { Auxiliary electrodes}
- H01M 6/5011 . . { for several cells simultaneously or successively}
- H01M 6/5016 . . . { Multimode utilisation}
- H01M 6/5022 . . {Arrangements for moving electrodes or separating elements}
- H01M 6/5027 . . { Dummy cells}
- H01M 6/5033 . . { used as charging means for another battery}
- H01M 6/5038 . . {Heating or cooling of cells or batteries}
- H01M 6/5044 . . {Cells or batteries structurally combined with cell condition indicating means ([H01M 2/34](#) takes precedence)}
- H01M 6/505 . . . { Cells combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity}
- H01M 6/5055 . . . {End of discharge indicated by a voltage step}
- H01M 6/5061 . . . { cells combined with sound indicating means}
- H01M 6/5066 . . { Type recognition}
- H01M 6/5072 . . { Preserving or storing cells}
- H01M 6/5077 . . {Regeneration of reactants or electrolyte}
- H01M 6/5083 . . {Testing apparatus}
- H01M 6/5088 . . { Initial activation; predischage; Stabilisation of initial voltage}

- H01M 6/52 . Reclaiming serviceable parts of waste cells or batteries, { e.g. recycling}

H01M 8/00 Fuel cells; Manufacture thereof

NOTE

Fuel cells are electrochemical generators wherein the reactants are supplied from outside

- H01M 8/002 . { Shape, form of a fuel cell}
- H01M 8/004 . . { Cylindrical, tubular or wound}
- H01M 8/006 . . { Flat}

- H01M 8/008 . { Destruction or recycling of fuel cells}

- H01M 8/02 . Details
- H01M 8/0202 . . { Collectors, separators, interconnectors, e.g. bipolar separators}
- H01M 8/0204 . . . { Non-porous and characterised by the material}
- H01M 8/0206 {Metals or alloys}
- H01M 8/0208 {Alloys}
- H01M 8/021 {Alloys based on iron}

H01M 8/0213	....	{Gas-tight carbon-containing material}
H01M 8/0215	....	{Glass or ceramic materials}
H01M 8/0217	.....	{Complexed oxides, optionally doped, of the type M1MeO3, M1 being an alkaline earth metal or rare earth metal, Me being a metal, e.g. perovskites}
H01M 8/0219	.....	{Chromium complex oxides}
H01M 8/0221	....	{ Polymers or organic resins}
H01M 8/0223	....	{Composites}
H01M 8/0226	.....	{in the form of mixtures}
H01M 8/0228	.....	{in the form of layered products, e.g. coatings}
H01M 8/023	...	{ Porous and characterised by the material}
H01M 8/0232	....	{ Metals or alloys}
H01M 8/0234	....	{ Carbonaceous material}
H01M 8/0236	....	{ Glass, ceramics or cermets}
H01M 8/0239	....	{ Polymers or organic resins}
H01M 8/0241	....	{ Composites}
H01M 8/0243	.....	{ in the form of mixtures}
H01M 8/0245	.....	{ in the form of layered products, e.g. coatings}
H01M 8/0247	...	{ Porous or non porous and characterised by the form (characterised by a channel configuration H01M 8/0258)}
H01M 8/025	....	{ Semicylindrical}
H01M 8/0252	....	{ Tubular}
H01M 8/0254	....	{ Corrugated or undulate shaped}
H01M 8/0256	....	{ Vias, i.e. connector passing through the separator material}
H01M 8/0258	...	{ Porous or non-porous and characterised by a channel configuration, i.e. by the flow field}
H01M 8/026	....	{ Grooves characteristics, pitch, depth}
H01M 8/0263	....	{ Meander or serpentine path}
H01M 8/0265	....	{ Variable section of reactant channel}
H01M 8/0267	...	{ Heating or cooling facilities in the separators, collectors or interconnectors}
H01M 8/0269	...	{ Separators, collectors or interconnectors including a printed circuit board}
H01M 8/0271	..	{of surrounding electrodes, matrices, membranes or fuel cell elements with sealing or supporting material}
H01M 8/0273	...	{in the form of a frame; Frame materials; Way of attaching to frames}
H01M 8/0276	...	{ Seals characterised by their form}
H01M 8/0278	.....	{ O-rings}
H01M 8/028	...	{ Seals characterised by their composition}
H01M 8/0282	....	{ Inorganic material}
H01M 8/0284	.....	{ Organic resins or polymers}
H01M 8/0286	...	{ Process of seal formation}
H01M 8/0289	..	{of membranes or electrolyte holding means}
H01M 8/0291	...	{Matrices; Diaphragms; Membranes}
H01M 8/0293	.....	{for immobilising electrolyte solutions}

- H01M 8/0295 {for immobilising electrolyte melts}
- H01M 8/0297 . . {of joining electrodes, reservoir layers, heat exchange units or bipolar separators to each other}

- H01M 8/04 . Auxiliary arrangements or processes, e.g. for control of pressure, for circulation of fluids

- H01M 8/04007 . . { Arrangements or means or processes related to heat exchange or temperature measurements (methods for controlling fuel cells or fuel cell systems [H01M 8/04298](#))}

- H01M 8/04014 . . . {by a gaseous fluid or by combustion of reactants, e.g. bigascooling}
- H01M 8/04022 {Heating by combustion}
- H01M 8/04029 . . . {by a liquid fluid}
- H01M 8/04037 . . . { Electrical heating}
- H01M 8/04044 . . . { Coolant purification}
- H01M 8/04052 . . . { Storage of heat in the fuel cell system}
- H01M 8/04059 . . . { Evaporative processes for the cooling of a fuel cell}
- H01M 8/04067 . . . { Heat exchange or temperature measuring elements, thermal insulation, e.g. heat pipes, heat pumps, fins}

- H01M 8/04074 { Heat exchange unit structures specially adapted for fuel cell (heat exchanger F28, heat exchangers for fuel cells [F28D 2021/0043](#))}

- H01M 8/04082 . . { Arrangements or means for reactant regulation. E.g. pressure or concentration}
- H01M 8/04089 . . . {of gaseous reactants}
- H01M 8/04097 {with recycling of the reactants ([H01M 8/04119](#), [H01M 8/04104](#) take precedence)}

- H01M 8/04104 {Regulation of differential pressures}
- H01M 8/04111 { Using a compressor turbine assembly}
- H01M 8/04119 {with simultaneous supply or evacuation of electrolyte; Humidifying or dehumidifying}

- H01M 8/04126 { Humidifying}
- H01M 8/04134 { by coolants}
- H01M 8/04141 { by water containing exhaust gases}
- H01M 8/04149 { by diffusion, e.g. making use of membranes}
- H01M 8/04156 {with product water removal}
- H01M 8/04164 { by condensers, gas-liquid separators or filters}
- H01M 8/04171 { using adsorbents, wicks or hydrophilic material}
- H01M 8/04179 { by purging or increasing flow or pressure of reactants}
- H01M 8/04186 . . . {of liquid- or electrolyte-charged reactants}
- H01M 8/04194 { Concentration measuring cells}
- H01M 8/04201 . . . { Reactant storage and supply, e.g. means for feeding, pipes}
- H01M 8/04208 { Cartridges, cryogenic media or cryogenic reservoirs}
- H01M 8/04216 { characterised by the choice for a specific material, e.g. carbon, hydride, absorbent}

- H01M 8/04223 . . . { Arrangements or means particularly during start-up or shut-down; Depolarisation or activation treatment, e.g. purging; Short-circuiting means for defective fuel cells}

H01M 8/04231	....	{ Purging of the reactants}
H01M 8/04238	....	{ Depolarisation}
H01M 8/04246	....	{ Short circuiting means for defective fuel cells (detection of defective fuel cells H01M 8/04664, methods for shunting fuel cells H01M 8/04955)}
H01M 8/04253	....	{ Means for solving freezing problems}
H01M 8/04261	....	{ Preventing means for fuel crossover}
H01M 8/04268	....	{ Heating of fuel cells during the start-up of the fuel cells}
H01M 8/04276	..	{ Arrangements or means related to the management of the electrolyte stream, e.g. heat exchange (H01M 8/04119 takes precedence; Treatment of electrolyte residue H01M 8/0693)}
H01M 8/04283	...	{ Supply means of electrolyte to or in matrix-fuel cells}
H01M 8/04291	..	{Electrolyte- or water-management of solid electrolyte cells (H01M 8/04119 takes precedence)}
H01M 8/04298	..	{ Methods for controlling fuel cells or fuel cell systems (means for control H01M 8/04007 to H01M 8/04291)}
H01M 8/04305	...	{ Modelling, demonstration models of fuel cells, e.g. for training purposes}
H01M 8/04313	...	{ characterised by variables to be detected or calculated, failure or abnormal functionality of the system}
H01M 8/0432	....	{ Temperature including ambient temperature}
H01M 8/04328	.....	{ of anode reactants at the inlet or inside the fuel cell}
H01M 8/04335	.....	{ of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04343	.....	{ of anode exhausts}
H01M 8/0435	.....	{ of cathode exhausts}
H01M 8/04358	.....	{ of the coolant}
H01M 8/04365	.....	{ of other components of a fuel cell or fuel cell stacks}
H01M 8/04373	.....	{ of auxiliary devices, e.g. reformers, compressors, burners}
H01M 8/0438	....	{ Pressure or flow including ambient pressure}
H01M 8/04388	.....	{ of anode reactants at the inlet or inside the fuel cell}
H01M 8/04395	.....	{ of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04402	.....	{ of anode exhausts}
H01M 8/0441	.....	{ of cathode exhausts}
H01M 8/04417	.....	{ of the coolant}
H01M 8/04425	.....	{ at auxiliary devices, e.g. reformers, compressors, burners}
H01M 8/04432	.....	{ Pressure differences, e.g. between anode and cathode}
H01M 8/0444	....	{ Concentrations or densities}
H01M 8/04447	.....	{ of anode reactants at the inlet or inside the fuel cell}
H01M 8/04455	.....	{ of cathode reactants at the inlet or inside the fuel cell}
H01M 8/04462	.....	{ of anode exhausts}
H01M 8/0447	.....	{ of cathode exhausts}
H01M 8/04477	.....	{ of the electrolyte}
H01M 8/04485	.....	{ of the coolant}
H01M 8/04492	....	{ Humidity, moisture or water content including ambient humidity}
H01M 8/045	.....	{ of anode reactants at the inlet or inside the fuel cell}
H01M 8/04507	.....	{ of cathode reactants at the inlet or inside the fuel cell}

H01M 8/04514	.....	{ of anode exhausts}
H01M 8/04522	.....	{ of cathode exhausts}
H01M 8/04529	.....	{ of the electrolyte}
H01M 8/04537	....	{ Electric variables}
H01M 8/04544	.....	{ Voltage}
H01M 8/04552	.....	{ of the individual fuel cell}
H01M 8/04559	.....	{ of fuel cell stacks}
H01M 8/04567	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04574	.....	{ Current}
H01M 8/04582	.....	{ of the individual fuel cell}
H01M 8/04589	.....	{ of fuel cell stacks}
H01M 8/04597	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04604	.....	{ Power, energy, capacity or load}
H01M 8/04611	.....	{ of the individual fuel cell}
H01M 8/04619	.....	{ of fuel cell stacks}
H01M 8/04626	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04634	.....	{ Other electric variables, e.g. resistance or impedance}
H01M 8/04641	.....	{ of the individual fuel cell}
H01M 8/04649	.....	{ of fuel cell stacks}
H01M 8/04656	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04664	....	{ Failure or abnormal functionality}
H01M 8/04671	.....	{ of the individual fuel cell}
H01M 8/04679	.....	{ of fuel cell stacks}
H01M 8/04686	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04694	...	{ characterised by variables to be regulated}
H01M 8/04701	....	{ Temperature}
H01M 8/04708	.....	{ of fuel cell reactants}
H01M 8/04716	.....	{ of fuel cell exhausts}
H01M 8/04723	.....	{ of the coolant}
H01M 8/04731	.....	{ of other components of a fuel cell or fuel cell stacks}
H01M 8/04738	.....	{ of auxiliary devices, e.g. reformer, compressor, burner}
H01M 8/04746	....	{ Pressure or flow}
H01M 8/04753	.....	{ of fuel cell reactants}
H01M 8/04761	.....	{ of fuel cell exhausts}
H01M 8/04768	.....	{ of the coolant}
H01M 8/04776	.....	{ at auxiliary devices, e.g. reformer, compressor, burner}
H01M 8/04783	.....	{ Pressure differences, e.g. between anode and cathode}
H01M 8/04791	....	{ Concentrations or densities}
H01M 8/04798	.....	{ of fuel cell reactants}
H01M 8/04805	.....	{ of fuel cell exhausts}
H01M 8/04813	.....	{ of the coolant}
H01M 8/0482	.....	{ of the electrolyte}

H01M 8/04828	....	{ Humidity, moisture or water content}
H01M 8/04835	.....	{ of fuel cell reactants}
H01M 8/04843	.....	{ of fuel cell exhausts}
H01M 8/0485	.....	{ of the electrolyte}
H01M 8/04858	....	{ Electric variables}
H01M 8/04865	.....	{ Voltage}
H01M 8/04873	.....	{ of the individual fuel cell}
H01M 8/0488	.....	{ of fuel cell stacks}
H01M 8/04888	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04895	.....	{ Current}
H01M 8/04902	.....	{ of the individual fuel cell}
H01M 8/0491	.....	{ of fuel cell stacks}
H01M 8/04917	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04925	.....	{ Power, energy, capacity or load}
H01M 8/04932	.....	{ of the individual fuel cell}
H01M 8/0494	.....	{ of fuel cell stacks}
H01M 8/04947	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04955	.....	{ Turning on/off, shunting of fuel cells or fuel cell system components (arrangements or means during start-up or shut-down H01M 8/04223)}
H01M 8/04962	.....	{ Other electric variables e.g. resistance or impedance}
H01M 8/0497	.....	{ of the individual fuel cell}
H01M 8/04977	.....	{ of fuel cell stacks}
H01M 8/04985	.....	{ of auxiliary devices, e.g. batteries, capacitors}
H01M 8/04992	...	{ characterised by the implementation of the control method by mathematical or computational algorithm, e.g. control feedback loop mechanisms, fuzzy logic, neural networks, artificial intelligence}
H01M 8/06	.	Combination of fuel cell with means for production of reactants or for treatment of residues
H01M 8/0606	..	{Producing gaseous reactants}
H01M 8/0612	...	{from carbon containing material}
H01M 8/0618	....	{ Reforming processes, e.g. autothermal, partial oxidation or steam reforming}
H01M 8/0625	....	{in a modular combined reactor/fuel cell structure}
H01M 8/0631	.....	{ Reactor construction specially adapted for combination reactor/fuel cell (Hydrogen C01B 3/00 , reactors for physicochemical processes B01J 19/00)}
H01M 8/0637	....	{ Direct internal reforming at the anode of the fuel cell}
H01M 8/0643	....	{Gasification of solid fuel}
H01M 8/065	...	{ by dissolution of metals or alloys or by dehydrating metallic substance}
H01M 8/0656	...	{by electrochemical means (H01M 8/065 takes precedence)}
H01M 8/0662	..	{Treatment of gaseous reactants or gaseous residues, e.g. cleaning (humidifying or dehumidifying of gaseous reactants H01M 8/04119)}
H01M 8/0668	...	{ Removal of carbon monoxide or carbon dioxide}

- H01M 8/0675 . . . { Removal of sulfur}
- H01M 8/0681 . . . { Reactant purification by the use of electrochemical cells}
- H01M 8/0687 . . . { Reactant purification by the use of membranes or filters}
- H01M 8/0693 . . {Treatment of the electrolyte residue, e.g. reconcentrating}

- H01M 8/08 . Fuel cells with aqueous electrolytes
- H01M 8/083 . . { Alkaline fuel cells}
- H01M 8/086 . . { Phosphoric acid fuel cells (PAFC)}

- H01M 8/10 . Fuel cells with solid electrolytes
- H01M 8/1002 . . {with anode and cathode gas-diffusion electrodes or electrode layers, e.g. using gaseous or vaporised reactants (H01M 8/12 takes precedence)}
- H01M 8/1004 . . . { characterised by the electrode/electrolyte combination}
- H01M 8/1006 { Undulated, corrugated, curved or wave-shaped membrane-electrode-assemblies (MEA)}
- H01M 8/1009 . . {with one of the reactants being liquid, solid or liquid-charged (H01M 8/12 takes precedence)}
- H01M 8/1011 . . . { Direct methanol fuel cells (DMFC)}
- H01M 8/1013 . . . { Other direct alcohol fuel cells (DAFC)}
- H01M 8/1016 . . {characterised by the electrolyte material (H01M 8/12 takes precedence)}
- H01M 8/1018 . . . {Polymeric electrolyte material}
- H01M 8/102 { characterised by the chemical structure of the main chain of the ion conducting polymer (membrane support H01M 8/1058, semi-permeable membrane composition B01D 71/00, ion-exchange membrane C08J 5/22)}

NOTE

Multiple classification is done when two or more heteroatoms from O, P, N, S, Si are present

- H01M 8/1023 { having only carbon, e.g. Nafion, vinylsulfonic acid, polyarylenes, polystyrenes, polybutadiene-styrene}
- H01M 8/1025 { having only carbon and oxygen, e.g. polyethers, sulfonated-polyetheretherketones [s-PEEK], sulfonated-polysaccharides, sulfonated-celluloses, sulfonated-polyesters}
- H01M 8/1027 { having carbon, oxygen and other atoms, e.g. sulfonated-polyethersulfones [s-PES], sulfonated-polyphenyl-quinoxaline [s-PPQ] }
- H01M 8/103 { having nitrogen, e.g. sulfonated-polybenzimidazoles [s-PBI], polybenzimidazoles with phosphoric acid, sulfonated-polyamides [s-PA], sulfonated polyphosphazenes [s-PPh]}
- H01M 8/1032 { having sulfur, e.g. sulfonated polyphosphazene [s-PPh]}
- H01M 8/1034 { having phosphorous, e.g. sulfonated polyphosphazene [s-PPh]}
- H01M 8/1037 { having silicon, e.g. sulfonated crosslinked polydimethylsiloxane}
- H01M 8/1039 { being halogenated, e.g. Nafion, sulfonated polyvinylidene fluoride}
- H01M 8/1041 { Polymer electrolyte composites, mixtures or blends other than copolymers or grafted polymers}
- H01M 8/1044 { Mixtures of polymers with at least one polymer being ionically conductive}

H01M 8/1046	.....	{ Mixtures of polymer and additives}
H01M 8/1048	.....	{ Ion conductive additives, e.g. polybenzimidazole with phosphoric acid, ion conducting particles, heteropolyacids or metal phosphate}
H01M 8/1051	.....	{ Non ion conductive additives, e.g. stabilizers, SiO ₂ , ZrO ₂ }
H01M 8/1053	.....	{ Layers of polymers with at least one layer being ionically conductive}
H01M 8/1055	.....	{ Inorganic layers on the polymer electrolytes, e.g. inorganic coatings}
H01M 8/1058	....	{ characterized by a porous support having no ionic conductive properties (membrane immobilizing electrolyte solutions or melts H01M 8/0293 , H01M 8/0295)}
H01M 8/106	.....	{ Chemical composition of the porous support}
H01M 8/1062	.....	{ Physical properties of the porous support, e.g. porosity, thickness}
H01M 8/1065	....	{ characterized by their form, e.g. perforated, undulated (semi-permeable membranes characterised by their form B01D 69/00)}
H01M 8/1067	....	{ characterized by their physical properties, e.g. porosity, ionic conductivity, thickness}
H01M 8/1069	....	{ characterized by the manufacturing processes (semi-permeable membrane manufacturing processes B01D 67/00 ; manufacture of ion-exchange membrane C08J 5/22)}
H01M 8/1072	.....	{ Chemical reactions, e.g. in-situ polymerisation, in-situ crosslinking}
H01M 8/1074	.....	{ Sol-gel processes}
H01M 8/1076	.....	{ Micromachining techniques, e.g. masking, etching steps, photolithography}
H01M 8/1079	.....	{ Inducing porosity into non porous precursors membranes, e.g. leaching, pore stretching}
H01M 8/1081	.....	{ Starting from polymer solutions, dispersions, slurries other than monomer solutions, dispersions, slurries}
H01M 8/1083	.....	{ Starting from polymer melts other than monomer melts}
H01M 8/1086	.....	{ After-treatment of the membrane other than polymerisation}
H01M 8/1088	.....	{ chemical modification, e.g. sulfonation}
H01M 8/109	.....	{ thermal other than drying, e.g. sintering}
H01M 8/1093	.....	{ mechanical, e.g. pressing, puncturing}
H01M 8/1097	..	{ Fuel cells applied on a support, e.g. miniature fuel cell deposited on a silica support}
H01M 8/12	..	operating at high temperature, e.g. with stabilised ZrO ₂ electrolyte
H01M 8/1206	...	{with the anode and the cathode in the form of gas diffusion electrodes}
H01M 8/1213	....	{characterised by the electrodes, the electrode/electrolyte combination or the supporting material}
H01M 8/122	.....	{ Undulated, corrugated, curved or wave-shaped membrane electrode assemblies (MEA)}
H01M 8/1226	.....	{Supporting layer characteristics}
H01M 8/1233	...	{one of the reactants being solid or liquid}
H01M 8/124	...	{characterised by the process of manufacturing or by the material of the electrolyte}
H01M 8/1246	....	{ the electrolyte consisting of oxides (solid oxides ion conductive electrolyte H01M 2300/0074)}
H01M 8/1253	.....	{ the electrolyte containing zirconium oxide (solid electrolyte based on zirconium oxide H01M 2300/0077)}

- H01M 8/126 {the electrolyte containing cerium oxide}
- H01M 8/1266 {the electrolyte containing bismuth oxide}
- H01M 8/1273 { Fuel cells with solid halide electrolytes (**solid halide electrolyte H01M 2300/008**)}
- H01M 8/1286 ... { Fuel cells applied on a support, e.g. miniature fuel cells deposited on a silica support}

- H01M 8/14 . Fuel cells with fused electrolytes
- H01M 8/141 .. {the anode and the cathode being gas-permeable electrodes or electrode layers}
- H01M 8/142 ... {with matrix-supported or semi-solid matrix-reinforced electrolyte}
- H01M 8/143 .. {with liquid, solid or electrolyte-charged reactants}
- H01M 8/144 .. {characterised by the electrolyte material}
- H01M 8/145 ... {comprising carbonates}
- H01M 8/146 .. { Fuel cells with molten hydroxide (**molten hydroxide electrolyte T01M300/B6H**)}
- H01M 8/148 .. {Measures, other than selecting a specific electrode material, to reduce electrode dissolution}

- H01M 8/16 . Biochemical fuel cells, i.e. cells in which micro-organisms function as catalysts

- H01M 8/18 . Regenerative fuel cells
- H01M 8/182 .. {Regeneration by thermal means}
- H01M 8/184 .. {Regeneration by electrochemical means}
- H01M 8/186 ... {by electrolytic decomposition of the electrolytic solution or the formed water product}
- H01M 8/188 ... {by recharging of redox couples containing fluids; Redox flow type batteries}

- H01M 8/20 . Indirect fuel cells, e.g. Redox cells ([H01M 8/18](#) takes precedence)

- H01M 8/22 . Fuel cells in which the fuel is based on materials comprising carbon or oxygen or hydrogen and other elements; Fuel cells in which the fuel is based on materials comprising only elements other than carbon, oxygen or hydrogen
- H01M 8/222 .. {Fuel cells in which the fuel is based on compounds containing nitrogen, e.g. hydrazine, ammonia}
- H01M 8/225 .. {Fuel cells in which the fuel is based on materials comprising particulate active material in the form of a suspension, a dispersion, a fluidised bed or a paste}
- H01M 8/227 .. {Dialytic cells or batteries; Reverse electrodialysis cells or batteries}

- H01M 8/24 . Grouping of fuel cells into batteries
- H01M 8/2405 .. {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte layer or electrolyte compartment}
- H01M 8/241 ... {with solid or matrix-supported electrolyte}
- H01M 8/2415 {External manifolded battery stock ([H01M 8/2425](#), [H01M 8/244](#) take precedence)}
- H01M 8/242 {comprising framed electrodes or intermediary frame-like gaskets ([H01M 8/2425](#), [H01M 8/244](#) take precedence)}
- H01M 8/2425 {High-temperature cells with solid electrolyte}
- H01M 8/243 {of tubular or cylindrical configuration}

- H01M 8/2435 {with monolithic core structure, e.g. honeycombs}
- H01M 8/244 {with matrix-supported molten electrolyte}
- H01M 8/2445 ... {comprising spaced diffusion electrodes or electrode layers with interposed electrolyte compartment with possible electrolyte supply or circulation}
- H01M 8/245 {comprising framed electrodes or intermediary frame-like gaskets}
- H01M 8/2455 .. {with liquid, solid or electrolyte-charged reactants}
- H01M 8/246 ... {with framed electrodes or intermediary frame-like gaskets}
- H01M 8/2465 .. {Details of fuel cell stacks}
- H01M 8/247 ... { Arrangements for tightening a stack, for accommodation of a stack in a tank, for assembling different tanks}
- H01M 8/2475 { Enclosures, casings or containers of fuel cells}
- H01M 8/248 { Compression means of the fuel cell stack}
- H01M 8/2485 ... {Arrangements for sealing or mounting external manifolds around a stack; Manifold structure and material}
- H01M 8/249 .. {comprising a plurality of stacks, e.g. modular assembly}
- H01M 8/2495 ... {of fuel cells of different type}

H01M 10/00 Secondary cells; Manufacture thereof

NOTE

Secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.

- H01M 10/02 . Details (of non-active parts [H01M 2/00](#); of electrodes [H01M 4/00](#))
- H01M 10/04 . Construction or manufacture in general ([H01M 10/12](#), [H01M 10/28](#), [H01M 10/38](#) take precedence)
- H01M 10/0404 .. { Machines for assembling batteries}
- H01M 10/0409 ... { for cells with wound electrodes}
- H01M 10/0413 .. { Large-sized flat cells or batteries for motive or stationary systems with plate-like electrodes}
- H01M 10/0418 ... {with bipolar electrodes}
- H01M 10/0422 .. { Cells or battery with cylindrical casing }
- H01M 10/0427 ... {Button cells}
- H01M 10/0431 .. { Cells with wound or folded electrodes ([H01M 10/045](#) takes precedence)}
- H01M 10/0436 .. { Small-sized flat cells or batteries portable equipment}
- H01M 10/044 ... {with bipolar electrodes}
- H01M 10/0445 .. { Multimode batteries, e.g. containing auxiliary cells or electrodes switchable in parallel or series connections}
- H01M 10/045 .. { Cells or batteries with folded plate-like electrodes}
- H01M 10/0454 ... { Cells or batteries with electrodes of only one polarity folded}
- H01M 10/0459 .. { Cells or batteries with folded separator between plate-like electrodes}
- H01M 10/0463 .. { Cells or batteries with horizontal or inclined electrodes}
- H01M 10/0468 .. { Compression means for stacks of electrodes and separators}

- H01M 10/0472 .. { Vertically superposed cells with vertically disposed plates}
- H01M 10/0477 .. { with circular plates}
- H01M 10/0481 .. { Compression means other than compression means for stacks of electrodes and separators}
- H01M 10/0486 .. { Frames for plates or membranes}
- H01M 10/049 .. {Processes for forming or storing electrodes in the battery container}

- H01M 10/05 . Accumulators with non-aqueous electrolyte ([H01M 10/39](#) takes precedence)
- H01M 10/052 .. Li-accumulators
- H01M 10/0525 ... Rocking-chair batteries, i.e. batteries with lithium insertion or intercalation in both electrodes; Lithium-ion batteries
- H01M 10/054 .. Accumulators with insertion or intercalation of metals other than lithium, e.g. with magnesium or aluminium
- H01M 10/056 .. characterised by the materials used as electrolytes, e.g. mixed inorganic/organic electrolytes {(electrolytes for hybrid or electric double layer capacitors [H01G 11/54](#))}
- H01M 10/0561 ... the electrolyte being constituted of inorganic materials only
- H01M 10/0562 Solid materials
- H01M 10/0563 Liquid materials, e.g. for Li-SOCl₂ cells
- H01M 10/0564 ... the electrolyte being constituted of organic materials only
- H01M 10/0565 Polymeric materials, e.g. gel-type or solid-type
- H01M 10/0566 Liquid materials
- H01M 10/0567 characterised by the additives
- H01M 10/0568 characterised by the solutes
- H01M 10/0569 characterised by the solvents
- H01M 10/058 .. Construction or manufacture
- H01M 10/0583 ... of accumulators with folded construction elements except wound ones, i.e. folded positive or negative electrodes or separators, e.g. with "Z"-shaped electrodes or separators
- H01M 10/0585 ... of accumulators having only flat construction elements, i.e. flat positive electrodes, flat negative electrodes and flat separators
- H01M 10/0587 ... of accumulators having only wound construction elements, i.e. wound positive electrodes, wound negative electrodes and wound separators

- H01M 10/06 . Lead-acid accumulators ([semi-lead accumulators H01M 10/20](#))
- H01M 10/08 .. Selection of materials as electrolytes
- H01M 10/10 ... Immobilising of electrolyte
- H01M 10/12 .. Construction or manufacture
- H01M 10/121 ... { Valve regulated lead acid batteries [VRLA] }
- H01M 10/122 ... {Multimode batteries}
- H01M 10/123 ... { Cells or batteries with cylindrical casing}
- H01M 10/124 {Button cells}
- H01M 10/125 ... {Cells or batteries with wound or folded electrodes}
- H01M 10/126 ... {Small-sized flat cells or batteries for portable equipment ([H01M 10/123](#) and [H01M 10/125](#) take precedence)}
- H01M 10/127 {with bipolar electrodes}

- H01M 10/128 . . . {Processes for forming or storing electrodes in the battery container}
- H01M 10/14 . . . Assembling a group of electrodes or separators
- H01M 10/16 Suspending or supporting electrodes or groups of electrodes in the case
- H01M 10/18 . . with bipolar electrodes

- H01M 10/20 . Semi-lead accumulators, i.e. accumulators in which only one electrode contains lead
- H01M 10/22 . . Selection of materials as electrolytes

- H01M 10/24 . Alkaline accumulators
- H01M 10/26 . . Selection of materials as electrolytes
- H01M 10/28 . . Construction or manufacture
- H01M 10/281 . . . {Large cells or batteries with stacks of plate-like electrodes}
- H01M 10/282 {with bipolar electrodes}
- H01M 10/283 . . . {Cells or batteries with two cup-shaped or cylindrical collectors ([H01M 10/281](#) takes precedence)}
- H01M 10/285 {Button cells}
- H01M 10/286 . . . {Cells or batteries with wound or folded electrodes}
- H01M 10/287 . . . {Small-sized flat cells or batteries for portable equipment ([H01M 10/283](#) and [H01M 10/286](#) take precedence)}
- H01M 10/288 . . . {Processes for forming or storing electrodes in the battery container}
- H01M 10/30 . . Nickel accumulators ([H01M 10/34](#) takes precedence)
- H01M 10/32 . . Silver accumulators ([H01M 10/34](#) takes precedence)

- H01M 10/34 . Gastight accumulators
- H01M 10/342 . . { Gastight lead accumulators ([H01M 10/121](#) takes precedence)}
- H01M 10/345 . . { Gastight metal hydride accumulators}
- H01M 10/347 . . . {with solid electrolyte}

- H01M 10/36 . Accumulators not provided for in groups [H01M 10/05-H01M 10/34](#)
- H01M 10/365 . . {Zinc-halogen accumulators}
- H01M 10/38 . . Construction or manufacture
- H01M 10/39 . . Working at high temperature
- H01M 10/3909 . . . { Sodium-sulfur cells}
- H01M 10/3918 { characterised by the electrolyte}
- H01M 10/3927 { Several layers of electrolyte or coatings containing electrolyte}
- H01M 10/3936 { Electrolyte with a shape other than plane or cylindrical}
- H01M 10/3945 { containing additives or special arrangements in the sodium compartment}
- H01M 10/3954 { containing additives or special arrangement in the sulfur compartment}
- H01M 10/3963 { Sealing means between the solid electrolyte and holders}
- H01M 10/3972 { Flexible parts}
- H01M 10/3981 { Flat cells}
- H01M 10/399 . . . { Cells with molten salts}

- H01M 10/42 . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells

- H01M 10/4207 .. {for several batteries or cells simultaneously or sequentially}
- H01M 10/4214 .. {Arrangements for moving electrodes or electrolyte}
- H01M 10/4221 .. { with battery type recognition}
- H01M 10/4228 .. { Leak testing of cells or batteries}
- H01M 10/4235 .. {Safety or regulating additives or arrangements in electrodes, separators or electrolyte ([H01M 10/4242](#) takes precedence)}
- H01M 10/4242 .. {Regeneration of electrolyte or reactants}
- H01M 10/425 .. { Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing ([printed circuits H05K 1/00](#))}
- H01M 10/4257 ... { Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries}
- H01M 10/4264 ... { with capacitors}
- H01M 10/4285 .. {Testing apparatus}
- H01M 10/44 .. Methods for charging or discharging ([circuits for charging H02J 7/00](#))
- H01M 10/441 ... {for several batteries or cells simultaneously or sequentially}
- H01M 10/443 ... { in response to temperature}
- H01M 10/445 ... { in response to gas pressure}
- H01M 10/446 ... { Initial charging measures}
- H01M 10/448 ... { End of discharge regulating measures}
- H01M 10/46 .. Accumulators structurally combined with charging apparatus ([circuits for charging H02J 7/00](#))
- H01M 10/465 ... {with solar battery as charging system}
- H01M 10/48 .. Accumulators combined with arrangements for measuring, testing or indicating condition, e.g. level or density of the electrolyte ([H01M 10/44](#) takes precedence); [indicating or measuring level of liquid in general G01F 23/00](#); [measuring density G01N](#), e.g. [G01N 9/00](#); [measuring electric variables G01R](#))
- H01M 10/482 ... {for several batteries or cells simultaneously or sequentially}
- H01M 10/484 ... { for measuring electrolyte level, electrolyte density or electrolyte conductivity}
- H01M 10/486 ... { for measuring temperature}
- H01M 10/488 ... { Cells or batteries combined with indicating means for externally visualisation of the condition, e.g. by change of colour or of light intensity}
- H01M 10/50 .. Heating or cooling or regulating temperature ([control of temperature in general G05D 23/00](#))
- H01M 10/5002 ... { Types of temperature regulation}

WARNING

Groups [H01M 10/5002](#) to [H01M 10/5097](#) are not complete, pending reclassification. See also [H01M 10/50](#), [H01M 10/50B](#), **T01M 6/50S2-T01M 6/50S2R**

- H01M 10/5004 { Cooling or keeping cold}
- H01M 10/5006 { Heating or keeping warm}
- H01M 10/5008 { Uniformity or distribution of temperature in space}
- H01M 10/501 ... { specially adapted for a specific application}
- H01M 10/5012 { Portable devices, e.g. mobiles, cameras, pacemakers}
- H01M 10/5014 { Power tools}

H01M 10/5016	....	{ Vehicles}
H01M 10/5018	....	{ Stationary plants, e.g. power plant buffering, backup power supplies}
H01M 10/502	...	{ Control systems (measurement of temperature H01M 10/486 ; charging and discharging in response to temperature H01M 10/443)}
H01M 10/5022	....	{ characterized by method steps, e.g. algorithms, flow charts, software details}
H01M 10/5024	....	{ based on ambient temperature}
H01M 10/5026	....	{ characterised by the use of reversible temperature sensitive devices, e.g. NTC, PTC, bimetal or by control of the internal current flowing through the battery, e.g. by switching (H01M 2/34 takes precedence; Temperature sensitive safety devices for primary or secondary batteries H01M 2200/10)}
H01M 10/5028	...	{ characterized by the shape of the cells}
H01M 10/503	....	{ Cylindrical}
H01M 10/5032	....	{ Prismatic or flat, e.g. pouch cells}
H01M 10/5034	...	{ Means for temperature regulation having parts combined with the battery}
H01M 10/5036	....	{ characterized by values or quantitative relationships, e.g. ratios, sizes, formulas, concentrations}
H01M 10/5038	....	{ characterized by gradients (temperature gradients H01M 10/5008)}
H01M 10/504	....	{ characterized by electrically insulating, thermally conductive materials}
H01M 10/5042	....	{ inside the innermost case of the battery, e.g. mandrels, electrodes, electrolytes}
H01M 10/5044	....	{ Solid structures for heat-exchange or conduction}
H01M 10/5046	.....	{ Surfaces specially adapted for heat dissipation or radiation, e.g. fins, coatings}
H01M 10/5048	.....	{ Closed pipes transferring heat by thermal conductivity and phase transition, e.g. heat pipes}
H01M 10/5051	.....	{ Terminals or leads}
H01M 10/5053	.....	{ Solid parts specially adapted for heat conduction other than terminals or leads, e.g. rods, plates}
H01M 10/5055	.....	{ arranged between the cells}
H01M 10/5057	.....	{ Solid parts with flow channels or tubes for heat exchange}
H01M 10/5059	.....	{ arranged between the cells}
H01M 10/5061	....	{ Fluids for heat exchange}
H01M 10/5063	.....	{ Gases}
H01M 10/5065	.....	{ freely flowing by convection only}
H01M 10/5067	.....	{ forcedly flowing, e.g. by blowers}
H01M 10/5069	.....	{ Compressed gases}
H01M 10/5071	.....	{ Recirculation or a U-turn in the flow path, i.e. back and forth (H01M 10/5069 takes precedence)}
H01M 10/5073	.....	[Means within the gas flows giving the gas flows around a cell or a battery a certain direction, e.g. manifolds, baffles, obstacles]
H01M 10/5075	.....	{ Liquids}
H01M 10/5077	.....	{characterised by flow circuits external to the battery or the battery pack}
H01M 10/5079	.....	{ Fluids undergoing a liquid-gas phase change, e.g. evaporation, condensation (heat pipes H01M 10/5048)}

- H01M 10/5081 { Electric or electromagnetic means ([H01M 2/34](#) takes precedence)}
- H01M 10/5083 { Resistor heaters (arrangements for heating the battery by its resistance to internal current [H01M 10/5026](#))}
- H01M 10/5085 { Peltier elements or thermo-electric devices}
- H01M 10/5087 { Thermal insulation or shielding}
- H01M 10/5089 { Heat storage or buffering, e.g. heat capacity, liquid-solid phase changes}
- H01M 10/5091 { Chemical reactions other than electrochemical reactions of the battery, e.g. catalytic heaters, burners}
- H01M 10/5093 . . . { Heat exchange relationships between a battery and another system, e.g. air-conditioners, central heating systems, vehicle engines, electronic components, fuel cells, capacitors}
- H01M 10/5095 { the system being an air-conditioner or an engine}
- H01M 10/5097 { the system being an electronic component, e.g. CPU, inverter, capacitor}
- H01M 10/52 . . . Removing gases inside the secondary cell, e.g. by absorption (vent plugs or other mechanical arrangements for facilitating escape of gases [H01M 2/12](#))
- H01M 10/523 . . . { by recombination on a catalytic material}
- H01M 10/526 . . . { by gas recombination on the electrode surface or by structuring the electrode surface to improve gas recombination}
- H01M 10/54 . . . Reclaiming serviceable parts of waste accumulators

H01M 12/00 Hybrid cells; Manufacture thereof

NOTE

Hybrid cells are electrochemical generators having two different types of half-cells, the half-cell being an electrode-electrolyte combination of either a primary, a secondary or a fuel cell.

- H01M 12/005 . . { composed of a half-cell of the capacitor type and of a half-cell of the primary or secondary battery type (hybrid capacitors [H01G 9/155](#))}
- H01M 12/02 . . Details (of non-active parts [H01M 2/00](#); of electrodes [H01M 4/00](#))
- H01M 12/04 . . composed of a half-cell of the fuel-cell type and of a half-cell of the primary-cell type (methods or arrangements for servicing or maintenance [H01M 6/50](#))
- H01M 12/06 . . with one metallic and one gaseous electrode
- H01M 12/065 . . . {with plate-like electrodes or stacks of plate-like electrodes}
- H01M 12/08 . . composed of a half-cell of a fuel-cell type and a half-cell of the secondary-cell type (methods or arrangements for servicing or maintenance, e.g. for charging, [H01M 10/42](#))
- H01M 12/085 . . {Zinc-halogen cells or batteries}

H01M 14/00 Electrochemical current or voltage generators not provided for in groups [H01M 6/00](#) - [H01M 12/00](#); Manufacture thereof

- H01M 14/005 . . { Photoelectrochemical storage cells (light sensitive devices [H01G 9/20](#),

semiconductors sensitive to light H01L131/00}

H01M 16/00

Structural combinations of different types of electrochemical generators

H01M 16/003

. { of fuel cells with other electrochemical devices, e.g. capacitors, electrolysers}

H01M 16/006

.. { of fuel cells with rechargeable batteries}

H01M 2002/00

Constructional details or processes of manufacture of the non-active parts

H01M 2002/02

. Cases, jackets or wrappings (working of plastics or substances in plastic stateB29)

H01M 2002/0202

.. {for small-sized cells or batteries, e.g. miniature battery or power cells, batteries or cells for portable equipment (H01M 2/025 takes precedence)}

H01M 2002/0205

... Cases with a shape not covered by groups H01M 2/0207 to T01M 2/02B6

H01M 2002/0257

.. {characterised by the material}

H01M 2002/0297

... characterised by physical parameters

H01M 2004/00

Electrodes (electrodes for electrolytic processes C25, { electrodes for hybrid or electric double capacitor H01G 11/22})

H01M 2004/02

. Electrodes composed of or comprising active material

H01M 2004/021

.. Physical characteristics, e.g. porosity, surface area

H01M 2004/022

.. Electrodes made of one single microscopic fiber

H01M 2004/023

.. Gel electrode

H01M 2004/024

.. Insertable electrodes

H01M 2004/025

.. with shapes other than plane or cylindrical

H01M 2004/026

.. characterised by the polarity

H01M 2004/027

... Negative electrodes

H01M 2004/028

... Positive electrodes

H01M 2004/029

... Bipolar electrodes

H01M 2004/86

. Inert electrodes with catalytic activity, e.g. for fuel cells

H01M 2004/8678

.. characterised by the polarity

H01M 2004/8684

... Negative electrodes

H01M 2004/8689

... Positive electrodes

H01M 2004/8694

... Bipolar electrodes

H01M 2006/00

Primary cells; Manufacture thereof

NOTE

In this group, primary cells are electrochemical generators in which the cell energy is present in chemical form and is not regenerated.

- H01M 2006/04 . Cells with aqueous electrolyte
- H01M 2006/06 .. Dry cells, i.e. cells wherein the electrolyte is rendered non-fluid
- H01M 2006/10 ... with wound or folded electrodes
- [H01M 2006/106](#) Elliptic wound cells
- H01M 2006/50 . Methods or arrangements for servicing or maintenance, e.g. maintaining operating temperature {(cells or batteries combined with safety devices [H01M 2200/00](#))}
- [H01M 2006/5094](#) .. Aspects relating to capacity ratio of electrolyte/electrodes or anode/cathode
- H01M 2008/00 Fuel cells; Manufacture thereof**
- NOTE**
- Fuel cells are electrochemical generators wherein the reactants are supplied from outside
- H01M 2008/10 . Fuel cells with solid electrolytes
- [H01M 2008/1095](#) .. Fuel cells with polymeric electrolytes
- H01M 2008/12 .. operating at high temperature, e.g. with stabilised ZrO₂ electrolyte
- [H01M 2008/128](#) ... Fuel cells with solid halide electrolytes
- [H01M 2008/1293](#) ... Fuel cells with solid oxide electrolytes
- H01M 2008/14 . Fuel cells with fused electrolytes
- [H01M 2008/147](#) .. Fuel cells with molten carbonates
- H01M 2010/00 Secondary cells; Manufacture thereof**
- NOTE**
- Secondary cells are accumulators receiving and supplying electrical energy by means of reversible electrochemical reactions.
- H01M 2010/04 . Construction or manufacture in general ([H01M 10/12](#), [H01M 10/28](#), [H01M 10/38](#) take precedence)
- [H01M 2010/0495](#) .. Nanobatteries
- H01M 2010/42 . Methods or arrangements for servicing or maintenance of secondary cells or secondary half-cells
- H01M 2010/425 .. { Structural combination with electronic components, e.g. electronic circuits integrated to the outside of the casing (printed circuits [H05K 1/00](#))}
- [H01M 2010/4271](#) ... Battery management systems including electronic circuits, e.g. control of current or voltage to keep battery in healthy state, cell balancing
- [H01M 2010/4278](#) ... Systems for data transfer from batteries, e.g. transfer of battery parameters to a controller, data transferred between battery controller and main controller
- [H01M 2010/4292](#) .. Aspects relating to capacity ratio of electrodes/electrolyte or anode/cathode

H01M 2200/00 Safety devices for primary or secondary batteries

- H01M 2200/10 . Temperature sensitive devices
 - H01M 2200/101 .. Bimetal
 - H01M 2200/103 .. Fuse
 - H01M 2200/105 .. NTC
 - H01M 2200/106 .. PTC
 - H01M 2200/108 .. Normal resistors
- H01M 2200/20 . Pressure-sensitive devices
- H01M 2200/30 . Preventing polarity reversal

H01M 2220/00 Batteries for particular applications

- H01M 2220/10 . Batteries in stationary systems, e.g. emergency power source in plant
- H01M 2220/20 . Batteries in motive systems, e.g. vehicle, ship, plane
- H01M 2220/30 . Batteries in portable systems, e.g. mobile phone, laptop

H01M 2250/00 Fuel cells for particular applications; Specific features of fuel cell system

- H01M 2250/10 . Fuel cells in stationary systems, e.g. emergency power source in plant
- H01M 2250/20 . Fuel cells in motive systems, e.g. vehicle, ship, plane
- H01M 2250/30 . Fuel cells in portable systems, e.g. mobile phone, laptop
- H01M 2250/40 . Combination of fuel cells with other energy production systems
 - H01M 2250/402 .. Combination of fuel cell with other electric generators ([combination of fuel cells with other electrochemical generator H01M 16/003](#))
 - H01M 2250/405 .. Cogeneration of heat or hot water
 - H01M 2250/407 .. Combination of fuel cells with mechanical energy generators

H01M 2300/00 Electrolytes

- H01M 2300/0002 . Aqueous electrolytes
 - H01M 2300/0005 .. Acid electrolytes
 - H01M 2300/0008 ... Phosphoric acid-based

- H01M 2300/0011 ... Sulfuric acid-based
- H01M 2300/0014 .. Alkaline electrolytes
- H01M 2300/0017 . Non-aqueous electrolytes
- H01M 2300/002 .. Inorganic electrolyte
- H01M 2300/0022 ... Room temperature molten salts
- H01M 2300/0025 .. Organic electrolyte
- H01M 2300/0028 ... characterised by the solvent
- H01M 2300/0031 Chlorinated solvents
- H01M 2300/0034 Fluorinated solvents
- H01M 2300/0037 Mixture of solvents
- H01M 2300/004 Three solvents
- H01M 2300/0042 Four or more solvents
- H01M 2300/0045 ... Room temperature molten salts comprising at least one organic ion
- H01M 2300/0048 .. Molten electrolytes used at high temperature
- H01M 2300/0051 ... Carbonates
- H01M 2300/0054 ... Halogenides
- H01M 2300/0057 Chlorides
- H01M 2300/006 ... Hydroxides
- H01M 2300/0062 ... Nitrates
- H01M 2300/0065 .. Solid electrolytes
- H01M 2300/0068 ... inorganic
- H01M 2300/0071 Oxides
- H01M 2300/0074 Ion conductive at high temperature
- H01M 2300/0077 based on zirconium oxide
- H01M 2300/008 Halides
- H01M 2300/0082 ... Organic polymers
- H01M 2300/0085 . Immobilising or gelification of electrolyte
- H01M 2300/0088 . Composites
- H01M 2300/0091 .. in the form of mixtures
- H01M 2300/0094 .. in the form of layered products, e.g. coatings
- H01M 2300/0097 ... with adhesive layers