

**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 2002/0205 ... {Cases with a shape not covered by groups [H01M 2/0207](#) to [H01M 2/0235](#) }
- 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-Cl<sub>2</sub> 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 ( <a href="#">H01M 2/029</a> 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 2002/0297	...	{characterised by physical parameters }
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 ( <a href="#">H01M 2/0443</a> 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 ( <a href="#">H01M 2/0417</a> 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 ( <a href="#">H01M 2/0443</a> 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 <a href="#">H01M 10/46</a> )
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 <a href="#">H01M 2220/30</a> )}
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 <a href="#">H01M 2220/10</a> , batteries in motive systems <a href="#">H01M 2220/20</a> )}
H01M 2/1077	....	{Racks, groups of several batteries ( <a href="#">H01M 2/1088</a> 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 <a href="#">H01M 2200/00</a> )}
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 ( <a href="#">H01M 8/04</a> takes precedence)
<b>H01M 4/00</b>		<b>Electrodes</b> (electrodes for electrolytic processes <a href="#">C25</a> , { electrodes for hybrid or electric double capacitor <a href="#">H01G 11/22</a> })
H01M 4/02	.	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 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 ( <a href="#">H01M 4/0438</a> 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 <a href="#">C23C 18/54</a> )}
H01M 4/044	....	{ Activating, forming or electrochemical attack of the supporting material}
H01M 4/0442	.....	{ Anodisation, Oxidation (electrolytic coating by anodisation <a href="#">C25D 9/00</a> )}
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 ( <a href="#">H01M 4/0438</a> , 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 ( <a href="#">use of alloy compositions as active materials H01M 4/38</a> )
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 Planté 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 <a href="#">H01G 11/30-H01G 11/50</a> )}
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 ( <a href="#">H01M 4/40</a> takes precedence)}
H01M 4/382	.....	{ Lithium ( <a href="#">H01M 4/405</a> takes precedence)}
H01M 4/383	....	{Hydrogen absorbing alloys}
H01M 4/385	.....	{ of the type LaNi <sub>5</sub> }
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 ( <a href="#">H01M 4/485</a> takes precedence)}
H01M 4/485	....	of mixed oxides or hydroxides for inserting or intercalating light metals, e.g. $\text{LiTi}_2\text{O}_4$ or $\text{LiTi}_2\text{O}_x\text{F}_y$ ( <a href="#">H01M 4/505</a> , <a href="#">H01M 4/525</a> take precedence)
H01M 4/50	....	of manganese
H01M 4/502	.....	{ for non-aqueous cells ( <a href="#">H01M 4/505</a> takes precedence)}
H01M 4/505	.....	of mixed oxides or hydroxides containing manganese for inserting or intercalating light metals, e.g. $\text{LiMn}_2\text{O}_4$ or $\text{LiMn}_2\text{O}_x\text{F}_y$
H01M 4/52	....	of nickel, cobalt or iron
H01M 4/521	.....	{of iron for aqueous cells}
H01M 4/523	.....	{ for non-aqueous cells ( <a href="#">H01M 4/525</a> takes precedence)}
H01M 4/525	.....	of mixed oxides or hydroxides containing iron, cobalt or nickel for inserting or intercalating light metals, e.g. $\text{LiNiO}_2$ , $\text{LiCoO}_2$ or $\text{LiCoO}_x\text{F}_y$
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 $\text{LiCoF}_y$
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}
<b><u>NOTE</u></b>		
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 $\text{CF}_x$
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 <a href="#">H01G 11/66</a> )}
H01M 4/66	...	Selection of materials
H01M 4/661	....	{ Metal or alloys, e.g. alloy coatings ( <a href="#">H01M 4/669</a> take precedence )}
H01M 4/662	.....	{ Alloys (collectors of lead alloys <a href="#">H01M 4/685</a> )}
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 ( <a href="#">H01M 4/668</a> 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. <a href="#">B21D</a> ; <a href="#">B22D</a> )
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 ( <a href="#">H01M 4/861</a> 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 2004/8678	..	{characterised by the polarity }
H01M 2004/8684	...	{Negative electrodes }
H01M 2004/8689	...	{Positive electrodes }
H01M 2004/8694	...	{Bipolar electrodes }
H01M 4/88	..	Processes of manufacture
H01M 4/8803	...	{ Supports for the deposition of the catalytic active composition ( <a href="#">H01M 4/90</a> takes precedence)}
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 <a href="#">H01M 8/0245</a> )}
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, calendering ( <a href="#">membrane electrode assemblies H01M 8/1004</a> )}
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 ( <a href="#">H01M 4/92</a> 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 ( <a href="#">H01M 4/8807</a> , <a href="#">H01M 4/881</a> , <a href="#">H01M 4/8814</a> , <a href="#">H01M 4/925</a> 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 ( <a href="#">H01M 4/94</a> , { <a href="#">H01M 4/9058</a> } 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 <a href="#">H01M 2/00</a> ; of electrodes <a href="#">H01M 4/00</a> )
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 2006/106	....	{Elliptic wound cells }
H01M 6/12	...	with flat electrodes
H01M 6/14	.	Cells with non-aqueous electrolyte ( <a href="#">H01M 10/05</a> takes precedence)
H01M 6/145	..	{containing ammonia}
H01M 6/16	..	with organic electrolyte ( <a href="#">H01M 6/18</a> ,{ <a href="#">H01M 10/05</a> take precedence})
H01M 6/162	...	{characterised by the electrolyte}
H01M 6/164	....	{ by the solvent (organic electrolyte solvents <a href="#">H01M 2300/0028</a> )}
H01M 6/166	....	{by the solute}
H01M 6/168	....	{by additives}
H01M 6/18	..	with solid electrolyte
H01M 6/181	...	{with polymeric electrolytes (organic polymers electrolytes <a href="#">H01M 2300/0082</a> )}
H01M 6/182	...	{ with halogenide as solid electrolyte (halide solid electrolytes <a href="#">H01M 2300/008</a> )}
H01M 6/183	....	{with fluoride as solid electrolyte}
H01M 6/185	...	{ with oxides, hydroxides or oxysalts as solid electrolytes (oxides solid electrolyte <a href="#">H01M 2300/0071</a> )}

- 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](#), [H01L 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; predischARGE; Stabilisation of initial voltage}
- H01M 2006/5094      ..      {Aspects relating to capacity ratio of electrolyte/electrodes or anode/cathode }
- 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 M1MeO<sub>3</sub>, 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 <a href="#">H01M 8/04298</a> )}
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 <a href="#">F28</a> , heat exchangers for fuel cells <a href="#">F28D 2021/0043</a> )}
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 ( <a href="#">H01M 8/04119</a> , <a href="#">H01M 8/04104</a> 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 ( <a href="#">detection of defective fuel cells H01M 8/04664</a> , <a href="#">methods for shunting fuel cells H01M 8/04955</a> )}
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 ( <a href="#">H01M 8/04119</a> takes precedence; <a href="#">Treatment of electrolyte residue H01M 8/0693</a> )}
H01M 8/04283	...	{ Supply means of electrolyte to or in matrix-fuel cells}
H01M 8/04291	..	{Electrolyte- or water-management of solid electrolyte cells ( <a href="#">H01M 8/04119</a> takes precedence)}
H01M 8/04298	..	{ Methods for controlling fuel cells or fuel cell systems ( <a href="#">means for control H01M 8/04007</a> to <a href="#">H01M 8/04291</a> )}
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 <a href="#">H01M 8/04223</a> )}
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 ( <a href="#">Hydrogen C01B 3/00</a> , <a href="#">reactors for physicochemical processes B01J 19/00</a> )}
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 ( <a href="#">H01M 8/065</a> takes precedence)}
H01M 8/0662	..	{Treatment of gaseous reactants or gaseous residues, e.g. cleaning ( <a href="#">humidifying or dehumidifying of gaseous reactants H01M 8/04119</a> )}
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 ( <a href="#">H01M 8/12</a> 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 ( <a href="#">H01M 8/12</a> 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 ( <a href="#">H01M 8/12</a> 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 <a href="#">H01M 8/1058</a> , semi-permeable membrane composition <a href="#">B01D 71/00</a> , ion-exchange membrane <a href="#">C08J 5/22</a> )}

**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 <sub>2</sub> , ZrO <sub>2</sub> }
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 <a href="#">H01M 8/0293</a> , <a href="#">H01M 8/0295</a> )}
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 <a href="#">B01D 69/00</a> )}
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 <a href="#">B01D 67/00</a> ; manufacture of ion-exchange membrane <a href="#">C08J 5/22</a> )}
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 2008/1095	..	{Fuel cells with polymeric electrolytes}
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 <sub>2</sub> 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 <a href="#">H01M 2300/0074</a> )}
H01M 8/1253	.....	{ the electrolyte containing zirconium oxide (solid electrolyte based on zirconium oxide <a href="#">H01M 2300/0077</a> )}
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 <a href="#">H01M 2300/008</a> )}
H01M 2008/128	...	{Fuel cells with solid halide electrolytes}
H01M 8/1286	...	{ Fuel cells applied on a support, e.g. miniature fuel cells deposited on a silica support}



- H01M 2008/1293 . . . {Fuel cells with solid oxide electrolytes}
- 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 2008/147 . . {Fuel cells with molten carbonates}
- 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 2010/0495 .. {Nanobatteries }
- 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-SOCl<sub>2</sub> 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 ( <a href="#">H01M 10/281</a> 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 ( <a href="#">H01M 10/283</a> and <a href="#">H01M 10/286</a> take precedence)}
H01M 10/288	...	{Processes for forming or storing electrodes in the battery container}
H01M 10/30	..	Nickel accumulators ( <a href="#">H01M 10/34</a> takes precedence)
H01M 10/32	..	Silver accumulators ( <a href="#">H01M 10/34</a> takes precedence)
H01M 10/34	.	Gastight accumulators
H01M 10/342	..	{ Gastight lead accumulators ( <a href="#">H01M 10/121</a> takes precedence)}
H01M 10/345	..	{ Gastight metal hydride accumulators}
H01M 10/347	...	{with solid electrolyte}
H01M 10/36	.	Accumulators not provided for in groups <a href="#">H01M 10/05</a> - <a href="#">H01M 10/34</a>
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 ( <a href="#">H01M 10/4242</a> 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 ( <a href="#">printed circuits H05K 1/00</a> )}
H01M 10/4257	...	{ Smart batteries, e.g. electronic circuits inside the housing of the cells or batteries}
H01M 10/4264	...	{ with capacitors}
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 10/4285	..	{Testing apparatus}
H01M 2010/4292	..	{Aspects relating to capacity ratio of electrodes/electrolyte or anode/cathode }
H01M 10/44	..	Methods for charging or discharging ( <a href="#">circuits for charging H02J 7/00</a> )
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 ( <a href="#">circuits for charging H02J 7/00</a> )
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 ({ <a href="#">H01M 10/44</a> takes precedence}; <a href="#">indicating or measuring level of liquid in general G01F 23/00</a> ; <a href="#">measuring density G01N</a> , e.g. <a href="#">G01N 9/00</a> ; <a href="#">measuring electric variables G01R</a> )
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 ( <a href="#">control of temperature in general G05D 23/00</a> )
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](#), **[H01M10/50B](#)**, [H01M 2200/10-H01M 2200/108](#)

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 <a href="#">H01M 10/486</a> ; charging and discharging in response to temperature <a href="#">H01M 10/443</a> )}
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 ( <a href="#">H01M 2/34</a> takes precedence; Temperature sensitive safety devices for primary or secondary batteries <a href="#">H01M 2200/10</a> )}
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 <a href="#">H01M 10/5008</a> )}
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 ( <a href="#">H01M 10/5069</a> 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}



<b>H01M 14/00</b>	<b>Electrochemical current or voltage generators not provided for in groups <a href="#">H01M 6/00</a> - <a href="#">H01M 12/00</a>; Manufacture thereof</b>
<a href="#">H01M 14/005</a>	. { <a href="#">Photoelectrochemical storage cells (light sensitive devices <a href="#">H01G 9/20</a>, semiconductors sensitive to light <a href="#">H01L131/00</a>)</a> }
<b>H01M 16/00</b>	<b>Structural combinations of different types of electrochemical generators</b>
<a href="#">H01M 16/003</a>	. { of fuel cells with other electrochemical devices, e.g. capacitors, electrolyzers }
<a href="#">H01M 16/006</a>	.. { of fuel cells with rechargeable batteries }
<b>H01M 2200/00</b>	<b>Safety devices for primary or secondary batteries</b>
<a href="#">H01M 2200/10</a>	. Temperature sensitive devices
<a href="#">H01M 2200/101</a>	.. Bimetal
<a href="#">H01M 2200/103</a>	.. Fuse
<a href="#">H01M 2200/105</a>	.. NTC
<a href="#">H01M 2200/106</a>	.. PTC
<a href="#">H01M 2200/108</a>	.. Normal resistors
<a href="#">H01M 2200/20</a>	. Pressure-sensitive devices
<a href="#">H01M 2200/30</a>	. Preventing polarity reversal
<b>H01M 2220/00</b>	<b>Batteries for particular applications</b>
<a href="#">H01M 2220/10</a>	. Batteries in stationary systems, e.g. emergency power source in plant
<a href="#">H01M 2220/20</a>	. Batteries in motive systems, e.g. vehicle, ship, plane
<a href="#">H01M 2220/30</a>	. Batteries in portable systems, e.g. mobile phone, laptop
<b>H01M 2250/00</b>	<b>Fuel cells for particular applications; Specific features of fuel cell system</b>
<a href="#">H01M 2250/10</a>	. Fuel cells in stationary systems, e.g. emergency power source in plant
<a href="#">H01M 2250/20</a>	. Fuel cells in motive systems, e.g. vehicle, ship, plane
<a href="#">H01M 2250/30</a>	. Fuel cells in portable systems, e.g. mobile phone, laptop
<a href="#">H01M 2250/40</a>	. Combination of fuel cells with other energy production systems
<a href="#">H01M 2250/402</a>	.. Combination of fuel cell with other electric generators ( <a href="#">combination of fuel cells with other electrochemical generator <a href="#">H01M 16/003</a></a> )
<a href="#">H01M 2250/405</a>	.. Cogeneration of heat or hot water
<a href="#">H01M 2250/407</a>	.. Combination of fuel cells with mechanical energy generators
<b>H01M 2300/00</b>	<b>Electrolytes</b>
<a href="#">H01M 2300/0002</a>	. Aqueous electrolytes
<a href="#">H01M 2300/0005</a>	.. Acid electrolytes
<a href="#">H01M 2300/0008</a>	... Phosphoric acid-based
<a href="#">H01M 2300/0011</a>	... Sulfuric acid-based
<a href="#">H01M 2300/0014</a>	.. Alkaline electrolytes
<a href="#">H01M 2300/0017</a>	. Non-aqueous electrolytes
<a href="#">H01M 2300/002</a>	.. 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