

An alkali metal, solid cathode, nonaqueous electrochemical cell capable of delivering high current pulses, rapidly recovering its open circuit voltage and having high current capacity, is described. The stated benefits are realized by the addition of at least one nitrite additive to an electrolyte comprising an alkali metal salt dissolved in a mixture of a low viscosity solvent and a high permittivity solvent. A preferred solvent mixture includes propylene carbonate, dimethoxyethane and an alkyl nitrite additive.

LEAD ACID

6037081

EXPANDED GRID FOR ELECTRODE PLATE OF LEAD-ACID BATTERY

Go Kashio, Yasuyuki Yoshihara, Japan assigned to Matsushita Electric Industrial Company Ltd.

A slit is formed in a clad sheet integrating a thin layer of lead alloy containing at least one of tin and antimony at least on one side of a parent material made of lead or lead-calcium system alloy. The clad sheet is processed by expanding to twist the rib of the formed grid, and the thin layer of the lead alloy containing at least one of tin and antimony is spirally oriented in multiple directions, as the positive electrode plate. An expanded grid is thus formed. In this manner, charging reception characteristics after long-term storage following deep discharge at high temperature of a lead-acid battery are improved.

FUEL CELLS

6033794

MULTI-STAGE FUEL CELL SYSTEM METHOD AND APPARATUS

Thomas J. George, William C. Smith, USA assigned to The United States of America as represented by the United States Department of Energy

A high-efficiency, multi-stage fuel cell system method and apparatus are provided. The fuel cell system is comprised of multiple fuel cell stages, whereby the temperatures of the fuel and oxidant gas streams and the percentage of fuel consumed in each stage are controlled to optimize fuel cell system efficiency. The stages are connected in a serial, flow-through arrangement such that the oxidant gas and fuel gas flowing through an upstream stage are conducted directly into the next adjacent downstream stage. The fuel cell stages are further arranged such that unspent fuel and oxidant-laden gases too hot to continue within an upstream stage because of material constraints are conducted into a subsequent downstream stage which comprises a similar cell configuration, but which is constructed from materials having a higher heat tolerance and designed to meet higher thermal demands. In addition, fuel is underutilized in each stage, resulting in a higher overall fuel cell system efficiency.

6037072

FUEL CELL WITH METAL SCREEN FLOW FIELD

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A polymer electrolyte membrane (PEM) fuel cell is provided with electrodes supplied with a reactant on each side of a catalyzed membrane assembly (CMA). The fuel cell includes a metal mesh defining a rectangular flow-field pattern having an inlet at a first corner and an outlet at a second corner located on a diagonal from the first corner, wherein all flow paths from the inlet to the outlet through the square flow field pattern are equivalent to uniformly distribute the reactant over the CMA. In a preferred form of metal mesh, a square weave screen forms the flow-field pattern. In a particular characterization of the present invention, a bipolar plate electrically connects adjacent fuel cells, where the bipolar plate includes a thin metal foil having an anode side and a cathode side; a first metal mesh on the anode side of the thin metal foil; and a second metal mesh on the cathode side of the thin metal foil. In another characterization of the present invention, a cooling plate assembly cools adjacent fuel cells, where the cooling plate assembly includes an anode electrode and a cathode electrode formed of thin conducting foils; and a metal mesh flow field there between for distributing cooling water flow over the electrodes to remove heat generated by the fuel cells.

6037073

BIPOLAR PLATE/DIFFUSER FOR A PROTON EXCHANGE MEMBRANE FUEL CELL

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A combination bipolar plate/diffuser fuel cell component includes an electrically conducting solid material having: a porous region having a porous surface; and a hermetic region, the hermetic region defining at least a portion of at least one coolant channel, the porous region defining at least a portion of at least one reactant channel, the porous region defining a flow field medium for diffusing the reactant to the porous surface.

6037076

MOLTEN CARBONATE FUEL CELL AND METHOD OF MANUFACTURING RETAINING MATERIAL FOR ELECTROLYTE BODY OF MOLTEN CARBONATE FUEL CELL

Norihiro Tomimatsu, Hideyuki Ohzu, Yoshihiro Akasaka, Kazuaki Nakagawa, Japan assigned to Kabushiki Kaisha Toshiba

A molten carbonate fuel cell comprises a fuel electrode, an oxidizing agent electrode, and an electrolyte body prepared by impregnating a porous body including a retaining material and a reinforcing material with an electrolyte containing

an alkali carbonate. The retaining material consists essentially of α -lithium aluminate (α -LiAlO₂) having at the most 0.60° of a half-value width of peak in an X-ray powder diffractometry.

6040073

FUEL CELL

Takafumi Okamoto, Japan assigned to Honda Giken Kogyo Kabushiki Kaisha

A fuel cell unit in which a hydrogen-side (anode) electrode and an air-side (cathode) electrode are disposed facing each other with an electrolyte membrane interposed there between, and wherein a separator is provided for supporting the said fuel cell structure interposed there between. The separator has, independently disposed therein, a first cooling passage through which a first cooling medium, generally composed of water, is introduced for cooling the hydrogen-side electrode, and a second cooling passage through which a second cooling medium having a melting point below that of water is introduced for cooling the air-side electrode. Accordingly, a melting operation for the first cooling medium can be easily and swiftly carried out, while the fuel cell unit itself remains simple in structure.

6040076

ONE-PIECE FUEL CELL SEPARATOR PLATE

Kenneth W. Reeder, USA assigned to M-C Power Corporation

A separator plate for an internally manifold fuel cell stack comprising a centrally disposed active region, a peripheral seal region, and forming at least one pair of perforations substantially geometrically disposed on opposite sides of the centrally disposed active region is provided. The peripheral seal region comprises a peripheral seal structure on each face of the separator plate completely around the periphery of each said face. A manifold seal region in each face completely encloses each perforation, the manifold seal region comprising conduits on one of the said faces for communication of a gas between the centrally disposed active region and at least the one pair of perforations. The separator plate is comprised of one sheet of a material suitable for use as a separator plate, preferably a pressed sheet metal.

6042955

FUEL CELL AND METHOD OF CONTROLLING THE SAME

Takafumi Okamoto, Japan assigned to Honda Giken Kogyo Kabushiki Kaisha

A fuel gas and an oxygen-containing gas are supplied downwardly through different passages into a first manifold plate, a first surface pressure generating plate, a separator body, a second surface pressure generating plate, a second

manifold plate, a first gasket, a solid polymer electrolyte membrane, and a second gasket, into which cooling water is supplied upwardly. The cooling water rises upwardly in the separator body to reduce the temperature distribution in a fuel cell.

BATTERY MATERIALS

6033803

HYDROPHILIC ELECTRODE FOR AN ALKALINE ELECTROCHEMICAL CELL, AND METHOD OF MANUFACTURE

Stephane Senyarich, Jean-Michel Cocciantelli, France assigned to SAFT

A negative electrode for an alkaline electrochemical cell is provided. The electrode comprises an active material and a hydrophilic agent constituted by small cylindrical rods of polyolefin provided with hydrophilic groups. The mean length of the rods is less than 50 μ m and the mean diameter thereof is less than 20 μ m. A method of manufacturing a negative electrode is given in which hydrophilic rods are made by fragmenting long polyolefin fibers having a mean diameter of less than 20 μ m by oxidizing them, with the rods being mixed with the active material and the mixture being applied to a current conductor.

6033806

METHOD OF PRODUCING A CROSS-LINKED POLYVINYL ALCOHOL SEPARATOR FOR AN ALKALI-ZINC SECONDARY BATTERY

Izuru Sugiura, Seiichi Akita, Nobuyuki Kuroda, Japan assigned to Nippon Oil Company Ltd.

A method of producing a cross-linked polyvinyl alcohol separator having a film of cross-linked polyvinyl alcohol for an alkali-zinc secondary battery, and a cross-linked polyvinyl alcohol separator produced by the method are disclosed. The method includes the steps of (1) providing a film of polyvinyl alcohol having a degree of saponification of 70–98.5% and containing 1,2-diol units; (2) contacting the film of polyvinyl alcohol with an oxidizing agent to effect oxidative cleavage of the 1,2-diol units; (3) contacting the film of polyvinyl alcohol with an acid catalyst to catalyze acetalization to form a film of cross-linked polyvinyl alcohol; and (4) preparing a separator with the film of cross-linked polyvinyl alcohol.

6037074

FLEXIBLE GRAPHITE COMPOSITE FOR USE IN THE FORM OF A FUEL CELL FLOW FIELD PLATE

Robert Angelo Mercuri, Jeffrey John Gough, USA assigned to UCAR Carbon Technology Corporation

Herein is given a flexible graphite sheet having embedded ceramic fibers extending from its surfaces into the sheet to increase the permeability of the sheet to resin which is grooved by mechanical deformation into a shape useful as a flow field plate in fuel cells, having a thin sheet of flexible graphite affixed to the grooved sheet to provide support therefor.

6037079

ALKALINE BATTERY SEPARATOR AND PROCESS FOR PRODUCING THE SAME

Masanao Tanaka, Nobutoshi Tokutake, Japan assigned to Japan Vilene Company Ltd.

An alkaline battery separator comprising a nonwoven fabric containing one or more mixture layers of entangled short fibers and entangled long fibers, wherein a fiber length of the short fibers is from 1 mm to less than 25 mm, a fiber length of the long fibers is 25 mm or more, and a total thickness of all of the mixture layers accounts for not less than one-third of the whole thickness of the nonwoven fabric is disclosed. The alkaline battery separator according to the present invention exhibits an excellent electrolyte-holding capacity, tensile strength, tear strength and bending resistance, and can be used to stably prepare a battery. Electrode flash rarely penetrates the separator, to thereby cause a short circuit between electrodes.

6037080

ORGANIC ELECTROLYTE COMPOSITION

Esam Kronfli, Christine Ruth Jarvis, Great Britain assigned to AEA Technology Plc.

A polymeric chain consisting primarily of vinylidene fluoride, onto which is grafted a mono-unsaturated carboxylic acid, ester, or amide, for example acrylic acid, may be combined with a lithium salt and a solvent to form an electrolyte material. This may be used as an electrolyte in a lithium cell, or may be combined with an insertion material to make a composite electrode for such a cell. The electrolyte, and so also the composite electrode incorporating this electrolyte, adhere well to a metal current collector.

6042969

NEGATIVE ELECTRODE MATERIAL AND NON-AQUEOUS LIQUID ELECTROLYTE SECONDARY CELL EMPLOYING THE SAME

Shinichiro Yamada, Hiroshi Imoto, Japan assigned to Sony Corporation

Herein are given a negative electrode material having high energy density per unit volume to realize high charging/discharging capacity, and a non-aqueous liquid electrolyte secondary cell employing the negative electrode material. The non-aqueous liquid electrolyte secondary cell includes a

negative electrode mainly composed of silicon and capable of doping/undoping light metal ions, a positive electrode and a non-aqueous liquid electrolyte.

6042970

METHOD OF FORMING A SEPARATOR FOR ALKALINE ELECTROLYTE SECONDARY ELECTRIC CELL

Stephane Senyarich, Patrick Viaud, France assigned to SAFT

An alkaline electrolyte secondary electric cell comprises at least one positive electrode and one negative electrode positioned on either side of a separator composed of polyolefin fibers grafted with a vinyl monomer. The cell contains a device for absorbing and retaining nitrogen in a strongly basic medium, with a pH of at least 12. This device is constituted by the separator. A vinyl monomer solution is forced into the pores of the separator by drawing the solution through the separator, for example by using a suction pump.

LITHIUM BATTERIES

6033797

AROMATIC MONOMER GASSING AGENTS FOR PROTECTING NON-AQUEOUS LITHIUM BATTERIES AGAINST OVERCHARGE

Huanyu Mao, Ulrich von Sacken, Canada assigned to NEC Moli Energy Limited

Non-aqueous rechargeable lithium batteries can be equipped with internal electrical disconnect devices to protect against overcharge abuse. At the abnormally high voltages of overcharge, the devices can be activated by gases generated as a result of the electrochemical polymerization of suitable monomer additives incorporated in the electrolyte. Aromatic compounds such as biphenyl are particularly suitable aromatic additives for LiCoO₂-based lithium ion batteries.

6033798

METHOD OF PREDICTING DISCHARGE CAPACITY AND OPERATING VOLTAGE OF LITHIUM RECHARGEABLE BATTERY USING LITHIUM MANGANESE SPINEL CATHODE MATERIAL

Mitsuharu Tabuchi, Kazuaki Ado, Kageyama, Hiroyuki Kageyama, Osamu Nakamura, Japan assigned to Agency of Industrial Science and Technology

A method of determining the charge and/or discharge capacities of non-aqueous batteries with an operating voltage of about 4 V is provided including determining an inverse molar susceptibility value at each of a plurality of different temperatures for a plurality of lithium manganese spinel oxide cathode materials having different respective Mn

valencies; plotting the inverse molar susceptibility values against temperatures for each of the plurality of lithium manganese spinel oxide cathode materials; determining the values of at least one of two paramagnetic parameters, Weiss temperature and effective magnetic moment, by obtaining the temperature dependence of the above inverse molar susceptibility from a plot derived from the Curie-Weiss law, the Weiss temperature corresponding to a temperature value extrapolated to a zero point of the inverse molar susceptibility and the effective magnetic moment being obtainable from the gradient value of the plot; producing plural rechargeable lithium batteries in which lithium manganese spinel oxides with well-defined Mn valencies are used as cathode materials, and finding at least one of the charge or discharge capacities around 4 V for each of the batteries; providing at least one correlation curve between the above-found charge and/or discharge capacities and the above-found at least one paramagnetic parameter value; and obtaining charge and/or discharge capacities for a rechargeable lithium battery containing a lithium manganese spinel oxide whose charge and/or discharge capacities are being sought from the at least one determined paramagnetic parameter value using the at least one correlation curve. A method of determining the charge and/or discharge capacities of non-aqueous batteries with an operating voltage of about 4 V is also provided which includes determining a spontaneous magnetization value for each of a plurality of lithium manganese spinel oxide cathode materials having a different respective Mn valency by determining a magnetization value of each of a plurality of magnetic fields at a constant temperature to obtain and thereafter use a correlation curve.

6033807

LITHIUM NICKELATE POSITIVE ACTIVE MATERIAL, PRODUCING METHOD THEREOF AND LITHIUM BATTERY EQUIPPED WITH THE ACTIVE MATERIAL

Hideo Yasuda, Japan assigned to Japan Storage Battery Company Ltd.

A positive active material contains lithium nickel-cobaltate, and its crystal structure is amorphous. The positive active material can further contain phosphorus. The cobalt in the positive active material can be present in a content in the range of 2–60 mol% (Co/(Ni+Co)). A lithium battery can contain the positive active material.

6033808

PROCESS FOR REMOVING ACIDS FROM LITHIUM SALT SOLUTIONS

Dennis J. Salmon, D. Wayne Barnette, USA assigned to FMC Corporation

The present invention provides a process for generating acid-free lithium salt solutions for lithium and lithium ion

batteries and for preparing high-purity lithium salts. The invention comprises removing acid species from lithium salt solutions such as lithium hexafluorophosphate solutions using weak base resins. The process does not require the addition of a base such as ammonia which when added to the electrolytic solution generally must be removed from the final product. Once the lithium salt has been treated by the weak base resin, the substantially acid-free lithium salt solution may be recovered from the weak base resin to provide a solution which may be used as an electrolytic solution or which may be used to prepare high-purity lithium salts.

6033809

LITHIUM SECONDARY BATTERY AND ELECTROLYTE THEREOF

Toshikazu Hamamoto, Atsuo Hitaka, Yukio Nakada, Koji Abe, Japan assigned to UBE Industries Ltd.

Herein is given a non-aqueous electrolyte lithium secondary battery comprising a cathode, an anode and a non-aqueous electrolyte comprising an electrolyte dissolved in a non-aqueous solvent, wherein the cathode is composed of a material containing a lithium complex oxide, the anode is composed of a material containing graphite and the non-aqueous solvent contains, as main components, a cyclic carbonate and a linear carbonate and 0.1–4% by weight, based upon the total weight of the non-aqueous solvent, of a sultone derivative having the general formula (I): (Figure) wherein R^1 , R^2 , R^3 , R^4 , R^5 and R^6 independently represent an alkyl group having one to 12 carbon atoms, a cycloalkyl group having three to six carbon atoms, an aryl group having six to 12 carbon atoms or a hydrogen atom and n is an integer from 0 to 2.

6037095

NON-AQUEOUS LITHIUM ION SECONDARY BATTERY

Tsutomu Miyasaka, Japan assigned to Fuji Photo Film Company Ltd.

A non-aqueous lithium ion secondary battery is composed of a positive electrode, a negative electrode, and non-aqueous electrolyte. In the battery, the positive electrode is composed of a positive electrode active material of the formula $Li_xNi_{1-y}M_yO_{2-z}X_a$ in which M is at least one element such as Mg, Ca, B, Al, Ga, In, Si, Sn, Ge, Pb and at least one transition metal element; X is a halogen atom; x , y , z and a are numbers satisfying the conditions of $0.2 < x \leq 1.2$, $0 < y \leq 0.5$, $0 < z \leq 1$ and $0 \leq a \leq 2z$, and the negative electrode is composed of an amorphous metal complex oxide or a combination of a crystalline and/or amorphous metal complex oxide and a carbonaceous material.

6040089**MULTIPLE-DOPED OXIDE CATHODE MATERIAL FOR SECONDARY LITHIUM AND LITHIUM-ION BATTERIES**

Vesselin Manev, Titus Faulkner, Wayne Barnette, Yuan Gao, USA assigned to FMC Corporation

The present invention provides a positive electrode material for lithium and lithium-ion secondary cells which exhibits good cycleability, reversible specific capacity, and structural stability. The positive electrode material comprises a lithium multimetal oxide having a spinel structure and described by the general formula $M_{m_k}^k O_{4+Z}$ wherein M^1, M^2, \dots, M^k are at least two cations other than lithium or manganese, selected from the group consisting of alkaline earth metals, transition metals, B, Al, Si, Ga and Ge; $X, Y, m_1, m_2, \dots, m_k$ are numbers between 0 and 0.2; m_1, m_2 and Y are greater than 0; Z is a number between -0.1 and 0.2 ; and wherein the metals M^1, M^2, \dots, M^k and the corresponding values m_1, m_2, \dots, m_k satisfy the following equation and inequality: (Figure) wherein V_1, V_2, \dots, V_k are the corresponding valence states of the cations M^1, M^2, \dots, M^k .

6040090**POSITIVE ELECTRODE MATERIAL FOR USE IN NON-AQUEOUS ELECTROLYTE BATTERY, PROCESS FOR PREPARING THE SAME, AND NON-AQUEOUS ELECTROLYTE BATTERY**

Takuya Sunagawa, Hiroshi Watanabe, Ryuji Ohshita, Masahisa Fujimoto, Toshiyuki Nohma, Koji Nishio, Japan assigned to Sanyo Electric Company Ltd.

A non-aqueous electrolyte battery according to the invention includes a positive electrode using a lithium-metal compound oxide as a positive electrode material, a negative electrode and a non-aqueous electrolyte solution, the battery employing a positive electrode material composed of the lithium-metal compound oxide which contains at least Ni, Co and Mn, and has a peak with a full width at half maximum of not greater than 0.22° in a range of $2\theta = 18.71 \pm 0.25^\circ$ as measured by the powder X-ray diffraction analysis using a Cu $K\alpha$ X-ray source or employing a positive electrode material composed of a lithium-metal compound oxide which contains at least Ni, Co and Mn, and a non-aqueous electrolyte solution which includes a solvent containing ethylene carbonate and a solute containing at least one type of fluorine-containing compound.

6040091**LITHIUM ION SECONDARY CELL SOLVENT**

Hiroaki Sugita, Hisashi Yamamoto, Japan assigned to Toyota Jidosha Kabushiki Kaisha

A thiophosphate flame retardant represented by $(R_1S)_3P=O$, wherein R_1 is aryl, alkaryl, or aralkyl, is added to a non-

aqueous solvent to the extent of approximately 1/10–1/100 of a carbonate-type solvent which is the main component of an electrolyte, to provide a lithium ion secondary cell solvent offering improved fire-retarding properties without much change in electrolyte composition. In this way, the boiling point can be raised and flame-retarding properties can be conferred with almost no increase in the viscosity of the electrolyte.

6040684**LITHIUM ION FAST PULSE CHARGER**

Nathan Mitchell, USA assigned to Compaq Computer Corporation

A lithium-ion cell charging system wherein pulse charging (with excursions above the critical voltage) is followed (once the average current has fallen low enough) by charging in a linear regulator mode, using a transistor internal to a battery pack as an element of a linear regulator.

6040685**ENERGY TRANSFER AND EQUALIZATION IN RECHARGEABLE LITHIUM BATTERIES**

Boris Tsenter, Mikhail Golod, USA assigned to Total Battery Management Inc.

Herein is given a method of charging a rechargeable lithium battery which comprises charging the battery with a charging current; sampling a charging voltage of the battery during charging to recognize potential electrolyte decomposition; interrupting the charging current periodically to create current-free periods and sampling an open circuit voltage of the battery at a plurality of points during each current-free period to identify potential shunting and unequal states of charge among individual cells of the battery; lowering the charging current if any of the above-identified adverse conditions are identified and continuing charging with the charging current if the potential adverse charging condition is not identified; and terminating charging when the charging current is lowered below a predetermined minimum level.

6043629**MODULAR CONTROL ELECTRONICS FOR BATTERIES**

Christopher R. Ashley, Craig H. Becker-Irvin, USA assigned to Hughes Electronics Corporation

A power system includes at least two battery cell modules. Each battery cell module has a lithium-ion battery cell, and a battery cell controller operably connected to the lithium-ion battery to control the charging and discharging of the lithium-ion battery cell. A central charge/discharge controller is operably connected to each of the battery cell controllers, allowing the charging and discharging of each lithium-ion battery cell to be individually controlled.

6033805**NICKEL-HYDROGEN SECONDARY BATTERY AND
PROCESS FOR PRODUCING ELECTRODE
THEREFOR**

Yoshitaka Dansui, Kenji Suzuki, Kohji Yuasa, Japan assigned to Matsushita Electric Industrial Company Ltd.

By using a thin film-formed positive electrode, and negative electrode and a film separator, the capacity density of the electrode plate can be improved, and at the same time, a nickel-hydrogen secondary battery with a higher capacity can be easily obtained; as a result, a nickel-hydrogen secondary battery with a higher capacity density can be provided.

6040007**NICKEL HYDROXIDE PARTICLES HAVING AN
 α - OR β -COBALT HYDROXIDE COATING LAYER
FOR USE IN ALKALI BATTERIES AND A PROCESS
FOR PRODUCING THE NICKEL HYDROXIDE**

Junichi; Imaizumi Junichi, Kawasaki Yuri, Makino Tetsushi, Iida Toyoshi, Japan assigned to Tanaka Chemical Corporation

High-density nickel powders are produced by forming an α - or β -cobalt hydroxide layer on the surfaces of and within pores of nickel hydroxide particles. The coated nickel hydroxide particles feature enhanced utilization as the positive electrode active material in alkali batteries and enable the capacity of the positive electrode to be increased.

6042753**ACTIVE MATERIALS FOR THE POSITIVE
ELECTRODE IN ALKALINE STORAGE BATTERIES**

Hidekatsu Izumi, Hiroyuki Sakamoto, Hirokazu Kimiya, Yoichi Izumi, Isao Matsumoto, Japan assigned to Matsushita Electric Industrial Company Ltd.

Active materials for positive electrodes in alkaline storage batteries excellent in capacity density, discharge voltage, and high-rate discharge characteristics can be provided by coating the surface of the active material powder with an α -like Al-substituted Ni(OH)₂. Moreover, active materials excellent in capacity density, discharge voltage and high rate discharge characteristics, and besides in high-temperature charging efficiency and/or charge and discharge characteristics can be provided by dissolving in solid state and/or coprecipitated state at least one different metal element selected from Ca, Cr, Y, Ti and Co in the α -like Al-substituted Ni(OH)₂ layer. Furthermore, active materials excellent in capacity density, discharge voltage and high-rate discharge characteristics, and besides in charge and discharge characteristics can be provided by coating with a Co oxide the surface of the active material powder coated with the α -like Al-substituted Ni(OH)₂.

OTHER BATTERIES**6033343****IRON-BASED STORAGE BATTERY**

Stuart Licht, Israel assigned to Chemergy Ltd.

Herein is given an electric storage battery having a solid phase Fe(VI) salt cathode. The anode may be any of a large variety of conventional anode materials capable of being oxidized. The cathode and the anode are located in separate half-cells which are in electrochemical contact through an electrically neutral ionic conductor. Optionally, means may be provided for impeding the transfer of chemically reactive species between the two half-cells. Also, optionally, gas separator means may be provided for preventing the build-up of oxygen, hydrogen and other gases.

6033602**CATHODE MEMBER INCLUDING FLUORINATED
ION EXCHANGE POLYMER FOR WATER-
ACTIVATED STORAGE BATTERY**

Morton Sunshine, Syed Zaigham Abbas Zaidi, William R. Kuenzel, USA assigned to Prosar Technologies Inc.

Disclosed is a water-activated battery comprising an anode member and a cathode member which comprises cuprous chloride, graphite, and a fluorinated ion exchange polymer having at least one pendant sulfonic acid group. Such a battery is capable of being activated in fresh water or sea water.

6033796**CHEMICAL REACTION BATTERY**

Yasuo Baji, Japan

Herein is given a battery having two chemical cells. A positive electrode of the first cell is composed of a first catalyst which reduces ions in an electrolyte and generates gas, and a negative electrode of the second cell is composed of a second catalyst which oxidizes the gas generated by the positive electrode of the first cell and generates ions as an active material of the negative electrode of the second cell. A gas-emitting surface of the positive electrode of the first cell and a gas-absorbing surface of the negative electrode of the second cell define a sealed chamber, and the positive electrode of the first cell and the negative electrode of the second cell are electrically connected to move the ions in the electrolyte of the first cell to the second cell without mixing the electrolytes or the like in the first and second cells.

6040086**NONAQUEOUS ELECTROLYTE
SECONDARY BATTERY**

Hiroaki Yoshida, Zenzo Hagiwara, Masanao Terasaki, Japan assigned to Japan Storage Battery Company Ltd.

A nonaqueous electrolyte secondary battery according to the present invention has a power-generating element and a collector. The power-generating element is provided with a portion where a negative electrode plate and a positive electrode plate are not opposed to each other. In the power-generating element, the electrode plates are wound or laminated through a separation body so that the side edge portion of one of the electrode plates protrudes from that of the other. The collector is connected to the side edge portions. The collector has a plurality of grooves bonded to the side edges of the electrode plates. The bonding is made by at least one of a welding method such as the ultrasonic welding method, the laser welding method, the electric welding method, the arc welding method and the plasma arc welding method, and a mechanical joint using a

rivet, pin or eyelet, or by deforming under pressure the collector to crimp.

6040092**NONAQUEOUS SECONDARY BATTERY**

Kazuo Yamada, Takehito Mitate, Naoto Nishimura, Yoshihiro Tsukuda, Kazuaki Minato, Japan assigned to Sharp Kabushiki Kaisha.

A nonaqueous secondary battery includes a working electrode containing graphite particles coated with less crystallized carbon and a nonaqueous electrolyte, which contains at least ethylene carbonate and propylene carbonate.

PII: S0378-7753(00)00517-6