compartment within the case, a second valve connected to the fuel compartment, and a conduit connected to the electrolyte reservoir and the fuel compartment. When the transportable container is attached to a refuelable battery, a closed flow circuit for the circulation of electrolyte is defined. Fuel particles and electrolyte are fed from the transportable container into the refuelable battery. When the refuelable battery is discharged, the transportable container, containing spent electrolyte and reaction products, is detached from the refuelable battery.

5955216

SEALED ALKALINE STORAGE BATTERY

Hoshina, Yasuko; Hattori, Yohei; Ito, Noboru; Morishita, Nobuyasu; Ikoma, Munehisa; Hirakata, Fujisawa, Toyohashi, Japan assigned to Matsushita Electric Industrial Company Ltd.

A sealed alkaline storage battery of the present invention employs a non-woven fabric having a double-layer structure of a dense and sparse layers as a separator to separate a positive electrode from a negative electrode, the sparse layer facing the negative electrode and being lower than the dense layer in fiber density.

5958623

ELECTROCHEMICAL CELL EMPLOYING A FINE CARBON ADDITIVE

Kozawa, Akiya; Mase, Shunzo; Sato, Atsushi; Ukino, Chiakicho, Ichinomiya-shi, Aichi-ken, 491, Tobishima-mura, Ama-gun, Aichi-ken, 490-14, Meitouku, Nagoya-shi, Aichi-ken, 465, JAPAN

In an electrochemical cell such as a lead–acid cell, fine carbon particles with or without an organic material is disposed in the electrolyte of the cell, deposited on the surface and/or dispersed within the electrically active material of the cell.

5958625

POSITIVE LEAD–ACID BATTERY GRIDS AND CELLS AND BATTERIES USING SUCH GRIDS

Rao, Purushothama; Aurora, IL, USA assigned to GNB Technologies, Inc.

Positive grids for lead–acid batteries for SLI, industrial battery, and electric vehicle batteries are disclosed. The positive active material paste pellet openings have a reduced area and the number per square inch of the grid area is increased. The individual area and the number of paste pellets vary with the intended application. The preferred embodiments include reduced distances from the center of the paste pellet to the adjacent grid wires, as well as an optimized amount of positive active material per area of the grid wire surface area so as to allow enhanced electrical performance, if desired, or substantial savings in grid weight while achieving electrical performance commensurate with conventional lead–acid cells and batteries.

5962161

RECOMBINANT BATTERY SEPARATOR

Zucker, Jerry; Charleston, SC, USA assigned to Daramic Inc.

A recombinant battery separator pad is made from a mat of meltblown ultrafine polymer fibers, with the fibers being treated with an agent to render them permanently wettable. The fibers include at least 10% of less than 1 μm, with the majority less than 5 μm. The mat has a liquid porosity of at least 90% and a surface area of at least 1.0 m^2/g.

5962164

NATURAL OIL BATTERY ELECTROLYTE ADDITIVE

Lajeunesse, Yves; Palm Beach Gardens, FL, USA assigned to Valany Import Export Inc.

The instant invention is an electrolyte additive for use with lead–acid batteries containing antimony. The electrolyte additive consists of a mixture of natural oil such as white mineral oil or a hydro-cracked and treated oil with naphthenic oil, a zinc-free rust and oxidation inhibitor and an ethylene–propylene copolymer. The electrolyte additive is placed above the plate cells in lead–acid batteries having antimony to inhibit gassing and misting with an ancillary benefit of increasing performance and durability of the battery.

5958304

DOPED LANTHANUM CHROMITE MATERIAL FOR BIPOLAR INTERCONNECTS FOR SOLID OXIDE FUEL CELLS

Khandkar, Ashok C.; Milliken, Christopher E.; Elangovan, Singaravelu; Hartvigsen, Joseph J.; Sandy, Kaysville, Salt Lake City, UT, USA assigned to Gas Research Institute

An improved ceramic interconnect component for a solid oxide fuel cell having good electrical conductivity and thermodynamic stability in the presence of fuel and a coefficient of thermal expansion matching closely that of zirconia electrolytes is disclosed. The interconnect is a lanthanum chromite material including strontium and magnesium as dopants.

5958613

POLYMER ELECTROLYTE FUEL CELL AND A POLYMER ELECTROLYTE FUEL CELL SYSTEM WHICH SUPPLY ANODE-SIDE CHANNELS WITH A GAS–LIQUID MIXTURE

Hamada, Akira; Matsubayashi, Takaaki; Nakaoka, Toru; Miyake, Yasuo; Nakajima, Toshikazu; Osaka, Bukui, JAPAN assigned to Sanyo Electric Company Ltd.

A polymer electrolyte fuel cell system with a polymer electrolyte fuel cell is made up of a cell main body, a mixture generator for generating a gas–liquid mixture by mixing fuel gas, which has been supplied from a fuel gas supply with water and a means for supplying the gas–liquid mixture to the anode-side channels. The gas–liquid mixture allows the solid-polymer film to be moistened without humidifying fuel gas and oxidant gas with a humidifier, and the cell main body to be cooled down without providing a cooling channel.

5958614
FUEL CELL GENERATING SET INCLUDING LYSHOLM COMPRESSOR

Takei, Noburou; Takabe, Shigeru; Urayasu, Sagamihara, JAPAN assigned to Ishikawajima-Harima Heavy Industries Company Ltd.

There is a provided fuel cell generating set including (a) a fuel cell, (b) a Lysholm compressor, (c) a gas–liquid separation apparatus condensing humidity generated in the fuel cell into water and retaining the thus-produced water, and (d) an injection pump for injecting the water to an intake port of the Lysholm compressor. The water exchanges heat with air under pressure in the Lysholm compressor to thereby cool air to be discharged from the Lysholm compressor by latent heat of vaporization. The water injected from the injection pump seals a leakage path in the Lysholm compressor. The above-mentioned generating set enhances volumetric efficiency and temperature efficiency of a Lysholm compressor, which ensures that the generating set can operate with less power and the generating set can be made smaller in size and lighter in weight. In addition, it is not necessary to supply water to the generating set, because it is self-sufficient with respect to water.

5958616
MEMBRANE AND ELECTRODE STRUCTURE FOR METHANOL FUEL CELL

Salinas, Carlos; Simpson, Stanley F.; Murphy, Oliver J.; Franaszczuk, Kryzysztof; Moaddel, Homayoun; Weng, Dacong; Bryan, College Station, Bryan, College Station, TX, USA assigned to Lynntech

The invention provides devices and techniques for reducing or eliminating fuel crossover from the anode to the cathode in fuel cells using organic fuels. The invention particularly provides proton exchange membranes having passages or channels with or without a catalyst layer active for the electrochemical oxidation of a fuel. The invention reduces fuel crossover by providing void spaces within the membrane where the fuel may be sequestered as it diffuses through the membrane from the anode to the cathode. The sequestered fuel may be removed physically and/or electrochemically. The invention provides for physical removal of the sequestered fuel by means of flowing a gas or a liquid stream through the passages, thus, evacuating the fuel before it diffuses to the cathode. Electrochemical removal of the fuel involves coating the inner walls of the passages with a catalyst, electronically connecting the catalyst with the anode, and electro-oxidation of the crossover fuel sequestered in contact with the catalyst which is active for this oxidation process.

5962155
FUEL CELL SYSTEM

Kuranaka, Sou; Gamou, Takaharu; Morita, Yoshio; Hatoh, Kazuhito; Osaka, Fujiidera, Suita, Daito, JAPAN assigned to Matsushita Electric Industrial Company Ltd.

When a polymeric electrolyte type fuel cell operating at about 60°C is used, heating with exhaust gas becomes difficult. Therefore, a polymeric electrolyte type fuel cell (PEM) is adopted as a fuel cell body, and a hydrogen storage vessel made of a metal containing hydrogen is connected to the PEM by a hydrogen supply piping via a humidifier for humidifying the electrolyte membrane of the PEM. The PEM and the hydrogen storage vessel are connected by a copper plate, which is a conductor of heat. Heat generated in the PEM is transferred to the hydrogen storage vessel by this copper plate, and elevates the temperature and pressure in the vessel. By this, hydrogen is well supplied to the PEM.

5965010
ELECTROCHEMICAL AUTOTHERMAL REFORMER (EATR)

Bloomfield, David P.; Rabe, Arthur N.; Boston, N. Quincy, MA, USA assigned to Niagara Mohawk Power Corporation

An EATR provides hydrogen. It includes an autothermal reformer region, a reformer anode supply region, and a composite membrane layer separating the reformer anode from the autothermal reformer region. The composite membrane layer includes a mechanically stable porous ceramic support member with a thin gas permeable ceramic substrate layer overlaying the support member. Overlaying the substrate layer is a first thin metallic catalyst layer, which promotes the dissociation of H_2 to $2H^+ + 2e^-$. Overlaying the first catalyst layer is a metallic oxide layer capable of conducting $2H^+ + 2e^-$ at elevated temperatures. Overlaying the metallic oxide layer is a second thin metallic catalyst layer, which promotes the recombination of $2H^+ + 2e^-$ to H_2.

5958281
LITHIUM ION-CONDUCTIVE SOLID ELECTROLYTE AND METHOD FOR PRODUCING IT

Takada, Kazunori; Iwamoto, Kazuya; Kondo, Shigeo; Ikeda, Nobuhiko; Yamamoto, Kazutomi; Uematsu,

Toshikatsu; Osaka, Sakai, Hirakata, Higashikurume, Kokubunji, JAPAN assigned to Matsushita Electric Industrial Company Ltd.

A method for producing an electrochemically advantageous lithium ion-conductive solid electrolyte with high ionic conductivity, low electronic conduction and electrochemical stability is disclosed. The method comprises the steps of synthesizing lithium sulfide by reacting lithium hydroxide with a gaseous sulfur source at a temperature of 130–445°C, thermally melting plural compounds containing at least silicon sulfide and the synthesized lithium sulfide, and cooling the molten mixture. The silicon sulfide is synthesized by the steps of adding a silicon powder to molten sulfur while stirring to disperse the silicon powder in the molten sulfur and heating the silicon powder-dispersed sulfur in a reaction chamber under reduced pressure.

5958362
METHOD OF PRODUCING ACTIVE MATERIAL POWDER FOR LITHIUM SECONDARY BATTERY
Takatori, Kazumasa; Watanabe, Naoyoshi; Tani, Toshihiko; Sasaki, Tsuyoshi; Takahashi, Akio; Kato, Masahiko; Murakami, Akihiko; Nagoya, Aichi-ken, Tokai, JAPAN assigned to Kabushiki Kaisha Toyota Chuo Kenkyusho

The present method is to produce an active material powder formed from a spinel oxide containing lithium or a layer-structured oxide containing lithium for a lithium secondary battery which is uniform in composition, fine in particle size and free of oxygen defects. It is unlikely to cause capacity deterioration resulting from repetitive charge/discharge cycles at a high current density. A suspension 1 prepared by suspending an ingredient of the active material powder in a combustible liquid or an emulsion prepared by emulsifying a solution of the ingredient in the combustible liquid is sprayed in a droplet state 15 together with an oxygenic gas 2. The combustible liquid contained in the droplet 15 is burned to have the ingredient reacted and to evaporate the solvent. As a result, active material powder 4 formed from the spinel oxide containing lithium is obtained. An active material powder formed from the layer-structured oxide containing lithium is obtained by re-heating the oxide powder that has been generated by spraying and burning the droplet.

5958622
NEGATIVE ELECTRODE MATERIAL FOR LITHIUM SECONDARY BATTERIES
Kojima, Yoshitsugu; Koiwai, Akihiko; Suzuki, Nobuaki; Yamamoto, Satoru; Aichi, JAPAN assigned to Kabushiki Kaisha Toyota Chuo Kenkyusho

A negative electrode material capable of absorbing and desorbing lithium is comprised of a mixture of coke and graphite. The amount of graphite in the mixture is near to that which induces percolation transition. Preferably, the amount of graphite in the mixture is 2–37 wt.% relative to the total amount of the coke and graphite. The coke may be prepared by heating raw coke from oil or coal at 500–900°C. The coke may be 0.06 or more in the atomic ratio of hydrogen to carbon and 0.003 or more in the atomic ratio of oxygen to carbon. The graphite may be 0.5–30 μm in a mean particle size. Lithium secondary batteries comprising the negative electrodes have a large discharge capacity.

5961671
APPARATUS AND METHOD OF PREPARING ELECTROCHEMICAL CELLS
Guindy, Wade; Cochran, Steven D.; Richwine, Carl; Adamson, George; Mitchell, Porter H.; Henderson, Las Vegas, NV, USA assigned to Valence Technology Inc.

A method for removing plasticizers such dibutyl phthalate from the anode, cathode, and polymeric matrix components of electrochemical cell precursors using carbon dioxide in the supercritical state is provided. The method forms a porous polymeric structure that enhances the mass transport of ions in the cell, which results in improved electrochemical performance.

5961950
METHOD FOR PREPARING SOLID SOLUTION MATERIALS SUCH AS LITHIUM MANGANESE OXIDE
Dahn, Jeffery Raymond; Rossen, Erik; Reimers, Jan N.; Fuller, Eric Wayne; Surrey, North Vancouver, Maple Ridge, CANADA assigned to NEC Moli Energy (Canada) Limited

Lithiated manganese oxides are synthesized using a novel two-stage process. Using appropriate starting materials, lithiation is accomplished via low temperature ion exchange in aqueous warm salt solution. A drying stage follows which completes the synthesis. Materials suitable for use as cathodes in lithium ion rechargeable batteries have been prepared in this way. Other solid solution transition metal materials might also be prepared using a similar low temperature ion exchange process.

5962165
HYDROGEN-ABSORBING ALLOY, METHOD OF SURFACE MODIFICATION OF THE ALLOY, NEGATIVE ELECTRODE FOR BATTERY AND ALKALINE SECONDARY BATTERY
Tsuruta, Shinji; Kohno, Tatsuoki; Kanda, Motoya; Yokohama, Kawasaki, JAPAN assigned to Kabushiki Kaisha Toshiba

A hydrogen-absorbing alloy which is excellent in stability in an aqueous solution and in mechanical pulverizability is

disclosed. This hydrogen-absorbing alloy contains an alloy represented by the following general formula (*I*): wherein M1 is at least one element selected (excluding Mg, elements which are capable of causing an exothermic reaction with hydrogen, A1 and B) from elements which are incapable of causing an exothermic reaction with hydrogen; and y is defined as $1 < y \leq 1.5$.

5962168
POLYMER ELECTROLYTE SOLVENT FOR ELECTROCHEMICAL CELL

Denton, III, Frank R.; Lawrenceville, GA, USA assigned to Motorola

An electrochemical cell includes first and second electrodes with an electrolyte system disposed between. The electrolyte system includes a polymeric support structure through which an electrolyte active species in a solvent is dispersed. The solvent comprises a poly (vinylidene fluoride) having a number average molecular weight of less than about 50,000 amu. Alternatively, the solvent may be a blend or copolymer of polyvinylidene fluoride and another solvent or polymer.

5962170
ELECTROCHEMICAL CELL

Mitchell, Porter H.; Las Vegas, NV, USA assigned to Valence Technology Inc.

A method of preparing an electrochemical cell wherein the electrode material adheres to the current collector to create good electrical contact is provided. A critical aspect in the process of preparing the polymer mixture for both the anode and cathode slurries is that the polymer (or copolymer) cannot be subjected to high shear so as to be degraded. Polymer degradation contributes to the creation of the polymer concentration gradient in the electrode film.

5962171
COMPOSITION USEFUL IN ELECTROLYTES OF SECONDARY BATTERY CELLS

Boguslavsky, Leonid I.; Mikhaylik, Yuriy V.; Gavrilov, Alexei B.; Skotheim, Terje A.;Tucson, AZ, USA assigned to Moltech Corporation

Provided is a non-aqueous electrolyte element for use in secondary battery cells. It comprises an effective lithium stripping enhancing amount of one or more soluble materials, such as a lithium polysulfide, which increases the lithium stripping efficiency. Also provided is a secondary lithium battery cell comprising said non-aqueous electrolyte element. Such a non-aqueous electrolyte element can be advantageously used in the manufacture of secondary electric-current producing cell elements, and provides many advantages in achieving extended cycle life and increased safety of secondary lithium batteries.

5962720
METHOD OF SYNTHESIZING UNSYMMETRIC ORGANIC CARBONATES AND PREPARING NON-AQUEOUS ELECTROLYTES FOR ALKALI ION ELECTROCHEMICAL CELLS

Gan, Hong; Palazzo, Marcus; Takeuchi, Esther S.; East Amherst, Niagara Falls, East Amherst, NY, USA assigned to Wilson Greatbatch Ltd.

The present invention relates to an improved method of synthesizing unsymmetric linear organic carbonates comprising the reaction of two symmetric dialkyl carbonates, R^1 and R^2, in the presence of a nucleophilic reagent or an election donating reductant as a catalyst, wherein R^1 and R^2 can be either saturated or unsaturated alkyl or aryl groups. The present invention further provides a preparation method for a non-aqueous organic electrolyte having an unsymmetric linear organic carbonate as a co-solvent.

5964903
METHOD OF PREPARING ELECTROCHEMICAL CELLS

Gao, Feng; Mitchell, Porter H.; Barker, Jeremy; Henderson, Las Vegas, NV, USA assigned to Valence Technology Inc.

Amethod of fabricating electrochemical cells employing novel plasticizers that can be removed by evaporation under vacuum is provided, thereby obviating the need for solvent extraction. The plasticizers comprise 2-(2-ethoxyethoxy) ethyl acetate, dimethyl adipate, dibutyl phthalate, propylene carbonate, and mixtures.

5965054
NON-AQUEOUS ELECTROLYTE FOR ELECTRICAL STORAGE DEVICES

McEwen, Alan B.; Yair, Ein-Eli; Melrose, Waltham, MA, USA assigned to Covalent Associates Inc.

Improved non-aqueous electrolytes for application in electrical storage devices such as electrochemical capacitors or batteries are disclosed. The electrolytes of the invention contain salts consisting of alkyl substituted, cyclic delocalized aromatic cations, and their perfluoro derivatives, and certain polyatomic anions having a van der Waals volume less than or equal to 100 Å^3, preferably inorganic perfluoride anions and most preferably PF_6^-, the salts being dissolved in organic liquids, and preferably alkyl carbonate solvents, or liquid sulfur dioxide or its combinations, at a concentration of greater than 0.5 M, and preferably greater than 1.0 M. Exemplary electrolytes comprise 1-ethyl-3-methylimidazolium hexafluorophosphate dissolved in a cyclic or acyclic alkyl carbonate, or methyl formate, or its combination. These improved electrolytes have useful characteristics such as higher conductivity, higher concentration, higher energy storage capabilities, and higher power

characteristics compared to prior art electrolytes. Stacked capacitor cells using electrolytes of the invention permit high energy, high-voltage storage.

5965289
SEPARATOR FOR BATTERIES

Han, Kyeng-ho; Chungchongnam-do, SOUTH KOREA assigned to Samsung Display Devices Company Ltd.

A separator for a battery includes a first separating layer for preventing a short circuit between a positive electrode and a negative electrode, and a second separating layer having higher electrolyte retaining power than the first separating layer. The second separating layer is attached on the first separating layer. The second separating layer is made of polyethylene terephtalate, and the first separating layer is selected from the group consisting of nylon and polypropylene. Preferably, the first separating layer is attached on the second separating layer through a thermal fusing process.

5965299
COMPOSITE ELECTROLYTE CONTAINING SURFACE MODIFIED FUMED SILICA

Khan, Saad A.; Fedkiw, Peter S.; Baker, Gregory L.; Fan, Jiang; Raghavan, Srinivasa R.; Hou, Jun; Cary, Raleigh, Haslett, Dublin, Berkeley, CA, USA assigned to North Carolina State University, Michigan State University

A composite electrolyte comprises (a) surface modified fumed silica filler, wherein the surface modified fumed silica comprises polymerizable groups on the surface, the polymerizable groups being bonded to each other such that the surface modified fumed silica filler is cross-linked in a three-dimensional structure; (b) a dissociable lithium salt; and (c) a bulk medium which contains the surface modified fumed silica filler and the dissociable lithium salt. An electrochemical cell comprises an anode, a cathode, and a composite electrolyte dispersed between the anode and cathode.

5968681
POLYETHER COPOLYMER AND POLYMER SOLID ELECTROLYTE

Miura, Katsuhito; Yanagida, Masanori; Higobashi, Hiroki; Endo, Takahiro; Sanda, Amagasaki, JAPAN assigned to Daiso Company Ltd.

A polyether copolymer is prepared from 5% to 95%, 5% to 95%, and 0% to 15% by mol of a monomer of the formula (I), (II), and (III) or (IV), respectively as a cross-linking component; the copolymer having a weight-average molecular weight within the range from 10^3 to 10^7. The copolymer of the present invention provides a polymer solid electrolyte having a feature of being superior in ionic conductivity and also superior in processability, moldability, mechanical strength, and flexibility to a conventional solid electrolyte.

5968685
BATTERY ELECTRODE SUBSTRATE AND PROCESS FOR PRODUCING IT

Harada, Keizo; Watanabe, Kenichi; Yamanaka, Shosaku; Hayashi, Kiyoshi; Morishita, Nobuyasu; Takeshima, Hiroki; Kaiya, Hideo; Ikoma, Munehisa; Itami, Neyagawa, Fujiidera, Fujisawa, Chigasaki, Nara, JAPAN assigned to Sumitomo Electric, Matsushita Electric Industrial Company Ltd.

A battery electrode substrate is constituted of a porous metallic body structure having communicating pores at a porosity of at least 90% and an Fe/Ni multilayer structure. The skeletal portion of the porous metallic body is composed mainly of Fe and has an Ni covering layer on the surface while pores communicating with the inside and outside of Fe skeletal portion exist in the Fe skeletal portion and the inside of the pores is covered with Ni. The electrode substrate is produced by applying an iron oxide powder of at most 20 μm in an average particle size on a porous resin core body; heat-treating the core to remove an organic resin component while simultaneously sintering Fe to obtain a porous Fe body; and then covering the Fe skeletal portion with Ni by electroplating. In this process, the iron oxide can be used in combination with carbon powder. Further, a nickel porous sintered body can also be produced using nickel oxide in place of iron oxide.

5961672
STABILIZED ANODE FOR LITHIUM-POLYMER BATTERIES

Skotheim, Terje A.; Soloveichik, Grigorii L.; Gavrilov, Alexei B.; Tucson, AZ, USA assigned to Moltech Corporation

The invention relates to thin film solid state electrochemical cells consisting of a lithium metal anode, a polymer electrolyte, and a cathode, where the lithium anode has been stabilized with a polymer film capable of transmitting lithium ions. Methods for making battery cells using the anode stabilizing films of the invention are disclosed.

5962162
LITHIUM ION POLYMER CELL SEPARATOR

Barrella, Joseph N.; Manna, Michael E.; Irvington, Waterloo, NY, USA assigned to Ultralife Batteries Inc.

A lithium ion cell has a polymeric anode and cathode and a separator between. The separator, such as of non-woven polymeric fibers, is provided with its own discrete structure without carrier substrate and with structural integrity, apart from being laminated/compressed between the polymeric anode and cathode elements. Operable cells are

made thinner despite the self-supporting discrete structure, with obtained improved rate capacity and high temperature performance.

5962169

LITHIUM ION CONDUCTING ELECTROLYTES

Angell, Charles Austen; Liu, Changle; Xu, Kang; Skotheim, Terje A.; Mesa, Midland, Montgomery Village, Tucson, AZ, USA assigned to Arizona Board of Regents

The present invention relates generally to highly conductive alkali-metal ion non-crystalline electrolyte systems, and more particularly to novel and unique molten (liquid), rubbery, and solid electrolyte systems which are especially well-suited for use with high current density electrolytic cells such as primary and secondary batteries.

5964902

USE OF B_2O_3 ADDITIVE IN NON-AQUEOUS RECHARGEABLE LITHIUM BATTERIES

Mao, Huanyu; Reimers, Jan Naess; Burnaby, Maple Ridge, CANADA assigned to NEC Moli Energy (Canada) Limited

The loss in delivered capacity upon cycling non-aqueous rechargeable lithium batteries can be reduced by incorporating a small amount of B_2O_3 additive in the electrolyte. The B_2O_3 additive is preferably dissolved in the electrolyte prior to assembling the battery. The invention is particularly suited to lithium ion rechargeable batteries.

5965296

NON-AQUEOUS SECONDARY BATTERY AND A METHOD OF MANUFACTURING A NEGATIVE ELECTRODE ACTIVE MATERIAL

Nishimura, Naoto; Yamada, Kazuo; Tsukuda, Yoshihiro; Mitate, Takehito; Minato, Kazuaki;Kitakatsuragi-gun, Yamatotakada, Osaka, JAPAN assigned to Sharp Kabushiki Kaisha

A non-aqueous secondary battery comprises a negative electrode, a positive electrode in which a chalcogenated substance containing lithium is used as a positive electrode active material and a non-aqueous ion conductor. Said negative electrode containing a negative electrode active material, which is a carbon material where an amorphous carbon is adhered on the surface of graphite particles, are subjected to an oxidizing treatment.

5965300

POLYMER SOLID ELECTROLYTE, METHOD FOR MANUFACTURING POLYMER SOLID ELECTROLYTE, AND LITHIUM SECONDARY CELL ADOPTING POLYMER SOLID ELECTROLYTE

Lee, Doo-yeon; Seong, Sang-hyun; Lee, Hyung-bok; Uiwang, Seoul, SOUTH KOREA assigned to Samsung Electronics Company Ltd.

A polymer solid electrolyte, a method for manufacturing the polymer solid electrolyte, and a lithium secondary cell adopting the polymer solid electrolyte are provided. The polymer solid electrolyte includes a polymer electrolyte medium, at least one vinylidene fluoride resin, and/or at least one *N,N*-diethylacrylamide. The polymer solid electrolyte provides excellent ion conductivity and mechanical strength.

5962156

NICKEL–METAL HYDRIDE STORAGE BATTERY AND ALLOY FOR CONFIGURING ITS NEGATIVE ELECTRODE

Izumi, Yoichi; Moriwaki, Yoshio; Yamashita, Katsumi; Tokuhiro, Takashi;Habikino, Hirakata, Fujisawa, Kamakura, JAPAN assigned to Matsushita Electric Industrial Company Ltd.

A nickel–metal hydride storage battery having a high capacity and excellent cycle life is disclosed. The battery employs, as its material for the negative electrode, a hydrogen storage alloy powder having a composition represented by the general formula $Zr_{1-x}M3_xMn_a$-$Mo_bCr_cM1_dM2_eNi_f$, where M1 represents at least one element selected from the group consisting of V, Nb, and rare earth elements, M2 represents at least one element selected from the group consisting of Fe, Co, and Cu, and M3 represents at least one element selected from the group consisting of Ti and Hf, and where $0 \le x \le 0.3$, $0.3 \le a \le 0.7$, $0.01 \le b \le 0.2$, $0.05 \le c \le 0.3$, $0 \le d \le 0.1$, $0 \le e \le 0.2$, $0.8 \le f \le 1.3$, and $1.6 \le a+b+c+d+e+f \le 2.2$. Said hydrogen storage alloy has at least one of a Laves phase having a crystal structure of the $MgCu_2$ type (C15) and a Laves phase having a crystal structure of the $MgZn_2$ type (C14). The sum of integrated intensities of diffraction peaks, other than those attributed to the presence of said Laves phase, is not more than 5% of a sum of integrated intensities of all diffraction peaks in a diffraction angle 2θ of 10° to 80° in a powder X-ray diffraction pattern by Cu Kα radiation.

5964968

RARE EARTH METAL–NICKEL HYDROGEN STORAGE ALLOY, METHOD FOR PRODUCING IT, AND ANODE FOR NICKEL–HYDROGEN RECHARGEABLE BATTERY

Kaneko, Akihito; Kobe, JAPAN assigned to Santoku Metal Industry Company Ltd.

A rare earth metal–nickel hydrogen storage alloy having a composition represented by the formula (1) (R: La, Ce, Pr, Nd; L: Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Y, Sc, Mg, Ca; M: Co, Al, Mn, Fe, Cu, Zr, Ti, Mo, Si, V, Cr, Nb, Hf, Ta,

W, B, C; $0.01 \leq x \leq 0.1$; $0 \leq y \leq 0.5$; $4.5 \leq z \leq 5.0$) includes an amount of 10–95 vol.% of crystals, each containing 2–20 antiphase boundaries extending perpendicular to *C*-axis of a crystal grain of the alloy per 20 nm along the *C*-axis. An added amount of 60–95% of said element represented by L in the formula (1) is arranged in antiphase areas. This is the method for producing the alloy and an anode for a nickel–hydrogen rechargeable battery. The anode for a nickel–hydrogen rechargeable battery can improve initial activity, battery, capacity, and battery life all at the same time.

5968684
NICKEL POSITIVE ELECTRODE FOR ALKALINE RECHARGEABLE BATTERIES AND NICKEL–METAL HYDRIDE CELLS

Hayashi, Kiyoshi; Tomioka, Katsuyuki; Morishita, Nobuyasu; Ikeyama, Masakazu; Ikoma, Munehisa; Katano, Toyohashi, JAPAN assigned to Matsushita Electric Industrial Company Ltd.

The paste-type nickel positive electrode was prepared by filling pores of a metal nickel plaque made of three-dimensional high porous sheet or coating on both sides or one side of a plaque, which is made of either perforated nickel sheet or nickel plated steel sheet with a paste type active material mainly composed of nickel hydroxide. By adding particles of cobalt hydroxide, having the specific surface area of at least 10 m^2/g, average particle size of 1.7 μm or more, and fine particle content size of 1.0 μm or 20% or less, the utilization of positive electrode active material is enhanced. By using this nickel positive electrode, the alkaline rechargeable battery, in particular, the nickel–metal hydride alkaline battery, is enhanced in capacity and extended in service life.

5969506
APPARATUS AND METHOD FOR RAPID BULK CHARGING OF A LEAD–ACID BATTERY

Neal, Martin; Redditch, GREAT BRITAIN assigned to C&K Systems Inc.

Apparatus to rapidly bulk charge, a lead–acid battery is used in a "standby" power supply unit (PSU) or similar equipment containing said function such as in an alarm panel system, fire panel (system) etc. Without increasing the output capacity of the regulated PSU, the battery significantly increases its dissipation, size or cost, or causes an unacceptable recharge time of (often) several days. The apparatus comprises minimal additional components to provide a bulk charge of approximately 70% capacity to a 65-A h battery within 14 h, while only drawing an average current of approximately 0.4 A from the regulated PSU.

5969508
BATTERY CHARGING METHOD USING BATTERY CIRCUITRY IMPEDENCE MEASUREMENT TO DETERMINE OPTIMUM CHARGING VOLTAGE

Patino, Joseph; Geren, Michael D.; Doutre, Barbara R.; Pembroke Pines, Suwanee, Plantation, FL, USA assigned to Motorola Inc.

A charging technique charges a battery pack by taking into account the additional internal circuit impedance of the battery pack. An optimum pack voltage value for the battery pack is calculated based on the rated internal cell voltage as well as the charge current and the internal battery pack circuitry impedance. The battery pack can now be charged such that the internal battery cell voltage is maintained at the rated voltage throughout the charging process. The optimum pack voltage is also updated to account for variations in the battery pack circuitry impedance over temperature as well as variations in charge current during the charging process.

5958615
METAL–AIR CATHODE CAN AND ELECTROCHEMICAL CELL

McKenzie, Rodney Stuart; Dopp, Robert B.; Madison, WI, USA assigned to Rayovac Corporation

This invention pertains to metal–air electrochemical cells. One or more air entry ports is located in the bottom of the cathode can to provide for entry of oxygen-rich air into the cathode can. The oxygen participates in the chemical reaction whereby the cell produces electrical energy. In this invention, multiple small air entry ports are provided. Generally, the use of multiple ports distributed over the bottom of the cathode can, opposite the reaction surface of the cathode assembly, while not increasing the overall open area of the ports, results in an increase in the ratio of the cell limiting current to the rate at which moisture is lost from the cell. Accordingly, moisture loss, as a function of electrical energy produced, is reduced. Preferred embodiments of the air entry ports have a stepped cross-sectional opening that provides a larger diffusion area controlling diffusion of air into and out of the cell through a covering tab prior to the cell being put into use, and a smaller untabbed diffusion area controlling diffusion of air into and out of the cell when the cell is in use.

5962160
SODIUM–SULFUR BATTERY AND BATTERY SYSTEM

Oyama, Tetsuo; Miyoshi, Tadahiko; Madokoro, Manabu; Hatoh, Hisamitsu; Nishimura, Shigeoki; Shiota, Katsuhiko;

Otaka, Kiyoshi; Takahagi, Hitachi, Hitachinaka, Tokai-mura, Takahagi, JAPAN assigned to Hitachi Ltd.

A highly reliable sodium–sulfur battery includes a cell container for the positive electrode, which is hardly deteriorated by corrosion. The cell container for the positive electrode is made of a Co base alloy containing Cr, Ni, and Mo, wherein carbide containing at least one of Cr, W, and Mo is precipitated. The cell container for positive electrode is assembled by integrating plural members made of a high corrosion resistance alloy containing Cr by welding. A readily deformable portion is provided to the cell container for positive electrode, whereby the reliability of the sodium–sulfur battery can be significantly improved.

5962167

NON-AQUEOUS LIQUID ELECTROLYTE SECONDARY CELL

Nakai, Kenji; Ochida, Manabu; Tokyo, JAPAN assigned to Shin-Kobe Electric Machinery Company Ltd.

A non-aqueous liquid electrolyte secondary cell is capable of preventing bursting or explosion even when a current breaking device or a relief valve for pressure release fails in operation due to any trouble or failure. The cell includes a wound-up body formed by laminatedly spirally winding up a positive electrode and a negative electrode together while interposing a separator between. The wound-up body formed is received in a cell can. The negative electrode is constructed by forming a negative active material layer containing amorphous carbon on each of both surfaces of a negative collector. The positive electrode is constructed by forming a positive active material layer containing Li_xCoO_2 on each of both surfaces of a positive collector. The negative electrode is electrically connected to the cell can through a negative electrode lead. The positive electrode is electrically connected to the cell lid through a positive electrode lead joined to a connection plate of the cell lid by welding.

5965290

NON-AQUEOUS ELECTROLYTE CELL

Shimizu, Toshiyuki; Daio, Fumio; Inui, Takeshi; Sakai, Kitakatsuragi-gun, Yao, JAPAN assigned to Matsushita Electric Industrial Company Ltd.

A non-aqueous electrolyte cell has an electrode assembly including a negative electrode strip, a positive electrode strip having an active cathode material, and a separator. The positive electrode strip and the negative electrode strip are superposed with the separator between and wound in a spiral. The negative electrode strip is disposed outside the positive electrode strip and has an outermost winding, a negative electrode strip winding end, and a penultimate winding. The positive electrode strip has an outermost winding terminating at a positive electrode strip winding end. An anode current collector contacts the negative electrode strip on the penultimate winding and is radially aligned with a portion of the outermost winding of the positive electrode strip. Insulating tape is bonded to an inside surface and an outside surface of the positive electrode strip extending from the positive electrode strip winding end. It has an outer portion extending continuously and intermittently on the outer surface of the positive electrode strip a greater distance than an inner portion of the insulating tape covering the inner side of the positive electrode strip. In an embodiment, the outer portion of the insulating tape continuously extends from the positive electrode strip winding end to a point radially aligned with the anode current collector. Alternatively, an auxiliary insulating tape is bonded to an inside surface of the outermost winding of the negative electrode strip in place of the above outer portion of the insulating tape.

5965293

NON-AQUEOUS SECONDARY BATTERY

Idota, Yoshio; Mishima, Masayuki; Miyaki, Yukio; Kubota, Tadahiko; Miyasaka, Tsutomu; Kanagawa, JAPAN assigned to Fuji Photo Film Company Ltd.

A non-aqueous secondary battery comprising a positive electrode active material, a negative electrode active material, and a lithium salt is disclosed. The negative electrode active material contains (1) a compound capable of intercalating and deintercalating lithium comprising an atom of the group IIIB, IVB, or VB of the periodic table, (2) an amorphous compound containing at least two atoms selected from the elements of the groups IIIB, IVB, and VB of the periodic table, (3) a compound capable of intercalating and deintercalating lithium containing at least one of the atoms of the group IIIB, IVB, and VB of the periodic table and fluorine, or (4) a compound of the metal of the group IIIB, IVB, or VB of the periodic table, Zn, or Mg which is capable of intercalating and deintercalating lithium. The non-aqueous secondary battery of the invention exhibits improved charge and discharge characteristics and improved safety.

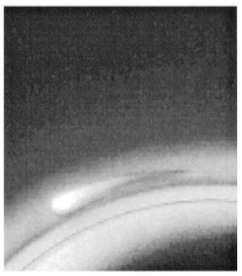
5965295

ALKALINE SECONDARY BATTERY, PASTE TYPE POSITIVE ELECTRODE FOR ALKALINE SECONDARY BATTERY, METHOD FOR MANUFACTURING ALKALINE SECONDARY BATTERY

Bando, Naomi; Yamane, Tetsuya; Hiruma, Masayoshi; Wakabayashi, Makoto; Miyamoto, Kunihiko; Fukuju, Takeshi; Komiyama, Ken; Kaneko, Hiroshi; Kanno, Kenichil; Kawasaki, Yokohama, Atsugi, Tokyo, Yokosuka,

Yokohama, JAPAN assigned to Toshiba Battery Company Ltd.

An alkaline secondary battery comprises a positive electrode, a negative electrode, and an alkaline electrolyte. The positive electrode comprises a conductive substrate and a mixture held by the conductive substrate. The mixture containing nickel hydroxide and a conductive cobalt compound and the positive electrode has pores, substantially, each having a diameter ranging from 0.0001 to 10 μm.



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