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Patents ALERT

This section contains abstracts of recently issued patents in the United States and published patent applications filed from over 100 countries under the Patent Cooperation Treaty and compiled in accordance with interest profiles developed by the Editors.

Journal of Power Sources

*LEAD ACID***6555265****VALUE-REGULATED LEAD ACID BATTERY**

Frank Albert Fleming; Russell Harvey Newnham; Australia assigned to Hawker Energy Products Inc.

A valve-regulated lead acid (VRLA) battery cell has positive and negative plates separated by separator media and held together under pressure. The separator is adapted to support therein an electrolyte. Each plate has a first single or plurality of tabs on a first side and a second single or plurality of tabs on a second side of the plate, each tab being connected to a busbar to form positive and negative busbars on each of the first and second sides of the plate. The cell may be alternatively configured in a spirally wound arrangement or in a prismatic arrangement of flat plates. The cell may be constructed using a plurality of such positive and negative plates. A VRLA battery may be constructed using one or a plurality of such VRLA cells, in which case the busbars of neighboring cells are connected by welded joints. The busbars are serviced by at least plural pairs of positive and negative terminals.

6548211**NEGATIVE ELECTRODE PLATE FOR LEAD STORAGE BATTERY**

Akira Kamada; Masahiko Kosai; Japan assigned to Japan Storage Battery Company Ltd.

Graphite powder having a mean particle size not larger than 30 μm is added to a negative electrode plate for a lead storage battery. Preferably, the amount of graphite powder added is in the range from 0.3 to 2 wt.%. Preferably, vein powder is used as the graphite powder. More preferably, 0.3 wt.% or more of an organic expander is added.

*BATTERY MATERIALS***6544688****CATHODE CURRENT COLLECTOR FOR ELECTROCHEMICAL CELLS**

Song Cheng; USA assigned to Moltech Corporation

Cathode current collectors are provided for use in electrochemical cells, wherein the current collector comprises a conductive primer layer applied upon a conductive support, and the primer layer comprises about 20–60 wt.% of a crosslinked polymeric material formed from a reaction of a polymeric material having hydroxyl groups and a crosslinking agent, about 2–15 wt.% of a cationic polymer comprising quaternary ammonium salt groups, and about 35–75 wt.% of a conductive filler. The present invention also pertains to methods of forming such cathode current collectors for use in electrochemical cells comprising: (i) an anode com-

prising lithium; (ii) a cathode comprising an electroactive sulfur-containing material, and electrochemical cells comprising such cathode current collectors.

6544689**COMPOSITE ELECTROLYTES BASED ON SMECTITE CLAYS AND HIGH DIELECTRIC ORGANIC LIQUIDS AND ELECTRODES**

Michael W. Riley; Peter S. Fedkiw; Saad A. Khan; Barrie Davies; USA assigned to North Carolina State University

A composite electrolyte comprises an inorganic clay material and a dielectric solution having a dielectric constant ranging from 50 to 85. The composite electrolyte has an ion transference number ranging from 0.80 to 1.00. An electrode comprises a component selected from the group consisting of an inorganic clay filler, a polymer, and mixtures thereof. Batteries and electrochemical cells comprising the above composite electrolytes and electrodes are also disclosed.

6544690**SELF-DOPED MOLECULAR COMPOSITE BATTERY ELECTROLYTES**

Mason K. Harrup; Alan K. Wertsching; Frederick F. Stewart; USA assigned to Bechtel BWXT Idaho, LLC

This invention is in solid polymer-based electrolytes for battery applications. It uses molecular composite technology, coupled with unique preparation techniques to render a self-doped, stabilized electrolyte material suitable for inclusion in both primary and secondary batteries. In particular, a salt is incorporated in a nano-composite material formed by the in situ catalyzed condensation of a ceramic precursor in the presence of a solvated polymer material, utilizing a condensation agent comprised of at least one cation amenable to SPE applications. As such, the counterion in the condensation agent used in the formation of the molecular composite is already present as the electrolyte matrix develops. This procedure effectively decouples the cation loading levels required for maximum ionic conductivity from electrolyte physical properties associated with condensation agent loading levels by utilizing the inverse relationship discovered between condensation agent loading and the time domain of the aging step.

*FUEL CELL***6544675****FUEL CELL SYSTEM**

19/10/1999

08/04/2003

Kenji Kurita; Japan assigned to Aisin Seiki Kabushiki Kaisha

A fuel cell system includes a reforming device 1 for reforming a fuel of hydrocarbon family to a fuel gas whose principal component is hydrogen, a fuel cell stack 2 for generating electricity by using the fuel gas and an oxidizing agent, a gauge 7 for determining concentration of CO in a fuel gas exhausted from the reforming device 1, a burning device 3 for burning the fuel gas, the burning device 3 being independent of the fuel cell stack 2, and a switching device 8 for directing the fuel gas to either the fuel cell stack 2 or the burning device 3. In such a fuel system control at initiation and cooling down time at termination become easy and shorter.

6544676

INTERNAL REFORMING MOLTEN CARBONATE FUEL CELL WITH MEMBRANE FOR INTERCEPTING CARBONATE VAPOR

Tae Hoon Lim; Heung Yong Ha; Suk Woo Nam; In Hwan Oh; Seong Ahn Hong; Hyeung Dae Moon; Ho In Lee; South Korea assigned to KIST (Korea Institute of Science and Technology)

An internal reforming molten carbonate fuel cell having a membrane for intercepting carbonate vapor and hydrated vapor is disclosed. The intercepting membrane is made from nickel or nickel alloy which has a high electrical conductivity, corrosion resistant property in an anode environment, and a low affinity for the carbonate vapor. Due to the presence of the intercepting membrane, the transfer of the carbonate vapors and hydrated vapors to the internal reforming catalyst is markedly retarded to prolong the catalytic activity. As a result, a longer operating molten carbonate fuel cell can be obtained.

6544677

FUEL CELL SYSTEM

Lothar Matejcek; Germany assigned to General Motors Corporation

A fuel cell system is described whose fuel cell is driven with a methanol-water mixture. The problem with such systems is that at the outlet from the cathode, as a result of the chemical reaction in the fuel cell, carbon dioxide is present which must be removed from the anode cycle. The previously known systems, however, have the disadvantage that water and methanol are also discharged simultaneously with the discharge of CO₂ in so-called vapor separators, and therefore are no longer available as energy carriers. Therefore, systems have already been proposed in which the liquid-vapor mixture is cooled before entering the vapor separator. In addition, combinations of several vapor separators are proposed. The present invention is related to this and proposes that the gas containing methanol emerging from a high temperature vapor separator be fed via a branch-stream cooler to the liquid accumulation of a low temperature vapor sep-

arator in a low temperature path. At this time the methanol there passes essentially over into the liquid phase.

6544680

FUEL CELL SEPARATOR, A FUEL CELL USING THE FUEL CELL SEPARATOR, AND A METHOD FOR MAKING THE FUEL CELL SEPARATOR

Shigeru Takano; Kenichi Uehara; Yasunobu Iizuka; Hitomi Hatano; Japan assigned to Kawasaki Steel Corporation

A fuel cell separator including (a) about 100 parts by weight of graphitized meso-carbon microbeads, (b) about 10–35 parts by weight of one of a thermosetting resin and a thermoplastic resin, and (c) about 1–40 parts by weight of at least one carbonaceous material selected from the group consisting of graphite powder, carbon black, and fine carbon fibers. The fuel cell separator exhibits low electrical resistivity, low volume resistivity, superior gas impermeability, and superior dimensional accuracy without a graphitizing treatment after molding. A fuel cell using the fuel cell separators can be produced while saving energy using a simplified facility and has superior generation efficiency.

6545609

HUMIDIFICATION SYSTEM FOR FUEL CELL

Hiroshi Shimanuki; Yoshio Kusano; Motohiro Suzuki; Toshikatsu Katagiri; Japan assigned to Honda Giken Kogyo Kabushiki Kaisha

A humidification system for a fuel cell includes a humidifier having a bundled plurality of tube type hollow thread members made of a water permeable membrane. The humidifier transfers a water content contained in a discharge gas, which is emitted from a fuel cell, to a supply gas, which is supplied to the fuel cell, when one of the discharge gas and the supply gas is passed through the inside of the tube type hollow thread members and the other one of the discharge gas and the supply gas is passed through between the tube type hollow thread members. Manometers P1, P2, P3, and P4 detect a difference in pressure of the supply gas and the discharge gas, respectively, between an upper stream side and a down stream side of the humidifier. A determination unit determines generation of clogging in the humidifier based on detection signals from the manometers.

6548029

APPARATUS FOR PROVIDING A PURE HYDROGEN STREAM FOR USE WITH FUEL CELLS

Gavin P. Towler; Kurt M. Vanden Bussche; USA assigned to UOP LLC

An apparatus is provided which comprises a thermosiphon shift reactor for the conversion of carbon monoxide and the

generation of steam for use in a fuel processor for the conversion of hydrocarbon fuels into hydrogen and employs the hydrogen in a fuel cell. The thermosiphon shift reactor comprises a vertically extended shell defining an interior volume containing a vertical axis defining a catalyst zone. The vertically extended shell contains a catalyst zone comprising a shift catalyst wherein a high temperature shift catalyst is disposed in successively tapering layers relative to a low temperature shift catalyst and the catalyst zone is at least partially surrounded by an external jacket which defines a flow passage between the vertically extended shell and the external jacket. A fluid reservoir is located above the vertically extended shell at a height effective to establish a thermosiphon effect between the flow passage and the reservoir which generates steam and provides an essentially uniform temperature at the shell wall.

6548197

SYSTEM INTEGRATION OF A STEAM REFORMER AND FUEL CELL

Ravi Chandran; Momtaz N. Mansour; USA assigned to Manufacturing and Technology Conversion International Inc.

A novel process and apparatus for power generation from biomass and other carbonaceous feedstocks are provided. The process integrates a pulse combustor steam reformer with a fuel cell to generate electricity such that (i) efficiencies are higher than those of conventional and emerging advanced power systems and (ii) emissions are lower than those proposed by the new environmental regulations, i.e. one-tenth of the New Source Performance Standards. The pulse combustor steam reformer generates a hydrogen-rich, medium-Btu fuel gas that is electrochemically oxidized in the fuel cell to generate electricity. The apparatus may be configured to produce only power or combined heat and power.

6548199

FUEL CELL DEVICE WITH A HEAT RELEASE MEANS DISPOSED ON AN AUTOMOBILE

Hirohisa Tanaka; Hiroshi Munetoki; Japan assigned to Daihatsu Motor Co. Ltd.

A fuel cell device that is designed to circulate cooling water with simplified and compact construction, without any need of a pump for circulating the cooling water, so as to reduce electric power loss. A fuel cell and a radiator are connected through a closed line via an inflow-side cooling pipe and an outflow-side cooling pipe and also the radiator is disposed under the wing of an air spoiler spaced above the fuel cell and open to outside air. With this arrangement, while the fuel cell generates electric power, the cooling water of decreased density flowing out of the fuel cell is allowed to rise through the outflow-side cooling pipe to feed

it to the radiator and the cooling water of increased density that was cooled down by heat exchanging the cooling water and outside air is allowed to lower through the inflow-side cooling pipe to feed it to the fuel cell again.

6548200

COLD STARTING OF GASOLINE FUELED FUEL CELL

Richard D. Breault; USA assigned to UTC Fuel Cells, LLC

A fuel cell power plant has a fuel cell receiving hydrogen from a fuel processing system which employs a vaporizer to vaporize clean gasoline from a source. A conventional start burner and startup heat exchanger are utilized to convert water from the fuel processing system and fuel cell into steam; but during sub-zero startup, an aqueous antifreeze solution is provided to the heat exchanger to produce the steam for starting the vaporization of gasoline in the vaporizer.

6548202

CARBON-SUPPORTED CATALYSTS FOR FUEL CELLS

Stephen A. Campbell; Jason Edward Chisham; David P. Wilkinson; Canada assigned to Ballard Power System Inc.

Carbon-supported catalysts are frequently employed in the electrodes of solid polymer fuel cells in order to make efficient use of the catalyst therein. The catalyst utilization in the electrode and the fuel cell performance can be further improved by introducing acidic surface oxide groups on the carbon-supported catalyst. The introduction of acidic surface oxide groups on the carbon-supported catalyst can be accomplished by treating the carbon-supported catalyst with a suitable acid, such as nitric acid, before incorporating the carbon-supported catalyst in a fuel cell electrode. The present technique is particularly suitable for use in solid polymer fuel cell cathodes.

6548203

CATHODE COMPOSITION FOR SOLID OXIDE FUEL CELL

Sten A. Wallin; Sunil D. Wijeyesekera; USA assigned to The Dow Chemical Company

A high performance electrocatalyst is based on transition metal perovskites of praseodymium, samarium, terbium or neodymium which react with YSZ to form a product which is itself active as the cathode in a fuel cell. While PrCoO_3 reacts with YSZ, the reaction product(s) do not result in severe degradation of cell performance. A fuel cell made with a cathode composed of only the reaction product of YSZ and PrCoO_3 has good performance, indicating that this phase is itself not only a good conductor, but also a good catalyst for oxygen activation.

6551081**SCROLL-TYPE COMPRESSOR FOR A FUEL CELL WITH AN OBSTRUCTION MEMBER AROUND A DRIVE SHAFT**

Yoshiyuki Nakane; Masato Sowa; Japan assigned to Kabushiki Kaisha Toyota Jidoshokki

A scroll-type compressor for a fuel cell of the present invention comprises: a fixed scroll for compression; a movable scroll for compression; a movable plate, which has the movable scroll for compression erected on the surface thereof and a shaft insertion portion into which a drive shaft is inserted; a bearing, which is provided inside the shaft insertion portion and supports the drive shaft with a lubricant; a fixed scroll for expansion; a movable scroll for expansion; and comprises a seal member that prevents the lubricant from leaking and an obstruction member that is provided between the seal member 8 and the inflow port to change the direction of passage of the gas that flows in through the inflow port 43.

6551731**FUEL CELL SYSTEM**

Norbert Berg; Gerhard Filip; Bernd Kohlstruck; Arnold Lamm; Germany assigned to AEG Energietechnik GmbH

The invention relates to a fuel cell system comprising an anode chamber and a cathode chamber which are separated from each other by a proton-conducting membrane. When the fuel cell system is operated, fuel, in particular H₂ or a water/methanol mixture, can be fed to the anode chamber and an oxidant, in particular oxygen, can be fed to the cathode chamber. In standby mode, the cathode chamber does not allow flow through and the oxidant and fuel are present in both the cathode chamber and the anode chamber, respectively. The fuel cell system remains at operating temperature in the standby mode. This enables the fuel cell system to be used as a combined interruption-free power supply unit and backup unit.

6551732**USE OF FUEL CELL CATHODE EFFLUENT IN A FUEL REFORMER TO PRODUCE HYDROGEN FOR THE FUEL CELL ANODE**

Jianguo Xu; USA assigned to Air Products and Chemicals Inc.

A fuel cell power system is provided that includes a fuel cell for generating electricity that has a cathode, an anode, and a polymer electrolyte membrane. The fuel cell processes air through the cathode to yield a cathode effluent stream. The fuel cell power system further includes a fuel processor for converting an inlet fuel stream of hydrogen and carbon containing fuels, utilizing a stream of oxygen containing gas and water vapor, to a processed fuel stream of hydrogen molecules for feeding into the fuel cell anode.

The system then feeds a substantial portion of the cathode effluent stream to the fuel processor as the oxygen containing gas and water vapor for converting the fuel stream into hydrogen. A method of using the system is also provided.

6551733**CONTROLLING THE TEMPERATURE AT WHICH FUEL CELL EXHAUST IS OXIDIZED**

Norm Peschke; Kenneth M. Rush Jr.; USA assigned to Plug Power Inc.

A fuel cell system includes a fuel cell stack that generates electrical energy during operation by reacting two streams of reactant gases. The fuel cell stack also produces a fuel cell exhaust stream. An oxidizer unit is positioned to receive the fuel cell exhaust stream. The oxidizer unit oxidizes at least a part of the fuel cell exhaust stream in an oxidizing gas stream during operation. A temperature sensor is positioned to sense a temperature of the oxidizer unit and an input system provides the oxidizer unit with at least the stoichiometric amount of the oxidizing gas stream during operation. The input system controls the amount of the oxidizing gas stream in excess of the stoichiometric amount provided to the oxidizer unit in response to the temperature of the oxidizer unit.

6551734**SOLID OXIDE FUEL CELL HAVING A MONOLITHIC HEAT EXCHANGER AND METHOD FOR MANAGING THERMAL ENERGY FLOW OF THE FUEL CELL**

Haskell Simpkins; Stephen M. Thomas; William J. Labarge; USA assigned to Delphi Technologies Inc.

A thermal energy management system for solid oxide fuel cells includes a monolithic small cell extrusion type heat exchanger coupled to an SOFC stack. In operation, a flow of air having a selected temperature is passed through the heat exchanger cells and thermal energy flowing into and out of the SOFC stack is managed primarily by radiation coupling between the SOFC stack and the heat exchanger. The system further provides management of the temperature distribution around the SOFC to meet outer skin temperature design targets and to control the inlet gas temperatures for the SOFC. The system provides a compact, efficient method for SOFC thermal energy management and is particularly well suited for transportation applications.

6551735**HONEYCOMB ELECTRODE FUEL CELLS**

Michael E. Badding; John F. Wight Jr.; USA assigned to Corning Incorporated

Solid oxide fuel cells (SOFC) based on mechanically durable honeycomb electrodes supporting thin electrolyte

and counter electrode layers in selected honeycomb channels provide dependable operation and high volume power density through extended use cycles.

6551736

FUEL CELL COLLECTOR PLATES WITH IMPROVED MASS TRANSFER CHANNELS

Vladimir Gurau; Frano Barbir; Jay K. Neutzler; USA assigned to Teledyne Energy Systems Inc.

A fuel cell collector plate can be provided with one or more various channel constructions for the transport of reactants to the gas diffusion layer and the removal of water therefrom. The outlet channel can be arranged to have a reduced volume compared to the inlet channel, in both interdigitated and discontinuous spiral applications. The land width between an inlet channel and outlet channel can be reduced to improved mass flow rate in regions of deleted reactant concentrations. Additionally or alternatively, the depth of the inlet channel can be reduced in the direction of flow to reduce the diffusion path as the concentration of reactant is reduced.

6554877

LIQUID FUEL COMPOSITIONS FOR ELECTROCHEMICAL FUEL CELLS

Gennady Finkelshtain; Yuri Katsman; Boris Filanovsky; Israel assigned to More Energy Ltd.

A new fuel composition useful for catalytic fuel cells is made up of at least two components. The primary fuel component is a surface active compound, such as methanol, that is a source of and acts to prevent unwanted decomposition of the auxiliary fuel. The auxiliary fuel is a hydrogen-containing inorganic compound with a high reduction potential, such as NaBH_4 , which acts as a highly reactive source of energy and serves to catalyze the catalytic oxidation of the primary fuel.

6555260

FUEL CELL SYSTEM HAVING A FUEL CELL STACK WITH INTEGRATED POLARITY REVERSAL PROTECTION DIODE

Markus Aberle; Anton Sonntag; Josef Sonntag; Germany assigned to Ballard Power Systems AG

A fuel cell system comprises a plurality of fuel cells arranged in a stack between two end plates. An electrical load is connected to the fuel cell stack via a load circuit, and a diode is arranged between the fuel cell stack and the electrical load in the load circuit. According to the invention, the diode is arranged directly on or in one of the end plates. Moreover, a cooling device, which is in thermal contact with the diode and dissipates the power loss from the diode, is provided in the region of the diode.

LITHIUM BATTERIES

6544685

ELECTROLYTE FOR LITHIUM SECONDARY BATTERY

Jin-Sung Kim; Jong-Wook Lee; Kwang-Sik Kim; Young-Gyu Kim; Je-Yun Kim; Jong-Seob Kim; South Korea assigned to Samsung SDI Company Ltd., Cheil Industries Inc.

Disclosed is an electrolyte for a lithium secondary battery including a non-aqueous organic solvent and alkylphosphonic acid cyclic anhydride of the following formula (I) where R, R', and R are alkyl groups having one to four carbon atoms.

6547838

SULFURIC POSITIVE ELECTRODE FOR USE IN LITHIUM SECONDARY BATTERY AND METHOD FOR MANUFACTURING THE SAME

Jai Young Lee; Hyo Jun Ahn; Sang Cheol Han; Young Soo Han; Sung Chul Park; Sang Min Lee; South Korea assigned to Korea Advanced Institute of Science and Technology

A sulfuric positive electrode for use in a lithium secondary battery whose life cycle is enhanced and a method for manufacturing the same are provided, in which nickel is added in sulfur that is an active material of a positive electrode. The sulfuric positive electrode manufactured by adding nickel that is an electrical conductor can solve the problem with respect to an electrode life cycle.

6547839

METHOD OF MAKING AN ELECTROCHEMICAL CELL BY THE APPLICATION OF POLYSILOXANE ONTO AT LEAST ONE OF THE CELL COMPONENTS

Zhiwei Zhang; Chi-Kyun Park; Lu Ying Sun; Chul Chai; USA assigned to SKC Company Ltd.

Lithium-ion electrochemical cells include an anode, a cathode and a separator between the anode and cathode, wherein at least one of the anode, cathode and separator includes a polysiloxane coating thereon. Most preferably, the polysiloxane coating is the polymerized reaction product of dimethyl siloxane and tetra(trimethylsiloxy)silane), and is present on the surface in an amount between 0.05 and 0.17 mg/cm². After being coated with the polysiloxane adhesive, the electrodes and separator can easily be attached one to another at ambient temperature by application of pressure using a hand roller or with a laminator, and then subsequently formed into a spiral or stacked structure for placement in a battery cell case.

6551571

**COBALT-COATED LITHIUM MANGANESE
COMPLEX OXIDE AND PREPARATION
PROCESS THEREOF**

Shoichi Fujino; Hiroshi Takahama; Mitsuaki Hatatani; Norimiki Sugiyama; Hideaki Sadamura; Japan assigned to Toda Kogyo Corporation

A cobalt-coated lithium manganese complex oxide is disclosed. This provides a particularly high discharge capacity which is useful for the improvement of cycle characteristics of a secondary battery as an active material of a positive electrode for a secondary battery with a non-aqueous electrolyte.

6551744

**POSITIVE ELECTRODE ACTIVE MATERIAL AND
NON-AQUEOUS ELECTROLYTE SECONDARY
BATTERY CONTAINING THE SAME**

Tsutomu Ohzuku; Hiroshi Yoshizawa; Masatoshi Nagayama; Japan assigned to Matsushita Electric Industrial Company Ltd., Osaka City Government, Tanaka Chemical Corporation

The present invention discloses a non-aqueous electrolyte secondary battery comprising: a negative electrode containing metallic lithium or a substance at least capable of absorbing/desorbing lithium ion; a separator; a positive electrode; an electrolyte, wherein the active material for the positive electrode comprises an oxide containing nickel element and manganese element in substantially the same atomic ratios. The non-aqueous electrolyte secondary battery thus fabricated is low cost in construction and has a high capacity.

6551745

**THIN LITHIUM BATTERY WITH SLURRY
CATHODE**

George W. Moutsios; Xuekun Xing; Jay Nardi; Frough K. Shokoohi; Wanjun Fang; USA assigned to NGK Spark Plug Company Ltd., NTK Powerdex Inc.

A cathode slurry for use in a lithium battery, comprised of about 60–70 wt.% manganese dioxide; 5–10 wt.% carbon; 25–35 wt.% electrolyte, said electrolyte comprised of about 10–40 wt.% ethylene carbonate, 60–90 wt.% propylene carbonate, and about 0.5–1.5 mol of triflate salt.

6551748

**PREVENTION OF POLYMERIZATION IN
Li/MnO₂ ORGANIC ELECTROLYTE
ELECTROCHEMICAL SYSTEMS**

Terrill B. Atwater; Louis E. Branovich; Anthony G. Pellegrino; USA assigned to The United States of America as represented by the Secretary of the Army

This invention provides a number of phosphorous and arsenic reducing agents to eliminate gas formation and polymerization of Li/MnO₂ and other lithium cells caused by the formation of dialcohol. The phosphorous reducing agents when added to the Li/MnO₂ and other lithium battery electrolytes cause the phosphorous compound and alcohol to react and produce ether and orthophosphorous acid, which prevents gas formation and the polymerization of Li/MnO₂ cells caused by the formation of dialcohol. The preferred reducing agent is phosphoric acid tri-ester. The arsenic reducing agents when added to the Li/MnO₂ and other lithium battery electrolytes cause the arsenic compound and alcohol to react and produce ether and orthoarsenic acid, which also prevents gas formation and the polymerization of Li/MnO₂ cells caused by the formation of dialcohol. Similar reactions and effects are also achieved with numerous other useful phosphorous and arsenic compounds that react with alcohol to produce ether and related acid compounds.

6555026

**STABILIZED ELECTROCHEMICAL CELL
ACTIVE MATERIAL**

Jeremy Barker; M. Yazid Saidi; Chariclea A. Scordilis-Kelley; USA assigned to Valence Technology Inc.

A composition and a method for forming the composition stabilized against capacity degradation comprises particles of spinel lithium manganese oxide (LMO) enriched with lithium by a decomposition product of lithium carbonate forming a part of each said particle and characterized by a reduced surface area and increased capacity expressed in milliamp hours per gram as compared to non-enriched spinel.

6555270

**FABRICATION OF HIGHLY TEXTURED LITHIUM
COBALT OXIDE FILMS BY RAPID THERMAL
ANNEALING**

John B. Bates; USA assigned to Lockheed Martin Energy Research Corporation

Systems and methods are described for fabrication of highly textured lithium cobalt oxide films by rapid thermal annealing. A method of forming a lithium cobalt oxide film includes depositing a film of lithium cobalt oxide on a substrate; rapidly heating the film of lithium cobalt oxide to a target temperature; and maintaining the film of lithium cobalt oxide at the target temperature for a target annealing time of at most, approximately 60 min. The systems and methods provide advantages because they require less time to implement and are, therefore less costly than previous techniques.

6555271

ANODE FOR LITHIUM-ION BATTERY

Ronald Alfred Greinke; Daniel Witold Krassowski; Neal David Phillips; USA assigned to Graftech Inc.

An anode for a lithium-ion battery is presented as well as a process for producing an anode for a lithium-ion battery. The anode is formed from a generally continuous sheet of particles of exfoliated graphite having a thickness of not more than 350 μm , itself or in a laminate with a metallic substrate. The process involves laminating particles of exfoliated graphite to a metallic substrate, such that the particles of exfoliated graphite form a generally continuous sheet of graphite having a thickness of not more than 350 μm . The inventive anode reduces or eliminates capacity fading due to contact loss and has superior permeability to lithium.

6555272

LITHIUM SECONDARY BATTERY AND ACTIVE MATERIAL FOR NEGATIVE ELECTRODE IN LITHIUM SECONDARY BATTERY

Kimihito Suzuki; Takeshi Hamada; Taro Kono; Tsutomu Sugiura; Hiromasa Shoji; Japan assigned to Nippon Steel Corporation

A lithium secondary battery comprising a positive electrode active material, a negative electrode active material, and a non-aqueous electrolyte is disclosed. The negative electrode active material is a powder of a silicon material containing boron and has a boron content in the range of 0.1–50 wt.%.

NICKEL HYDRIDE BATTERIES

6544684

PRISMATIC BATTERY AND METHOD OF MANUFACTURING SAME

Masato Onishi; Hideo Asaka; Hiroshi Nagata; Noriyuki Fujioka; Shinji Hamada; Japan assigned to Matsushita Electric Industrial Company Ltd., Toyota Jidosha Kabushiki Kaisha

Positive and negative electrode plates 2 and 3 are alternately stacked upon one another with intervening separators 4 to constitute an electrode plate group 1. The respective electrode plates are laterally offset so that side edges of the electrode plates protrude on the opposite sides. Collector plates 5 and 6 are perpendicularly welded to the side edges of the electrode plates 2 and 3 on both sides of the electrode plate group 1. Loose ends 3c and 3e of the outermost negative electrode plates 3b and 3d that are not welded to the collector plate are secured to the electrode plate group by a holding tape 7.

6548210

NICKEL ELECTRODES FOR ALKALINE SECONDARY BATTERY AND ALKALINE SECONDARY BATTERIES

Katsuhiko Shinyama; Reizo Maeda; Yasuyuki Harada; Tadayoshi Tanaka; Yoshinori Matsuura; Toshiyuki Nohma;

Ikuo Yonezu; Japan assigned to Sanyo Electric Company Ltd.

A nickel electrode for alkaline secondary battery including a porous sintered nickel substrate loaded with a nickel hydroxide-based active material, the nickel electrode has a configuration wherein a surface portion of the active material loaded into the sintered nickel substrate is provided with a combination of a first coating layer of a suitable compound and a second coating layer of a suitable compound, or a coating layer of a compound of two or more suitable elements, or wherein the coating layer of two or more suitable elements is formed between the sintered nickel substrate and the active material.

COMPONENTS AND/OR CHARGERS

6556020

BATTERY STATE-OF-CHARGE INDICATOR

Paul Patrick McCabe; Dean Harvey; Daniel Robert Driscall; Augustus R. Baldini; USA assigned to The Raymond Corporation

A state-of-charge indicator system monitors the battery current and voltage during operation of a lift truck. Selected current and voltage samples are used to calculate the internal battery resistance and this is employed to calculate a "dynamic" battery voltage. This dynamic battery voltage is used as input to a stored look-up table which provides a battery state-of-charge value.

6545449

METHOD FOR CONTROLLING CHARGE TO SECONDARY BATTERY FOR AUTOMATED GUIDED VEHICLE

Toshifumi Ueda; Nobuyasu Morishita; Japan assigned to Matsushita Electric Industrial Company Ltd.

A method for controlling charge preventing an operation of a valve during charging and suppressing the false detection of the upper limit charging voltage due to the memory effect at the charge side in a secondary battery mounted on an automated guided vehicle is presented. The method includes charging the secondary battery at a charging current value of not less than 0.5 C and not more than 4.0 C; detecting current that flows in the secondary battery and calculating the remaining capacity by accumulating at least the detected current; and completing the charge to the secondary battery when the calculated remaining capacity is not less than the threshold value that is preset to not less than 60% and not more than 95%.

655263

SEALED BATTERY WITH INTERNAL PRESSURE ACTIVATED SAFETY MECHANISM

Hyun-Joong Kim; In-Han Kim; Ky-Hoon Ahn; South Korea assigned to Samsung SDI Company Ltd.

A sealed battery includes a can for receiving an electric generator, the can having an opened top end, a deformable plate air tightly mounted on the opened top with a gasket disposed between the deformable plate and an inner wall of the opened top end, a terminal cap disposed on the deformable plate, the terminal cap being elevated except for an edge, and a circuit breaker disposed between the deformable plate and the terminal cap to cut-off current flow when the deformable plate is deformed by internal pressure increased above an allowable level. The circuit breaker includes an insulating plate having a bridge disposed traversing above the deformable plate and provided with a mechanically weak portion and a via hole, the mechanically weak portion being severed when the deformable plate is deformed by internal pressure increased above a predetermined level, an upper conductive layer formed on an upper surface of the insulating plate, and a terminal member disposed through the via hole to electrically connect the upper conductive layer to the deformable plate.

OTHER BATTERIES

6544678

METAL-AIR FUEL CELL BATTERY SYSTEM EMPLOYING METAL-FUEL CARDS

Sadeg M. Faris; Yuen-Ming Chang; Tsepin Tsai; Wayne Yao; USA assigned to Reveo Inc.

Improved metal-air fuel cell battery systems having metal-fuel realized in the form of metal-fuel tape cartridges and metal-fuel cards, which can be either manually or automatically inserted within the power generation bay of the system. In order to produce a range of output voltages, the metal-fuel tape has a plurality of electrically isolated metal-fuel tracks and the metal-fuel cards have a plurality of electrically isolated metal-fuel strips. An output voltage configuration subsystem is provided for configuring the voltages produced by the individual cells to produce a desired output. A subsystem is provided for detecting oxide formation on the metal-fuel tracks and strips so that only metal-fuel that has been oxidized is reduced during recharging operations. A subsystem is also provided for controlling the flow of oxygen into the power generation head in order to control the power output from the system.

6544682

NON-AQUEOUS ELECTROLYTE SECONDARY BATTERY

Norio Takami; Hiroyuki Hasebe; Takahisa Ohsaki; Motoya Kanda; Japan assigned to Kabushiki Kaisha Toshiba

Provided is a non-aqueous electrolyte secondary battery, comprising an electrode group including a positive electrode, a negative electrode, and a porous separator interposed between the positive electrode and the negative electrode, the pores of the porous separator being closed when heated, a non-aqueous electrolyte held by the porous separator, and a jacket formed of a sheet including a thermoplastic resin layer forming at least a portion of the inner surface, having the electrode group housed therein, and having mutually facing regions of the thermoplastic resin layer heat-sealed to each other to seal the electrode group therein, wherein the positive electrode, the negative electrode and the separator are made integral, and the thermoplastic resin layer has a melting point higher than a pore-closing initiating temperature of the porous separator at which the pores of the separator begin to be closed.

6544686

METAL-ALKALINE BATTERY CELLS WITH REDUCED CORROSION RATES

Yair Ein-Eli; Chen Menachem; Yuli Zingerman; Israel assigned to Electric Fuel Limited

A metal-alkaline battery having a reduced corrosion rate and enhanced electrochemical properties comprises an anode that includes derivatives of polyethylene glycol (PEG). The PEG derivatives have one or more hydrophilic moieties attached to the ends of the PEG chain. The hydrophilic moieties may be a carboxyl group or a carboxymethyl group. A preferred PEG derivative is polyethylene glycol, bi-carboxy methyl ether (PEG BCME).

6548208

NON-AQUEOUS ELECTROLYTE SECONDARY BATTERY AND ITS NEGATIVE ELECTRODE

Shinji Kasamatsu; Harunari Shimamura; Yoshiaki Nitta; Japan assigned to Matsushita Electric Industrial Company Ltd.

A high capacity negative electrode for a non-aqueous electrolyte secondary battery which has low declining rate in discharge capacity caused by charge/discharge cycles by improving the electronic conductivity on the surface of the particles of the negative electrode material. The negative electrode material is formed by coating part of or the entire surface of solid phase A comprising a nucleus particle with the solid phase B. The solid phase A contains silicon as a

constituent element. The solid phase B is composed of a solid solution or intermetallic compounds composed of silicon and at least one another element selected from a group comprising group 2 elements, transition elements, group 12 elements, group 13 elements and group 14 elements (exclusive of carbon and silicon) of the periodic table.

6551737

CYLINDRICAL ALKALINE STORAGE BATTERY

Masao Takee; Japan assigned to Sanyo Electric Company Ltd.

A cylindrical alkaline storage battery including a group of spiral electrodes composed of positive and negative electrode plates spirally wound with a separator interposed therebetween. A winding end of the positive electrode plate is positioned in a maximum diameter portion of the group of spiral electrodes. The separator is reinforced by an additional separator of the same kind of material adhered thereto at an outside of the winding end of the positive electrode plate.

6551747

SANDWICH CATHODE DESIGN FOR ALKALI METAL ELECTROCHEMICAL CELL WITH HIGH DISCHARGE RATE CAPABILITY

Hong Gan; USA assigned to Wilson Greatbatch Ltd.

A new sandwich cathode design having a second cathode active material of a relatively high energy density but of a

relatively low rate capability sandwiched between two current collectors and with a first cathode active material having a relatively low energy density but of a relatively high rate capability in contact with the opposite sides of the two current collectors, is described. The present cathode design is useful for powering an implantable medical device requiring a high rate discharge application.

655264

BATTERY MODULE HAVING A PLURALITY OF INTERCONNECTED BATTERIES

Shinji Hamada; Yoshiaki Ogata; Noriyuki Fujioka; Munehisa Ikoma; Toyohiko Eto; Japan assigned to Matsushita Electric Industrial Company Ltd., Toyota Jidosha Kabushiki Kaisha

A plurality of cells each encased in prismatic cell cases having short lateral walls and long lateral walls are arranged side-by-side, with adjacent short lateral walls being integral with each other, thereby constituting an integral battery case. The upper open ends of the plurality of prismatic cell cases are integrally closed by a single lid member. Each of the cells accommodates therein a group of electrodes stacked alternately upon one another parallel to the long lateral walls of the cell cases with intervening separators therebetween. Neighboring cells are connected in series at their abutting lateral opposite ends with each other.