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Nashville, TN  
USA

**MEETING REPORT**



Running MACCOR's booth are (from left): President Andy MacKay and sales reps Mark Hulse, Dave Smith and Mike Sandoval. .>[More photos](#)

**AROUND THE INDUSTRY**

**Beyonics Receives Contract**

Beyonics Technology Ltd. of Singapore may receive 5% of its sales this fiscal year from a contract to make batteries for Matsushita Electric Industrial Co. According to CEO Goh Chan Peng, the batteries will account for \$50 million in sales.

The company already makes Panasonic cordless phones for Matsushita and earlier this year started producing batteries for notebook computers for companies such as Dell Inc. and video cameras from Victor Co. of Japan, maker of JVC products.

**EaglePicher Horizon to Open Oklahoma Facility**

EaglePicher Horizon Batteries LLC, a joint venture of EaglePicher Inc. and Horizon Batteries Inc., will open a state-of-the-art battery facility in Grove, Oklahoma. Initially, the plant will be used for charging EaglePicher Horizon™

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MEETING REPORT

**28th International**  
**Battery Seminar And**  
**Exhibition - PART 2**  
Ft. Lauderdale, FL USA

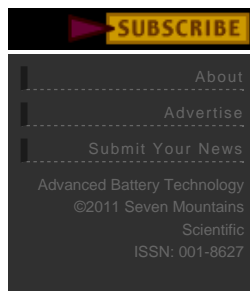
PHOTO REPORT

**28th Florida Battery**  
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TECH REPORT

**Dry Rooms: Why They**  
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sealed lead acid batteries and distributing them to the U.S. market. In the fall of 2004, EaglePicher Horizon will open manufacturing operations at the Grove site to supplement its manufacturing capabilities in Beijing, China.

EaglePicher Horizon expects to invest several million dollars in the plant and employ up to 200 workers at full production. Facility preparation has begun and initial employment recruiting will begin later this spring.

“We expect to ramp up production capability of the site to 1,500 batteries per day,” says Mike Reed, chief operating officer.

For more information, visit [www.ephorizon.com](http://www.ephorizon.com).

## Lithium-ion Battery Prices Up

Sanyo Electric Co. and Sony Corp. have increased their prices of lithium batteries due to rising materials costs, reports The Nikkei Weekly.

The increase for mobile phones will be approximately 8% and for notebook personal computers 10%.

Each month, Sanyo and Sony supply more than 60 million lithium-ion batteries worldwide. These batteries are used to power cell phones and notebook PCs. Since the price for cobalt, the main material for electrodes of lithium-ion batteries, rose worldwide, the battery price hike will likely lead to higher product prices.

## Battery Guru David Linden Retires

The NEMA Dry Battery Section honored David Linden at a reception on September 30, 2003. Linden has since retired from active participation in support of the ANSI C18 Committee on Portable Cells and Batteries.

Author of three editions of Handbook of Batteries, a book widely used by the battery industry today, Linden has been involved with battery research and development for more than 60 years. He began his career in the Power Sources Division of the U.S. Army Electronics R&D Command, was instrumental in drafting the original military specifications for the army, and was one of the initial participants in developing battery performance requirements. He contributed to the development of the first battery standards and also started CECOM's Power Sources Conference, the 41st of which will occur in June.

## Gordon Joins RBC

John Gordon has joined RBC Technologies as director of manufacturing and technology.

He has over 25 years of experience in equipment design for manufacturing, most recently as senior engineer at Solicore Inc. of Lakeland, Florida. From 1996 to 2001, he was engineering manager for Moltech Corp. of Tucson, Arizona, where he designed and installed the company's pilot line for the manufacture of prismatic batteries.

Gordon's career in battery manufacturing began with Valence Technology in Northern Ireland where he managed the installation and commissioning of their manufacturing lines. He holds a bachelor's degree in physics from the University of Ulster.

Gordon will lead the installation of a small-scale pilot line at RBC's College Station, Texas, facility to demonstrate the capability to produce HRB AA cells at rates of 600 per minute. The line will be operational by December.

The two to three times advantage of HRB in high power devices has drawn the interest of a number of potential licensees who have deemed it a viable approach to desired performance characteristics. An aggressive technical development program continues at RBC with thousands of prototype HRB AA cells made and tested to date. RBC is presenting the technology to select OEMs for applications testing, and has extended it to include prismatic and rechargeable alkaline formats.

For details, visit [www.rbctx.com](http://www.rbctx.com).

### **Burton Appointed UQM VP of Operations**

Ronald Burton has been appointed to the newly created position of vice president of operations at UQM Technologies of Frederick, Colorado. Responsible for the company's engineering and manufacturing operations, he will report to President and Chief Executive Officer William G. Rankin.

Prior to joining the company, Burton served as vice president of sales and engineering for Stature Electric Inc., a motor supplier to vehicle manufacturers and industrial markets. For the 12 years prior to that, he served as director of engineering and operations for Globe Motor Co., a high volume motor supplier to the automotive, industrial and military markets, where he was responsible for the management of three manufacturing facilities totaling over 250,000 square feet with approximately 1,000 employees. Burton began his career with the Electrocraft Motion Control Group of Robbins & Meyers in 1976.

He holds a bachelor's degree in electrical engineering from Morehead University.

### **Cellphones Face Power Failure**

Microchips have been getting denser according to "Moore's law", which holds that the number of transistors on a chip roughly doubles every two years.

Yrjoe Neuvo, chief technology officer of Finnish cellphone giant Nokia, predicts that battery capacity will have to rise by 10% a year to support the ever-increasing number of features available on mobile phones, often called "feature creep".

In Japan, there are phones that are incapable of delivering advertised features because their batteries are not powerful enough, says Isidor Buchmann, founder of Cadex Electronics in Vancouver, Canada.

To get more power out of a battery, more charge has to flow. To do that, battery makers must either get more lithium ions migrating or make those that do move faster,

But more ions means a bigger battery, and mobile phones are shrinking. Battery scientists are experimenting with alternatives to the carbon matrix and cobalt oxide to speed up ion migration, but no one is expecting a dramatic increase even if they are successful.

## **Electric Cars Accelerate Toward Market**

Chinese scientists have made remarkable progress in developing pollution-free vehicles, now that the commercialization of such cars has been listed as a key part of the country's science plan for the next decade, reports The China Daily.

In fact, the first experimental fuel cell-powered car has already been developed, laying a good foundation for introducing clean and environmentally friendly vehicles during the 2008 Beijing Olympic Games. According to Shao Liqin, an official of the ministry's High-Tech Development and Industrialization Department, low-emission vehicles will be put into special transport service during the Games.

Beijing, Tianjin, Wuhan, in central China's Hubei Province, and Weihai, in east China's Shandong Province, have been selected as pilot areas to employ a number of electric buses. Several such buses are operating in Wuhan, the department said.

By 2007, commercialization of the electric buses should be realized in Beijing and Shanghai, and expanded to ten other cities by 2015, the 21st Century Economic Report said recently.

Air quality from pollution in major cities is a serious problem, with car emissions being a major contributor. To make the sky bluer and air cleaner in urban areas, the ministry wants Beijing, Tianjin, Shanghai and 13 other cities to introduce cars powered dually by high-performance, low-cost batteries along with a mix of cleaner-burning fuels in the next two years.

China first acknowledged the importance of electric vehicles in 1996 at an international exhibition on electric and clean-fuel vehicles. It has conducted

technological exchanges with the United States, Germany, Japan, France, and Italy to push domestic development of such cars.

It developed fuel cells in the 1990s, with Dalian Chemistry and Physics Institute, Tsinghua University, Zhejiang University and other research institutes cooperating.

China, which has to import oil to feed its growing appetite for energy, relies on coal to provide 75% of its power needs. Coal will continue to be a large part of the country's energy supply, experts say.

Scientists have been working to develop natural gas powered cars. By last October, 190,000 such vehicles were running in Beijing, Shanghai, Tianjin, Chongqing and a dozen other cities, with 560 stations providing fill-ups.

### **Takara Promotes Electric Cars**

Japanese toymaker Takara released its Q-car in 2002, reports The Nikkei Weekly. Since then the tiny autos have been adopted by businesses for short-distance transportation, in the process enlivening the electric car market.

The Q-car is a full-size electric version of its popular Choro-Q toy cars. These tiny cars are environment-friendly and are powered by fuel cells from major automakers heavily supported by the Japanese government.

The company has released a special model to commemorate the Hanshin Tigers baseball team capturing the Central League pennant and plans to introduce a new model designed for anglers with a special space for holding fishing tackle.

Developing applications of electric cars for specific purposes and specific types of users could support the spread of the eco-friendly vehicles.

### **AEA Battery Systems Powers First Comet Landing**

The European Space Agency's Rosetta spacecraft hopes to become the first to enter a comet's orbit and land on its surface. AEA provided lithium-ion batteries to power the mission to study the chemical composition of Comet 67P/Churyumov-Gerasimenko, and to shed light on the origins of the solar system. The 12-year mission blasted off from Kourou, French Guiana, on March 2, 2004.

AEA's rechargeable batteries are powering both the Rosetta spacecraft and its lander, Philae. The batteries were chosen for their reduced size and weight, approximately 50% lighter and smaller than other battery chemistries used in space exploration.

AEA's lithium-ion battery power recently powered the Mars Express Mission,

heralded as a success.

### **Altair and Hosokawa Sign Memorandum**

Altair Nanotechnologies has signed a memorandum of joint development with Hosokawa Micron International, a leader in powder and particle processing..

Altair and Hosokawa will focus on three strategic initiatives: establishing a development program using both companies' combined technologies; strengthening the technical and market position of the companies; and applying for U.S. government grants to develop and test electrodes.

In tests, Altair's nano-sized lithium titanate spinel battery material has exhibited charge and discharge rates 100 times higher than materials used in commercially available batteries. Telcordia recently developed a non-aqueous asymmetric hybrid prototype battery that incorporates Altair's nano-lithium titanate spinel. The prototype has exceeded DOE/PNGV standards.

### **Pure Energy Receives \$4 Million Purchase Order**

Pure Energy Visions Inc. has received a 12-month blanket purchase order for over Cdn\$4 million from an undisclosed, large international private label customer. The order includes AA and AAA size rechargeable alkaline (RAM™) batteries and chargers.

Energy Visions Inc. (EVI), which develops and commercializes advanced battery and direct methanol fuel cell technologies and products, recently acquired a major interest in Pure Energy Inc. and its subsidiary, Pure Energy Visions Inc. The latter manufactures and markets rechargeable and single-use alkaline batteries globally sold under the "Pure Energy", XL™ and "Pure Power" labels and to private label customers worldwide.

Contact Stephen Meldrum, phone: (905) 764-9457 ext 254, or Dr. Phil Whiting, phone: (905) 764-9457 ext 249.

### **Electric Scooters Sales Rising In Shanghai**

The Shanghai Bicycle Industry Association predicts that prices on mopeds will drop 15% due to a production surplus, reports The China Daily.

Last year 300,000 electric scooters were sold, compared with average annual sales of 20,000 the previous years. Many people turned to this new vehicle during the SARS spread last year and more joined during the extreme hot summer to avoid taking public transportation.

These booming sales have led to massive investment in the industry and surplus output, forcing some manufacturers to resort to price cutting.

## **EaglePicher Enters Indian Marketplace**

Under an agreement between EaglePicher Inc. of Phoenix, Arizona, and SAR Silicon Systems Pvt. Ltd. of New Delhi, India, SAR is now marketing Luminous EaglePicher batteries, including automotive batteries and valve regulated lead acid (VRLA) batteries for use in uninterruptible power sources (UPS).

Rakesh Malhotra, managing director, SAR Silicon Systems Pvt. Ltd., said, "The technology development and R&D in the battery industry in India has not kept pace with global standards due to lack of effective competition in the industry. Recognizing the need to bring superior technology automotive and VRLA batteries, SAR has entered into the technology transfer and licensing agreement with EaglePicher Incorporated."

## **Rayovac to Buy Brazilian Battery Company**

Rayovac Corp. will buy Brazilian battery company Microlite S.A., of Sao Paulo, for nearly \$28 million in cash plus future payments based on Microlite's performance through June 30, 2005. It would be the last step for Rayovac to reclaim the worldwide rights to its brand name.

Rayovac plans to move its headquarters to Atlanta. Microlite is currently owned by VARTA of Germany and Tabriza Brasil Empreendimentos Ltda. of Brazil.

Under the agreement, Rayovac will buy all the outstanding stock of Microlite, which owns the Rayovac brand name in Brazil. Rayovac is the market-leading brand in Brazil, with a 49% value share of the alkaline and zinc carbon market.

## **Tariffs on Lithium Battery Imports**

The Korean Trade Commission (KTC) has made a preliminary anti-dumping ruling on primary lithium battery imports from Japan and the United States.

Under the wing of the Ministry of Commerce, Industry and Energy, the KTC conducted anti-dumping investigations last July following a complaint by local lithium battery manufacturer Vitzrocell that batteries from Japan and the U.S. had been imported at prices below the fair-market value.

In the preliminary ruling, the KTC said it would impose 130% and 34.28% anti-dumping duties, respectively, on Japanese and U.S. imports.

However, instead of referring the case to the Ministry of Finance and Economy, the KTC said it would conduct on-the-spot inspections of local, Japanese and U.S. manufacturers for three months, through May 2004, before it makes a final ruling.

The domestic market was estimated at 6.8 billion won (US\$5.78 million) annually last year, of which imports accounted for 89.9%

### **Atul Auto to Enter Battery Manufacturing**

Next year, Atul Auto Ltd. will set up a manufacturing unit with an investment of up to Rs60 crore to make Mark brand batteries for industrial and automobile use, the company's managing director Jayantibhai Chandra said.

"We have decided to enter into battery manufacturing in technical collaboration with some firms in Thailand and Japan," says Chandra. "At present, we import these batteries from Thailand."

Initially, the company will focus on marketing in Gujarat, Rajasthan, and some parts of Punjab and Maharashtra where they have a network of 180 dealers.

"We have a service station every 30km in Gujarat. They will provide service to the customers of our batteries also," Chandra said.

### **Delphi Pilots Program With U.S. Marine Corps**

Delphi Corp., the U.S. Marine Corps, and the National Center for Manufacturing Sciences (NCMS) will equip a Light Armored Vehicle (LAV) with existing automotive-based sensors, control electronics, diagnostics, and telematics technology to show potential performance improvements.

For over 35 years, Delphi has supplied connectors and printed flex circuits to major U.S. defense contractors performing at subzero cold to more than 400EF, salt spray to sandstorms, and 12,000G blasts to supersonic speeds.

For this program, rollover, oil quality and fuel level sensors, a battery health monitor, absorbent glass mat battery, and DS800 Diagnostic Suite will be installed in several operational vehicles to validate the usefulness of these technologies in the field.

The LAV pilot will also undergo a full diagnostic mapping procedure that will allow Delphi's patented DS800 system to fully assess the health and performance history of the vehicle.

### **Hawaiian Police Department Chooses N-Charge**

The Honolulu, Hawaii, Police Department has selected Valence Technology, Inc.'s N-Charge™ Power System as the power source to provide all day run-time for notebook PCs in 800 of its vehicles.

"Through our vigorous marketing and sales efforts, we continue to identify more and more markets which call for all day notebook run-time," says Stephan



Godevais, chairman and CEO of Valence. "The N-Charge product is a universal power source that meets this need and enables individuals like the Honolulu police officers to be completely mobile, wireless and productive throughout the entire day."

### **Ultralife Lands Development Contract**

Ultralife Batteries, Inc. received a \$2.7 million development contract from General Dynamics for lithium-primary and lithium-ion rechargeable batteries, as well as vehicle and soldier-based chargers for the Land Warrior-Stryker Interoperable (LW-SI) program. Initial deliveries are expected in January 2005.

Land Warrior is the first integrated soldier system, combining computers, lasers, geolocation, and embedded voice and data communications with soldiers' mission equipment.

### **Fuel Cell Company Adjusts Strategic Alliances**

*The Montreal Gazette* reports that Ballard Power Systems Inc. of Vancouver, Canada, is adjusting its strategic alliances with DaimlerChrysler and Ford as the automakers grow more interested in hybrid engines. Hybrid technology is seen as an intermediate step between standard internal-combustion engines and the fuel cells.

## **ELECTRIC VEHICLES**

### **UQM to Power Electric Transit Bus in Japan**

The UQM Technologies, Inc. PowerPhase 75 propulsion system will power an electric transit bus being developed by Japan's Waseda University in collaboration with corporate sponsors Mitsui Engineering and Shipbuilding Company, Toshiba Engineering, Hino Motors Ltd., and Tokyo Electric Power Co., Inc. The bus is expected to link the Waseda University campus to a nearby transit stop for the Shinkansen bullet train.

As part of the project, Waseda University is also developing a battery charging system that will be powered principally from renewable energy resources.

Visit [www.uqm.com](http://www.uqm.com)

### **A New Electric Vehicle in Dubai's Neighborhood**

General Motors and Club Car have a new EV, the Pathway, in response to a U.S. law, reports AME Info.

The Pathway is an ideal vehicle for owners to move around in their private

residential communities, which are very popular in the Middle East.

Dubai Police say all such vehicles sharing roads with standard vehicles must be legally licensed. This makes the Pathway, which is legal in the USA, the only vehicle in its category in the UAE to comply with this regulation.

## **IEEE Spectrum's "Year of the Hybrid Electric Car"**

IEEE Spectrum has issued its annual top ten tech cars:

Hyundai HCD-8 Sports Tourer. One of a handful of concept cars unveiled in recent years that put high-brightness, white light-emitting diodes (LEDs) in front.

Volvo XC90. This SUV does not roll over because it adjusts brake torque individually at each wheel with its proprietary Roll Stability Control (RSC).

BMW 5-Series. The first manufacturer to offer an electronic "active steering" system which varies the steering ratio to suit the car's speed.

Lexus RX 400H. This fall, Toyota will offer a hybrid-electric version of its popular Lexus RX SUV.

Toyota Prius. The Prius hybrid, redesigned for 2004 is bigger, faster and even stingier with fuel.

Ford Escape Hybrid. This car will be the first mass-produced hybrid SUV, as well as the first hybrid built in North America.

Ford Hydrogen Hybrid Research Vehicle. Hydrogen-powered but without a fuel cell.

Honda Inspire and Accord. These cars offer an optional Lane-Keeping Assist System (LKAS).

Chevrolet Silverado Hybrid. A pickup truck offering 110V alternating current. A mild hybrid, it has one battery under the hood and three under the back seat.

Toyota Crown Royal. The world's first 42V electrical system in a production car.

### **RESEARCH AND DEVELOPMENT**

## **ONR Sails into Propulsion System Development**

The Office of Naval Research (ONR) is developing fuel cell propulsion systems

for future ships. ONR is also funding development of a method to extract hydrogen from diesel fuel to take advantage of the relative low cost of the fuel and the Navy's established infrastructure for buying, storing, and transporting it.

"The Navy's shipboard gas-turbine engines typically operate at 16% to 18% efficiency because Navy ships usually sail at low to medium speeds that don't require peak use of the power plant," says ONR program officer Anthony Nickens. "The fuel cell system that ONR is developing will be capable of between 37% to 52% efficiency."

Fuel cells will permit design of a "distributed" power system, since they can be dispersed throughout the ship instead of being co-located with the ship's shaft.

At the Department of Energy Idaho National Engineering and Environmental Laboratory in Idaho Falls, ONR is testing a 500kW diesel fuel reformer compatible with a proton exchange membrane fuel cell. Reforming diesel is complicated due to the sulfur present. The integrated fuel processor heats and vaporizes the diesel, then the sulfur in it is converted into hydrogen sulfide. The hydrogen sulfide is then exposed to zinc oxide, oxidizing the sulfur into sulfur dioxide and separating it from the hydrogen.

ONR is looking at designs to reduce the size of the processor, which consists of an arrangement of valves, water-gas shift reactors, an oxidizer, and other components.



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U. S. BATTERY AND FUEL CELL PATENTS

Compiled by Eddie T. Seo

Littleton, CO, USA

seoeddie@gmail.com

Official Gazette, Volume 1280 (March 2004)

U.S. 6,698,278 (20040302), Indirect measurement of fuel concentration in a liquid feed fuel cell, Jiujun Zhang, Kevin M. Colbow, Alfred Wong, and Bruce Lin, Ballard Power Systems Inc. (CA).

U.S. 6,698,448 (20040302), Spill containment system and method, Douglas Frazier, Expo Power Systems, Inc.

U.S. 6,698,515 (20040302), In situ thermal processing of a coal formation using a relatively slow heating rate, John Michael Karanikas, Harold J. Vinegar, Scott Lee Wellington, Eric Pierre de Rouffignac, Ilya Emil Berchenko, George Leo Stegemeier, Etuan Zhang, Thomas David Fowler, and Robert Charles Ryan, Shell Oil Co.

U.S. 6,699,021 (20040302), Passively pumped liquid feed fuel cell system, George C. McNamee and William P. Acker, MTI MicroFuel Cells Inc.

U.S. 6,699,080 (20040302), Snap terminal with annular standoff, Larry J. Costa.

U.S. 6,699,297 (20040302), Method for preparing lithium manganate and positive electrode for lithium secondary cell containing the same, Tetsuya Yamawaki and Hideki Sakai, Toho Titanium Co., Ltd. (JP).

U.S. 6,699,336 (20040302), Amorphous electrode compositions, Robert L. Turner, Brian D. Fredericksen, Larry J. Krause, Jeffrey R. Dahn, Dominique C. Larcher, Ian A. Courtney, and Ou Mao, 3M Innovative Properties Co.

U.S. 6,699,456 (20040302), Method for producing lithium metal oxides, Horst Krampitz and Michael Fookan, Honeywell International Inc.

U.S. 6,699,457 (20040302), Low-temperature hydrogen production from oxygenated hydrocarbons, Randy D. Cortright and James A. Dumesic,

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Wisconsin Alumni Research Foundation.

U.S. 6,699,525 (20040302), Method of forming carbon nanotubes and apparatus therefor, Ahalapitiya H. Jayatissa, The Board of Trustees of Western Michigan University.

U.S. 6,699,582 (20040302), Fine carbon fiber, method for producing the same and electrically conducting material comprising the fine carbon fiber, Toshio Morita, Hitoshi Inoue, Kunio Nishimura, Yutaka Suhara, Satoshi Ohshima, and Motoo Yumura, Showa Denko Kabushiki Kaisha (JP).

U.S. 6,699,593 (20040302), Corrosion-resistant metallic member, metallic separator for fuel cell comprising the same, and process for production thereof, Yasushi Kaneta, Shinobu Takagi, Hiroaki Yoshida, Yoshihisa Suzuki, and Masaki Shinkawa, Daido Tokushuko Kabushiki Kaisha (JP).

U.S. 6,699,608 (20040302), Method and apparatus for humidifying a gas flow and to a method for using such a device, Janusz Blaszczyk, Wolfram Fleck, and Colin Keddie, Ballard Power Systems AG (DE).

U.S. 6,699,609 (20040302), Fuel cell system, Yasunori Kotani, Hikaru Okada, Nobutaka Nakajima, Seiji Tonegawa, and Minoru Uoshima, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,699,610 (20040302), Anode stream recirculation system for a fuel cell, Jefferson YS Yang, Asia Pacific Fuel Cell Technologies, Ltd. (TW).

U.S. 6,699,611 (20040302), Fuel cell having a thermo-responsive polymer incorporated therein, Gene Kim, Ronald J. Kelley, and Steven D. Pratt, Motorola, Inc.

U.S. 6,699,612 (20040302), Fuel cell power plant having a reduced free water volume, Richard D. Breault and Leslie L. Van Dine, UTC Fuel Cells, LLC.

U.S. 6,699,613 (20040302), Fuel cell having sealant for sealing a solid polymer electrolyte membrane, Masajiro Inoue, Nobuaki Kimura, Toshihiko Suenaga, and Harumi Hatano, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,699,614 (20040302), Converging/diverging flow channels for fuel cell, Jeffrey Allan Rock, General Motors Corp.

U.S. 6,699,615 (20040302), Electrical battery, Timofei Gutkin, I Zborovsky.

U.S. 6,699,616 (20040302), Battery housing for medical scooter, Donald P. H. Wu, Donald P. H. Wu (TW).

U.S. 6,699,617 (20040302), Alkaline storage battery, hydrogen-absorbing alloy electrode and method for producing the same, Takashi Ebihara, Susumu Kikuyama, Akiko Miyahara, Xianglong Wang, and Kohji Yuasa, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,699,618 (20040302), Cathode electroactive material, production method therefor and secondary cell, Takao Noda, Akihiko Shirakawa, Joseph Gaze, Yoshiaki Yamauchi, and Fumiyoshi Ono, Showa Denko KK (JP).

U.S. 6,699,619 (20040302), Negative electrode of a lithium secondary battery with a two-layered inorganic solid electrolytic material, Hirokazu Kugai, Nobuhiro Ota, and Shosaku Yamanaka, Sumitomo Electric Industries, Ltd. (JP).

U.S. 6,699,620 (20040302), Lead alloy surface coating for positive lead-acid battery grids and methods of use, Lu Zhang and John Lewis Ayres, Delphi Technologies, Inc.

U.S. 6,699,621 (20040302), Method for electrochemical conditioning polymeric electrodes, Theodore O. Poehler, Peter Searson, Jeffrey G. Killian, Haripada Sarker, Jennifer Giaccai, Yosef Gofer, and Walkiria S. Schlindwein, Johns Hopkins University.

U.S. 6,699,622 (20040302), Solid or gel electrolyte and battery using the same, Koichiro Kezuka and Takahiro Endo, Sony Corp. (JP).

U.S. 6,699,623 (20040302), High performance lithium or lithium ion cell, Hongli Dai, E I du Pont de Nemours and Co.

U.S. 6,699,998 (20040302), Non-aqueous electrolyte and lithium secondary battery using the same, Toshikazu Hamamoto, Koji Abe, Tsutomu Takai, and Yasuo Matsumori, UBE Industries, Ltd. (JP).

U.S. 6,700,221 (20040302), Electronic unit and method for detecting a polarity inversion of the onboard power supply voltage in motor vehicles, Armin Wagner, Christina Seidel, Christoph Luthe, and Hans-Urich Stahl, Bayerische Motoren Werke Aktiengesellschaft (DE).

U.S. 6,700,349 (20040302), Power supply unit, distributed power supply system and electric vehicle loaded therewith, Akihiko Emori, Takuya Kinoshita, and Hideki Miyazaki, Hitachi, Ltd. (JP).

U.S. 6,700,350 (20040302), Method and apparatus for controlling charge balance among cells while charging a battery array, Jose Antonio Viera Formenti and Garry Ross Elder, Texas Instruments Inc.

U.S. 6,700,351 (20040302), Modular uninterruptible power supply battery management, Charles F. Blair, Mark Gabel, Christopher Crawford, Dennis Weber, John R. Birchmeier, and Brad Reinbolt, Liebert Corp.

U.S. 6,700,352 (20040302), Dual capacitor/battery charger, Stephen Elliott and Robert Mylott, Radiant Power Corp.

U.S. 6,700,353 (20040302), Battery charging system and vehicle generator control system, Tadatashi Asada, Denso Corp. (JP).

U.S. 6,700,364 (20040302), Constant-current/constant-voltage circuit architecture, Trevor W. Barcelo, Robert L. Reay, and David M. Dwelley, Linear Technology Corp.

U.S. 6,700,383 (20040302), Method of detecting and resolving memory effect, Tadao Kimura, Masayoshi Toyota, Norito Yamabe, and Yusai Murakami, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,702,621 (20040309), Battery connector with dual compression terminals, Ryan Yeh, Hon Hai Precision Ind Co., Ltd. (TW).

U.S. 6,702,878 (20040309), Hydrogen-permeable membrane, manufacturing method of the same, and hydrogen gas separator using the same, Naoki Ito and Masahiko Iijima, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 6,702,887 (20040309), Inhomogeneous silicas for elastomer compounds, Stefan Uhrlandt, Ralf Schmoll, Anke Blume, and Detlef Luginsland, Deguss AG (DE).

U.S. 6,702,960 (20040309), Catalytic partial oxidation with a rhodium-rhodium alloy catalyst, David Schaddenhorst and Ronald Jan Schoonebeek, Shell Oil Co.

U.S. 6,702,961 (20040309), Preparation of lithium-containing materials, Jeremy Barker, M. Yazid Saidi, and Jeffrey Swoyer, Valence Technology, Inc.

U.S. 6,702,963 (20040309), Method of producing a polarizable electrode, Yukari Kibi, Takashi Saito, Shinobu Takagi, and Takayoshi Shimizu, NEC Corp. (JP).

U.S. 6,702,965 (20040309), Method of forming a porous composite product, in particular with a high specific surface, Jean-François Penneau, François Capitaine, and Philippe Le Goff, Bollere (FR).

U.S. 6,702,970 (20040309), Process to reduce sticking during surface treatment of graphite articles, Jeremy H. Klug, Advanced Energy Technology Inc.

U.S. 6,702,991 (20040309), Apparatus and method for reducing power consumption of a plasma fuel reformer, Rudolf M. Smaling, Michael J. Daniel, and Shawn D. Bauer, Arvin Technologies, Inc.

U.S. 6,703,068 (20040309), Amine oxide coating compositions, Klaus Hintzer, Armin Steurer, Dieter Birkhorst, James Michael Larson, Joseph William Frisk, and Wayne Meredith Board, 3M Innovative Properties Co.

U.S. 6,703,076 (20040309), Production of catalyst layers on diaphragms for low-temperature fuel cells, Ashok Kumar Gupta, Frank Tietz, Hans Peter Buchkremer, and Isabel Kundler, Forschungszentrum Julich GmbH (DE).

U.S. 6,703,149 (20040309), Method and apparatus for producing reformed hydrocarbon and hydrogen, engine installed with fuel cell, and energy station, Masaya Kuno, Masaya Kuno (JP) and Ohkawara Kakohki Co., Ltd. (JP).

U.S. 6,703,150 (20040309), Direct methanol feed fuel cell and system, Subbarao Surampudi, Harvey A. Frank, Sekharipuram R. Narayanan, William Chun, Barbara Jeffries Nakamura, Andrew Kindler, and Gerald Halpert, California Institute of Technology.

U.S. 6,703,151 (20040309), Compact precooler, Ned E. Cipollini and Antonio M. Vincitore, UTC Fuel Cells, LLC.

U.S. 6,703,152 (20040309), Method of operating phosphoric acid fuel cell, Teruaki Komiya, Masaru Iguchi, and Masahiro Ise, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,703,153 (20040309), Ceramic composite electrolytic device, Esin Cubukcu, Steve Dahar, Ravi Dodeja, Arnold Z. Gordon, Daniel Kalynchuk, Troy Shannon Prince, Justin Soltesz, Mike Waite, and Sandeep Chawla, IGR Enterprises.

U.S. 6,703,154 (20040309), Solid oxide fuel cell compression bellows, Brian Gorbell and Craig Talbot, Global Thermoelectric Inc. (CA).

U.S. 6,703,155 (20040309), Power tap device, fuel cell stack, and method of dividing a fuel cell stack, John P. Scartozzi, Avista Laboratories, Inc.

U.S. 6,703,156 (20040309), Fuel cell cathode utilizing multiple redox couples, Stanford R. Ovshinsky, Srinivasan Venkatesan, Boyko Aladjov, Subhash K. Dhar, Kevin Fok, and Thomas Hopper, Texaco Ovonic Fuel Cell, LLC

U.S. 6,703,157 (20040309), Cylindrical battery and method for manufacturing the same, Yasuhiko Shoji, Isao Kubo, Kenji Yamamoto, and Yuji Mototani, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,703,158 (20040309), Cylindrical storage battery, Fujio Hirano, Matsushita Electric Industrial Co, Ltd (JP).

U.S. 6,703,159 (20040309), Electronic device battery holder structure,



Tsungzho Wu, Inventec Appliances Corp. (TW).

U.S. 6,703,160 (20040309), Battery pack or battery providing increased heat dissipation, Yuan Gao, FMC Corp.

U.S. 6,703,161 (20040309), Multilayer separator for leadacid batteries, Jerry Zucker, Daramic, Inc.

U.S. 6,703,162 (20040309), Battery and process for examining battery, Hisashi Shiota, Hiroaki Urushibata, Shinji Nakadeguchi, Masaharu Moriyasu, Syoji Yoshioka, Hiroiti Ishida, and Kiyoshi Hanafusa, Mitsubishi Denki Kabushiki Kaisha (JP).

U.S. 6,703,163 (20040309), Lithium battery and electrode, Shizuo Ogura, Hidehisa Mokudai, Makoto Murata, and Barrie Linton Davies, Celanese Ventures GmbH (DE).

U.S. 6,703,164 (20040309), Hydrogen-absorbing alloy, secondary battery, hybrid car and electromobile, Hirotaka Hayashida, Masaaki Yamamoto, Hiroshi Kitayama, Shusuke Inada, Isao Sakai, Tatsuoki Kono, Hideki Yoshida, Takamichi Inaba, and Motoya Kanda, Kabushiki Kaisha Toshiba (JP).

U.S. 6,703,165 (20040309), Nickel electrode for alkaline storage battery, method of fabricating the same, and alkaline storage battery, Yuki Morikawa, Takeshi Ogasawara, Mitsunori Tokuda, and Mutsumi Yano, Sanyo Electric Co., Ltd. (JP).

U.S. 6,703,166 (20040309), Negative active material slurry composition for rechargeable lithium battery and method of manufacturing negative electrode using same, Kyoun Sheem, Sangyong Yoon, and Sangjin Kim, Samsung SDI Co., Ltd. (KR).

U.S. 6,703,438 (20040309), Electroconductive plate-like titania and electroconductive composition, Yukiya Hareyama, Otsuka Kagaku Kabushiki Kaisha (JP).

U.S. 6,703,497 (20040309), Cellulose microfibrils with modified surface, preparation method and use thereof, Laurence Ladouce, Etienne Fleury, Cecile Gousse, Robert Cantiani, Henri Chanzy, and Gerard Excoffier, Rhodia Chimie (FR).

U.S. 6,703,719 (20040309), Systems and methods for managing a battery source associated with a microturbine power generating system, Robert W. McConnell, General Electric Co.

U.S. 6,703,810 (20040309), Digital controlled charge current regulator, Carlo Peschke, Dialog Semiconductor GmbH (DE).

U.S. 6,703,811 (20040309), Apparatus and method for managing battery recharging and discharging and recharging operations, Gwang Su Kim, LG Electronics Inc (KR).

U.S. 6,704,192 (20040309), Electrically conductive, freestanding microporous sheet for use in an ultracapacitor, Richard W. Pekala, Amtek Research International LLC.

U.S. 6,704,629 (20040309), Device for monitoring motor vehicle's electric power and method therefor, YungSheng Huang, BPPower, Inc. (TW).

U.S. 6,705,101 (20040316), Vehicle cooling system for a temperature-raising device and method for the cooling of a temperature-raising device, Friedrich Brotz, Herbert Damsohn, Peter Geskes, Klaus Luz, and Conrad Pfender, BEHR GmbH & Co. (DE).

U.S. 6,705,152 (20040316), Nanostructured ceramic platform for micromachined devices and device arrays, Dmitri Routkevitch, Peter Mardilovich, Alex Govyadinov, Stephanie Hooker, and Stephen S. Williams, NanoProducts Corp.

U.S. 6,705,392 (20040316), Heat exchanger, Takaharu Gotou and Hiroyuki Yoshida, Nissan Motor Co., Ltd. (JP) and Calsonic Kansei Corp. (JP).

U.S. 6,705,418 (20040316), Arrangement for providing a compact battery with autonomous cooling, Bjorn Wessman, Volvo Car Corp. (SE).

U.S. 6,706,080 (20040316), Non-aqueous electrolyte cell and manufacturing method therefor, Sachio Akahira, Sony Corp. (JP).

U.S. 6,706,082 (20040316), Crystalline ceric oxide sol and process for producing the same, Isao Ota, Tohru Nishimura, and Kenji Tanimoto, Nissan Chemical Industries, Ltd. (JP).

U.S. 6,706,097 (20040316), Molecular separator apparatus, David A. Zornes, Hexablock, Inc.

U.S. 6,706,220 (20040316), Mixture consisting of metal particles and/or alloy particles and of a liquid electrolytic medium and method for producing the same, Wolfgang Glaeser, GrilloWerke AG (DE).

U.S. 6,706,239 (20040316), Method of co-forming metal foam articles and the articles formed by the method thereof, David P. Haack, Chi Lin, and Michael Speckert, Porvair PLC (GB).

U.S. 6,706,247 (20040316), Self regulating formulations for safe hydrogen gettering, Timothy Jon Shepodd, Sandia National Laboratories.

U.S. 6,706,400 (20040316), Flexible graphite article and method of manufacture, Robert Angelo Mercuri, Joseph Paul Capp, Michael Lee Warddrip, and Thomas William Weber, Advanced Energy Technologies Inc.

U.S. 6,706,429 (20040316), Catalytic humidifier and heater, primarily for humidification of the oxidant stream for a fuel cell, David Frank, Xuesong Chen, Pierre Rivard, and Joe Cargnelli, Hydrogenics Corp. (CA).

U.S. 6,706,430 (20040316), Electronic by-pass of fuel cell cathode gas to combustor, William S. Wheat, Derek S. Kilmer, Bruce J. Clingerman, and Matthew K. Hortop, General Motors Corp.

U.S. 6,706,431 (20040316), Fuel cell, Naotake Kawamura, Kazuhide Ota, and Ken K. Inouye, Fullerene USA, Inc.

U.S. 6,706,432 (20040316), Methods and products for improving performance of batteries/fuel cells, Klaus Heinrich Oehr, Steven Splinter, Joey Chung, ~~Ben~~ Jung, Elod Lajos Gyenge, and Colin W Oloman, Magpower Systems, Inc. (CA).

U.S. 6,706,433 (20040316), Refuelable electrochemical power source capable of being maintained in a substantially constant full condition and method of using the same, Martin Pinto, Stuart Smedley, and Jeffrey A. Colborn.

U.S. 6,706,434 (20040316), Fuel cell system, Tousaku Takamura, Nissan Motor Co., Ltd. (JP).

U.S. 6,706,435 (20040316), Fuel cell with polymer electrolyte membrane, Hubertus Biegert, Peter Britz, Arnold Lamm, Gabor Toth, and Peter Urban, Ballard Power Systems, Inc. (CA).

U.S. 6,706,436 (20040316), Electrochemical cell design using a bipolar plate, Trent M. Molter, Proton Energy Systems, Inc.

U.S. 6,706,437 (20040316), Bipolar plates for fuel cell stacks, Victor Trapp, Markus Leib, Ruediger Hengl, and Tetsu Yamamoto, SGL Carbon AG (DE).

U.S. 6,706,438 (20040316), Fluid supply device for fuel cell, Katsumi Sahoda, Ryoichiro Takahashi, Kuri Kasuya, and Kazunori Fukuma, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,706,439 (20040316), Pressure driven hermetically sealed pump for fuel cell system, Manfred Herrmann, General Motors Corp.

U.S. 6,706,440 (20040316), Apparatus and method for injecting liquid into container, Kiyohide Takimoto and Yuichi Maekawa, NEC Mobile Energy Corp. (JP).

U.S. 6,706,441 (20040316), Paste-like masses for electrochemical components, layers produced therefrom, and electrochemical components, Peter Birke and Gerold Neumann, Fraunhofer Gesellschaft zur Forderung der Angewandten Forschung eV (DE).

U.S. 6,706,442 (20040316), Alkaline storage battery, Hiroyuki Sakamoto, Hidekatsu Izumi, Yoichi Izumi, and Yoshio Moriwaki, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,706,443 (20040316), Process for preparing lithium manganese oxides, Horst Krampitz (DE) and Gerhard Wohner (DE).

U.S. 6,706,444 (20040316), Process for preparing lithium manganate in spinel structure, Koichi Numata and Tsuneyoshi Kamada, Mitsui Mining & Smelting Co., Ltd. (JP).

U.S. 6,706,445 (20040316), Synthesis of lithiated transition metal titanates for lithium cells, Jeremy Barker, M. Yazid Saidi, and Jeffrey L. Swoyer, Valence Technology, Inc.

U.S. 6,706,446 (20040316), Non-aqueous electrolytic solution secondary battery, Kenji Nakai, Yoshimasa Koishikawa, Yuichi Takatsuka, Kensuke Hironaka, Takeshi Nakano, and Youshin Yagi, ShinEbbe Electric Machinery Co., Ltd. (JP).

U.S. 6,706,447 (20040316), Lithium metal dispersion in secondary battery anodes, Yuan Gao and John L. Burba III, FMC Corp.

U.S. 6,706,448 (20040316), Method and apparatus for lithiating alloys, James L. Gole and Frank P. Dudel, Georgia Tech Research Corp.

U.S. 6,706,449 (20040316), Lithium anodes for electrochemical cells, Yuriy V. Mikhaylik, Christopher J. Sheehan, and Terje A. Skotheim, Moltech Corp.

U.S. 6,706,450 (20040316), Separator for sealed lead acid battery, Atsushi Asada, Nippon Sheet Glass Co., Ltd. (JP).

U.S. 6,706,833 (20040316), Polymers incorporating covalently attached organoimido polyoxometalates, Eric A. Maatta and Aaron R. Moore, Kansas State University Research Foundation.

U.S. 6,706,834 (20040316), Sulphonic fluorinated ionomers, Ivan Wlassics and Vito Tortelli, Ausimont SpA (IT).

U.S. 6,706,909 (20040316), Recycle of discharged sodium borate fuel, Jonathan Snover and Ying Wu, Millennium Cell, Inc and US Borax.

U.S. 6,707,271 (20040316), Power supply apparatus with chargeable battery and charge/discharge method, Seiya Kitagawa, Fujitsu Ltd. (JP).

U.S. 6,707,272 (20040316), Pulse charging circuit and method, Ilionga Thandiwe, Motorola, Inc.

U.S. 6,707,273 (20040316), Temperature/voltage controlled battery charging circuit, Roy G. Gignac, Electronic Design & Sales, Inc.

U.S. 6,707,274 (20040316), Optical battery recharger, Lawrence J. Karr.

U.S. 6,707,303 (20040316), Electronic battery tester, Kevin I. Bertness and Jamey Butteris, Midtronics, Inc.

U.S. 6,707,660 (20040316), Prismatic capacitor, David A. Evans and Ross Blakeney (CA).

U.S. 6,708,546 (20040323), Honeycomb hydrogen storage structure with restrictive neck, Vitaliy Myasnikov, Baoquan Huang, Rosa Young, and Stanford R. Ovshinsky, Texaco Ovonic Hydrogen Systems LLC.

U.S. 6,708,718 (20040323), High pressure gas supplying system, Akira Yamada and Akifumi Otaka, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,708,719 (20040323), Mounting structure for high pressure gas vessels and mounting method, Ryuichi Idoguchi, Nissan Motor Co., Ltd. (JP).

U.S. 6,708,753 (20040323), Method and apparatus for casting straps onto storage battery plates, Randall F. Brantley, Delphi Technologies, Inc.

U.S. 6,708,758 (20040323), In situ thermal processing of a coal formation leaving one or more selected unprocessed areas, Eric Pierre de Rouffignac, Harold J. Vinegar, Scott Lee Wellington, John Michael Karanikas, Ilya Emil Berchenko, George Leo Stegemeier, Kevin Albert Maher, Etuan Zhang, Thomas David Fowler, and Robert Charles Ryan, Shell Oil Co.

U.S. 6,709,264 (20040323), Catalytic combustor, Ingo Hermann, Axel Junge, Martin Stadie, André Mack Gardner, and Philip Klaus, General Motors Corp.

U.S. 6,709,471 (20040323), Single layer carbon nanotube electrode battery, Yoshiyuki Miyamoto, NEC Corp. (JP).

U.S. 6,709,497 (20040323), Honeycomb hydrogen storage structure, Vitaliy Myasnikov, Baoquan Huang, Rosa Young, and Stanford R. Ovshinsky, Texaco Ovonic Hydrogen Systems LLC.

U.S. 6,709,628 (20040323), Process for the production of sintered ceramic oxide, Christoph Kleinlogel, Martin Goedickemeier, and Ludwig Gauckler, Eidgenossische Technische Hochschule Zurich Nichtmetallische Werkstoffe (CH).

U.S. 6,709,777 (20040323), Performance recovery process for PEM fuel cells, Patrick L. Hagans and Gennady Resnick, UTC Fuel Cells, LLC.

U.S. 6,709,778 (20040323), Electrochemical conversion system, Lonnie G. Johnson, Johnson Electro Mechanical Systems, LLC.

U.S. 6,709,779 (20040323), Cooling device for fuel cell system and control method thereof, Tetsuo Uozumi, Nissan Motor Co., Ltd. (JP).

U.S. 6,709,780 (20040323), System and method for controlling steam in a fuel system with a fuel processor, Donald H. Keskula, Bruce J. Clingerman, Steven D. Burch, and Paul T. Yu, General Motors Corp.

U.S. 6,709,781 (20040323), Separators for solid polymer fuel cells and method for producing same, and solid polymer fuel cells, Noriyuki Suzuki, Yuichi Yoshida, Tsutomu Haeno, and Hiroshi Kihira, Nippon Steel Corp. (JP).

U.S. 6,709,782 (20040323), Fuel cell having an anode protected from high oxygen ion concentration, Kevin R. Keegan, Bernie Fischer, and Diane M. England, Delphi Technologies, Inc.

U.S. 6,709,783 (20040323), Battery pack cooling structure, Yoshiaki Ogata and Shinji Hamada, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,709,784 (20040323), Back-up battery for a cellular telephone, Øivind Resch, Michael Råberg, and Tore Lervik, Jumpit AS (NO).

U.S. 6,709,785 (20040323), Stacked electrochemical cell and method for preparing the same, Hyangmok Lee, Soonbe Ahn, Kyungdon Kim, and Jaehyun Lee, LG Chemical Co., Ltd. (KR).

U.S. 6,709,786 (20040323), Cell module structure, Satoru Asaka, Kenji Matsumoto, Toshiyuki Matsuoka, Koichi Yamamoto, Osamu Hasegawa, and Mitsuru Ikeo, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,709,787 (20040323), Polycarbon sulfide, process for preparing the same and nonaqueous electrolyte battery comprising the same, Jinbao Zhao, Shoko Ibuki, Hideki Nishihama, and Ryo Nagai, Hitachi Maxell, Ltd. (JP).

U.S. 6,709,788 (20040323), Lithium secondary cell and method of producing lithium nickel metal oxide positive electrode therefor, Norikazu Hosokawa, Hiroshi Ueshima, Kenichiro Kami, and Manabu Yamada, Denso Corp. (JP).

U.S. 6,709,789 (20040323), Non-aqueous electrochemical cell, Gunther Hambitzer (DE), Bernd Kreidler (DE), Ulrike Dorflinger (DE), Volker Doge (DE), and Klaus Schorb (DE).

U.S. 6,710,098 (20040323), Methods for reforming polymer surface for improved wettability, Sangyong Lee, Byeonggi Ahn, Heonsik Song, and Myungman Kim, LG Chemical Ltd (KR).

U.S. 6,710,123 (20040323), Fluoropolymers containing organo-silanes and methods of making the same, Ramin Aminshayaneyi and Claude Christophe Granel, Atofina Chemicals, Inc.

U.S. 6,710,575 (20040323), Method for controlling a charging state of a battery for an electric vehicle, Kiljung Youn, Hyundai Motor Co. (KR).

U.S. 6,710,576 (20040323), Auxiliary battery adapter for cellular telephones, Ronald A Kaufman, Elizabeth A. Bryant, and Due Quoc Huynh, Motorola, Inc.

U.S. 6,710,577 (20040323), Battery charger, King Mo Shum, Jackson Electric Co. Ltd. (HK).

U.S. 6,710,992 (20040323), Charge/discharge protection circuit for a rechargeable battery, Axel Pannwitz, Hans Martin von Staudt, and Achim Stellberger, Dialog Semiconductor GmbH (DE).

U.S. 6,710,995 (20040323), Battery protection by a sequential blowing fuse, Horst Knoedgen, Dialog Semiconductor GmbH (DE).

U.S. 6,712,088 (20040330), Pilot-type channel valves providing counter-flow prevention, Masaru Gamou, Syoichi Hagiwara, and Takeshi Yamamoto, Aisan Kogyo Kabushiki Kaisha (JP).

U.S. 6,712,135 (20040330), In situ thermal processing of a coal formation in reducing environment, Scott Lee Wellington, Harold J. Vinegar, Eric Pierre de Rouffignac, John Michael Karanikas, Ilya Emil Berchenko, George Leo Stegemeier, Etuan Zhang, Thomas David Fowler, and Robert Charles Ryan, Shell Oil Co.

U.S. 6,712,136 (20040330), In situ thermal processing of a hydrocarbon containing formation using a selected production well spacing, Eric Pierre de Rouffignac, Harold J. Vinegar, Scott Lee Wellington, Gordon Thomas Shahin Jr., Ilya Emil Berchenko, George Leo Stegemeier, Kevin Albert Maher, Etuan Zhang, Thomas David Fowler, and Robert Charles Ryan, Shell Oil Co.

U.S. 6,712,137 (20040330), In situ thermal processing of a coal formation to pyrolyze a selected percentage of hydrocarbon material, Harold J. Vinegar, Scott Lee Wellington, Eric Pierre de Rouffignac, John Michael Karanikas, Ilya Emil Berchenko, George Leo Stegemeier, Etuan Zhang, Thomas David Fowler,

and Robert Charles Ryan, Shell Oil Co.

U.S. 6,712,603 (20040330), Multiple port catalytic combustion device and method of operating same, William H. Pettit, General Motors Corp.

U.S. 6,712,643 (20040330), Electronic equipment, Shinji Suzuki, Fuji Photo Film Co., Ltd. (JP).

U.S. 6,712,923 (20040330), Manufacturing apparatus and manufacturing method of solid polymer film with catalyst deposited thereon, Katsuhisa Tanaka, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 6,712,944 (20040330), Gas/liquid phase separator for electrolysis cell, Robert H. Byron Jr. and Michael J. Brown, Proton Energy Systems, Inc.

U.S. 6,713,011 (20040330), Apparatus and methods for electrospinning polymeric fibers and membranes, Benjamin Chu, Benjamin S. Hsiao, and Dufei Fang, The Research Foundation at State University of New York.

U.S. 6,713,020 (20040330), Device and method for evaluating performance of fuel cells, device and method for evaluating specific surface area of fuel-cell electrode catalysts, fuel-cell electrode catalyst, and method of manufacturing the same, Hisao Kato, Tatsuya Kawahara, and Toshiaki Ozaki, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 6,713,032 (20040330), Catalyst for removing carbon monoxide in hydrogen rich gas and production method therefor, Manabu Mizobuchi, Kensaku Kinugawa, Noboru Hashimoto, Akira Igarashi, and Hajime Iida, Matsushita Electric Works, Ltd. (JP) and Akira Igarashi (JP).

U.S. 6,713,034 (20040330), Porous carbon electrode material, method for manufacturing the same, and carbon fiber paper, Makoto Nakamura, Yoshihiko Hosako, Hidehiko Ohashi, Mitsuo Hamada, and Kazushige Mihara, Mitsubishi Rayon Co., Ltd. (JP).

U.S. 6,713,039 (20040330), Lithium-manganese oxide for use in lithium secondary cell cathode and method for producing the lithium-manganese oxide, Hiroyuki Tabata, Kazue Matsui, and Noriko Anan, Kyushu Ceramics Industry Co., Ltd. (JP).

U.S. 6,713,040 (20040330), Method for generating hydrogen for fuel cells, Shabbir Ahmed, Sheldon H. D. Lee, John David Carter, and Michael Krumpelt, Argonne National Laboratory.

U.S. 6,713,176 (20040330), Processing and manufacturing methods enabled using non-stoichiometric nanomaterials, Tapesh Yadav, Ming Au, Bijan Miremadi, John Freim, Yuval Avniel, Roger Dirstine, John Alexander, and Evan Franke, NanoProducts Corp.



U.S. 6,713,201 (20040330), Systems including replaceable fuel cell apparatus and methods of using replaceable fuel cell apparatus, Michael L. Bullock and Winthrop D. Childers, Hewlett-Packard Development Co., LP.

U.S. 6,713,202 (20040330), Multifuel fuel cell system and a method for its operation, Marcel Corneille, Martina Fischer, Berthold Keppeler, Christian Lorenz, Stefan Paulik, and Bernd Schonrock, Ballard Power Systems AG (DE).

U.S. 6,713,203 (20040330), Fuel cell, Shuji Sato and Koji Okazaki, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,713,204 (20040330), Fuel cell system, Hiroshi Shimanuki, Yoshio Kusano, Toshikatsu Katagiri, and Motohiro Suzuki, Honda Giken Kogyo Kabushiki Kaisha (JP).

U.S. 6,713,205 (20040330), Sealing material for solid polymer fuel cell separator, Noriyuki Meguriya and Yujiro Taira, Shin-Etsu Chemical Co., Ltd. (JP).

U.S. 6,713,206 (20040330), Electrochemical cells comprising laminar flow induced dynamic conducting interfaces, electronic devices comprising such cells, and methods employing same, Larry J. Markoski, Jeffrey S. Moore, and Joseph W. Lyding, Board of Trustees of University of Illinois.

U.S. 6,713,207 (20040330), Membrane electrode assembly, and solid polymer fuel cell using the assembly, Kyoko Tsusaka, Masaya Kawasumi, and Yu Morimoto, Kabushiki Kaisha Toyota Chuo Kenkyusho (JP).

U.S. 6,713,208 (20040330), Vent valve and a storage cell including it, Stephane Payen and Alain Raymond, Alcatel (FR).

U.S. 6,713,209 (20040330), Arrangement for implementing a safety feature in a battery, Matti Naskali, Nokia Mobile Phones, Ltd. (FI).

U.S. 6,713,210 (20040330), Secondary cell protection circuit device and secondary cell assembly, Takashi Sato, Naofumi Miyasaka, and Takashi Hasunuma, Tyco Electronics Raychem KK (JP).

U.S. 6,713,211 (20040330), Square shaped battery, Nobuyasu Morishita, Shinichi Yuasa, Akihiro Taniguchi, and Munehisa Ikoma, Matsushita Electric Industrial Co., Ltd. (JP) and Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 6,713,212 (20040330), High-energy, rechargeable electrochemical cells, Doron Aurbach, Orit Chasid, Yossi Gofer, and Chaiim Gizbar, Bar-Ilan University (IL).

U.S. 6,713,213 (20040330), Non-aqueous electrolyte secondary battery with an organic magnesium electrolyte compound, Shuji Ito, Osamu Yamamoto, Teruhisa Kanbara, and Hiromu Matsuda, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,713,214 (20040330), Positive electrode active material for secondary battery and secondary battery, Hideyuki Koga, Masahisa Fujimoto, and Shin Fujitani, Sanyo Electric Co., Ltd. (JP).

U.S. 6,713,215 (20040330), Non-aqueous electrolyte rechargeable batteries, Shunji Watanabe, Toyoo Harada, Yoshimi Kanno, Shinichi Takasugi, Tsugio Sakai, Hideharu Onodera, and Tsuneaki Tamachi, SII Micro Parts Ltd. (JP).

U.S. 6,713,216 (20040330), Thin alkali metal film member and method of producing the same, Hirokazu Kugai, Nobuhiro Ota, and Shosaku Yamanaka, Sumitomo Electric Industries, Ltd. (JP).

U.S. 6,713,217 (20040330), Nonaqueous electrolyte secondary battery with a polyolefin microporous membrane separator, Takafumi Oura, Masaki Kitagawa, Hajime Nishino, and Hizuru Koshina, Matsushita Electric Industrial Co., Ltd. (JP).

U.S. 6,713,424 (20040330), Method of making fluid diffusion layers and electrodes having reduced surface roughness, Jurgen Stumper, John Robert Gordon, Herwig Robert Haas, and Kelvin Keen-~~En~~ Fong, Ballard Power Systems Inc. (CA).

U.S. 6,713,567 (20040330), Method for forming fluorinated ionomers, Paul Gregory Bekiarian and William Brown Farnham, E I du Pont de Nemours and Co.

U.S. 6,713,987 (20040330), Rechargeable battery having permeable anode current collector, Victor Krasnov, Kai-~~Wei~~ Nieh, Fan-~~Chiu~~ Chang, and Chun-~~Ing~~ Lin, Front Edge Technology, Inc.

U.S. 6,713,988 (20040330), Selectively activated electrochemical cell system, Donald Dubac, Michael Glover, and Haresh P. Kameth, Vionyx, Inc.

U.S. 6,714,391 (20040330), Ultracapacitor energy storage cell pack and methods of assembling and cooling the same, Michael D. Wilk and Kevin T. Stone, ISE Research Corp.

U.S. 6,714,402 (20040330), Microfabricated electrochemical device separators, Hundi P. Kamath, Cooper Technologies Co.

U.S. 6,714,882 (20040330), Second battery control circuit, Yoshinori Iwaizono, Matsushita Electric Industrial Co., Ltd. (JP).

