



In the Bosch center for research and advanced engineering, Dr. Thorsten Ochs works on the batteries of the future. See story below.

AROUND THE INDUSTRY

Bosch's Renningen Research Campus Inauguration

Dr. Thorsten Ochs, head of battery technology R&D at the newly inaugurated Bosch research campus in Renningen, explains what will be necessary for progress in battery technology: "To achieve widespread acceptance of electromobility, mid-sized vehicles need to have 50kWhrs of usable energy."

At a weight of 230kg, the battery of a modern-day electric car provides 18kWh to 30kWh. To achieve 50kWh, the same battery would weigh 380kg to 600kg. With his colleagues around the world, Ochs is working on energy storage media with even better performance to pack 50kWh into 190kg. In addition, the researchers are looking to significantly shorten the time a car needs to recharge. "Our new batteries should be capable of being loaded to 75% in less than 15 minutes," he says.

Ochs and his colleagues firmly believe that improved lithium technology will make it possible to achieve these goals. "There is still a long way to go when it comes to lithium," states Ochs. To make progress in this area, his team in Renningen is working closely with Bosch experts

in Shanghai and Palo Alto. And as a further measure to advance Li-ion battery research, Bosch has established the Lithium Energy and Power GmbH & Co. KG joint venture with GS Yuasa and the Mitsubishi Corp.

"The more lithium ions you have in a battery, the more electrons – and thus the more energy – you can store in the same space," explains Ochs.

Aqua Metals Closes \$10 Million for Recycling Center

Aqua Metals Inc., which is commercializing a non-polluting electrochemical lead recycling technology called AquaRefining™, has a \$10 million loan from Green Bank in conjunction with a 90% loan guarantee from the U.S. Department of Agriculture (USDA) Rural Development Agency. The loan will provide non-dilutive capital to finance the growth of Aqua Metals and enhance the development of the company's first AquaRefinery currently under construction in the Tahoe-Reno Industrial Center (TRIC) in Nevada. The company intends to apply the proceeds to expand its lead recycling capacity.

"Our credit enhancement tool is designed to lend the support needed to bring advanced technology businesses into America's rural areas, creating jobs and progress," says Sarah Adler, Nevada State Director of USDA Rural Development. "The fact that Aqua Metals will make lead battery recycling a clean and safe process for workers and the surrounding communities is a double bonus."

"Demand for our recycling capacity has been strong," says Dr. Stephen R. Clarke, Chairman and CEO of Aqua Metals. "This USDA backed loan provides Aqua Metals a key piece of financing with which to expand our initial AquaRefinery. Specifically, we have been able to develop a plan to produce lead at 80 tonnes per day and then to expand to 160 tonnes per day by 2018."

Dyson Acquires Battery Firm, Plans Factory

Vacuum cleaner manufacturer Dyson plans to build a major battery factory after acquiring a battery technology firm, the company's founder, James Dyson, told *USA TODAY*.

2016 ECS-TOYOTA Young Investigator Fellowship

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Submission Deadline: January 31, 2016



Dyson has acquired Ann Arbor, Michigan-based Sakti3 and plans to use the startup's solid-state Li-ion technology to improve the battery life on its cordless vacuums, deliver new products and build a battery production plant.

James Dyson (right), founder and chief engineer of the U.K.-based manufacturing and technology giant, says that the company's battery production facility will require up to \$1 billion in investment. Dyson says the U.S. is an option – including Sakti3's home state. "I think there are lots of places we could do it, so we are keeping a very open mind about it at the moment."



The \$90 million acquisition reflects a win for clean-tech investors in Sakti3, including General Motors and Khosla Ventures. Dyson had already invested \$15 million in Sakti3.

The University of Michigan spinoff company's founder and CEO Ann Marie Sastry will lead development of her technology as an executive for Dyson.

Made in Nigeria Automotive Batteries Debut Market

Locally assembled automotive batteries have been released into the market to serve Nigeria motorists and companies that use batteries, reports *Daily Trust (Abuja)*. Forgo Battery Co. Ltd.'s factory in Kwara State produced

the batteries and was commissioned by the Governor of Kwara State, Dr. Abdulfattah Ahmed who promised that henceforth all the government vehicles in the state will be running on the Forgo batteries.

Speaking during the opening of the factory, Joseph Alex Offorjama, managing director of Forgo Battery, explained that he was motivated to site the factory in Ilorin – the Kwara state capital – due to recent federal government policies which are replicated in the state that encourage investment in various sectors. He added that the company was prepared to offer quality products to power modern automobiles with increased electronic features and security tracking systems including other machinery and equipment.

Trojan Powers Airport Ground Support Equipment

Trojan Battery Co. LLC, a leading manufacturer of deep-cycle batteries, has entered the airport ground support vehicle market by supplying its deep-cycle batteries to LEKTRO Inc., one of the industry's leading electric towbarless tug manufacturer.

Trojan's L16, 6V batteries power selected models of LEKTRO's AP86, AP86X, AP87 and 87X series of towbarless, aircraft tugs. Trojan also provides a custom



designed L16, 6V battery featuring a 4V tap to provide a true 28V ground power unit (GPU) capability for LEKTRO equipment. The 4V tap enables LEKTRO equipment to effectively service aircraft that could be otherwise harmed by potential overcharging.

In addition, LEKTRO uses Trojan DC500ML 12V batteries in its AP8800 and AP8800-EZ models, as well as, Trojan's T105 batteries in its AP83 series tugs.

Trojan's deep-cycle flooded batteries feature T2 Technology™ for sustained capacity and total overall ampere-hours, resulting in more operating power. T2 Technology features Alpha Plus® Paste, a proprietary,

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high-density paste formulation precisely engineered to maximize performance of Trojan's flooded deep-cycle batteries. Combined with Trojan's unique grid technology and Maxguard® T2 Separator, the L16 is optimized to provide exceptional battery performance, with reduced downtime and lower overall maintenance costs.

Tesla is Already Making Grid Batteries

Electric car maker Tesla Motors is already assembling batteries to be used by utilities and building owners at its huge battery factory, the Gigafactory, just outside of Reno, Nevada. Tesla said that it started assembling these batteries – called the Powerpack and Powerwall – at its factory in Fremont, California in the third quarter of this year. In the early part of the fourth quarter, Tesla says it “relocated production from Fremont to an automated assembly line at the Gigafactory.” These Powerpack and Powerwall battery packs are likely using battery cells from its battery partner Panasonic.

At the end of 2016, Tesla will make the Powerpack and Powerwall battery packs using battery cells that it produces at the Gigafactory, says Tesla.

Samsung Introduces Flexible Batteries

Samsung introduced the Stripe and Band batteries at the InterBattery 2015 event in Seoul. The batteries hint at the future of wearables' batteries.



Stripe is a battery which can bend to match the contours of a person's body, such as their wrist. The flexibility is said to be akin to that of fiber, allowing it to be used in gadgets like smart bands, necklaces, t-shirt accessories and similar devices. Despite having a higher density than comparable batteries, Stripe is only 0.3mm thick.

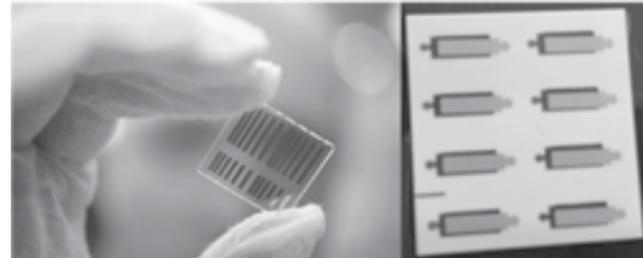
In addition to Stripe, Samsung also showcased the Band battery, which is designed specifically for smartwatches. The battery is designed in such a way that it can be “applied on the bands of any smartwatch,” says Samsung, where it

will boost the battery capacity by more than 50%. After being bent more than 50,000 times during testing, the battery still operated normally.

Oakridge Plans to Produce Thin Film Batteries

Oakridge Global Energy Solutions Inc. of Melbourne, Florida plans to fully use the many patents developed and owned by the company in thin film solid state batteries. The batteries have game-changing applications in electronics, robotics, industry, medical devices and the military.

In 2002, the company acquired Nevada-based Oak Ridge Micro-Energy Inc. to further the development and commercialization of rechargeable thin film solid state lithium battery technology that was based upon the thin film solid state lithium ion technology developed by Dr. John B. Bates, Ph.D., while he was employed at the United States Department of Energy's Oak Ridge National Lab (ORNL) under license from ORNL.



“The timing is now right and the market is now ready for thin film solid state batteries,” says Steve Barber, OGES executive chairman and CEO.

Global Touts Post-Vehicle Use of Li-ion Batteries

Global Battery Solutions LLC (GBS), a Holland-based sister organization of Sybesma's Electronics Inc., plans to grow its operations by integrating post-automotive Li-ion batteries into new applications.

For Hank Sybesma, the president and CEO of both companies, the battery technology has the potential to be “incredible” for his businesses. “Our little electronics business that we've had for 50 years will be dwarfed with what this company can do,” he says referring to the potential with Global Battery Solutions.

The number of available post-vehicle Li-ion batteries is expected to reach approximately 6.7 million by 2035, according to a report conducted last year by the Mineta National Transit Research Consortium and Grand Valley State University. The pending influx of used Li-ion batteries that are past their useful automotive life has prompted companies like Global Battery Solutions to develop

methods and applications to repurpose and reuse those components.

Global Battery Solutions is currently in talks with the state officials in New York to service lithium-ion batteries



previously used in bus fleets from various municipalities around the state. The company plans to repurpose the batteries for use in the state's power grid to avoid brownouts during peak power usage.

MEETING REPORT

**The Battery Show, Electric & Hybrid Vehicle Technology Expo, and Critical Power
Novi, Michigan
September 15-17, 2015**

Provided courtesy of the event organizers

In its sixth consecutive year, The Battery Show; Electric & Hybrid Vehicle Technology Expo, now in its third year; and the brand new Critical Power Expo hosted the advanced battery, power, and automotive engineering community in Novi, Michigan, September 15-17, 2015, for three days of networking, learning and business discussions. Achieving record attendance of over 5,700, the three co-located events demonstrated why the second week in September should be permanently marked in the industry's calendar.

Nearly 500 exhibitors showcased the latest technologies across a full-capacity exhibition floor. Some of the world's

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leading companies participated, exhibiting on the show floor, presenting on the conference and sponsoring the show, including Google, EnerSys, Intel, Voltabox, UL, Delphi, Hongfa, YASA Motors, BMW, East Penn and Schneider Electric.

Attendees from Siemens, Exide, General Motors (GM), Ford Motor Co., Tesla, Chrysler, Audi and Mitsubishi Motors, attended in large delegations in addition to thousands of senior buyers, engineers and technical leaders from the major OEMs, Tier 1 and Tier 2 Suppliers.

Event Highlights

Parker Hannifin led the off-highway track featuring Sevcon, Crown Equipment, Odyne and Artisan perspectives on electric and hybrid engineering options for industrial vehicles. Experts from DuPont, BASF, Johnson Matthey and Umicore discussed the challenges of creating scalable next generation materials whilst improving performance and managing cost.

Free-to-attend speaker sessions in the Open Technology and Buyers Forums provided three days of exhibitor-led seminars from companies including UL, IP Checkups, AMS, IAV, Doosan, Rittal Corp., Automotive Engineering Inc. and Powerex. The dedicated networking events hosted by EnerSys, Delphi and East Penn created several opportunities for exhibitors to build relationships with manufacturers, suppliers, and potential buyers in a relaxed environment.

Hongfa took automotive design to the next level, combining a 1965 Cobra with state-of-the-art technology. A vertically integrated company, Hongfa America is a focus relay business manufacturing fully automated products.

Genovation Cars debuted the first-ever all-electric Corvette. The Genovation GXE Corvette, will hit the market in just four months' time. Among the many key features of the electric car are the state-of-the-art battery management system, inverters, batteries and electric motors that produce in excess of 700hp and over 600 lb-ft of torque.

TE Connectivity broadcast live from the show on Google Hangout. Guests tuned in to hear experts discuss subjects such as TE's Litealum wire crimp technology, and tooling and megatrends in high-voltage connectivity.

YASA Motors, the world leader in high torque and power density axial flux motors, launched its latest high-performance products – the YASA P400 Series – at the Electric & Hybrid Vehicle Technology Expo.

ALABC displayed a Ram truck that combines lead-carbon batteries with a natural gas-powered engine and a

factory-built start-stop system while promoting its 2016-18 research development program, which aims to improve the life and performance of next-generation lead-acid and lead-carbon batteries.

Siemens Industry showcased solutions that demonstrated how the company's technologies have allowed OEMs and system integrators to reduce cost and time to market through optimization and process improvements.

Conference Overview

With a program designed to examine the key business and technical issues impacting the industry, The Battery Show and Electric & Hybrid Vehicle Technology Conferences provided three parallel tracks, offering commercial, regulatory, safety, technological, stationary energy storage and next-generation battery R&D perspectives. Conference highlights included:

Over 360 delegates attended the opening morning keynote session, out of the 573 in attendance overall.

Content went from strength to strength, with participation from Dell, EnerSys, Saft, UL Navitas, Continental, Bosch, Parker Hannifin, Wrightbus and more.

Attendance participation from OEMs included BMW Group, Nova Bus, Allison Transmission, U.S. Environmental Protection Agency, and Continental.

The Solid-State Breakthrough: It was standing room only on day two, track two, as speakers, from Toyota, Google, Samsung and Intel provided a brief history of the technology, the current status and breakthroughs required to achieve large-scale commercialization. "The distinguished panel delivered a great session," said moderator **Jeff Sakamoto** of the University of Michigan.

Dedicated sessions on the grid, focused on designing, testing and ensuring the safety of stationary storage systems. In-depth discussions across a variety of issues included battery markets, applications, manufacturing and materials.

Leading executives from Saft, Novabus, Wrightbus, New Flyer Industries and RATP discussed the strategies and enabling technologies for electric and hybrid buses.

In-depth discussions across a variety of market and engineering issues, included regulatory drivers on design and technology selection, and focus sessions on heavy-duty/transport and off-highway sectors.

Speakers from GM, Argonne National Laboratory, Sion Power Corp. and Joint Center for Energy Storage Research discussed the impact of advanced Li-ion used in EV applications.

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CONFERENCE PROGRAMS

TRACK 1:

Battery R&D

TRACK 2:

Battery Manufacturing

TRACK 3:

Battery Applications

SYMPOSIUM 1:

Battery Safety

SYMPOSIUM 2:

Fuel Cells

PLENARY KEYNOTES



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U.S. BATTERY AND FUEL CELL PATENTS

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U.S. 9,120,087 (20150901), Catalyst for fuel cell, method for preparing the same, and membrane-electrode assembly and fuel cell system comprising same, Myoung-Ki Min, Chan-Hee Park, Hye-A Kim, Chan Kwak, Ho-Jin Kweon, and Hasuck Kim, Samsung SDI Co., Ltd. (KR) and Hasuck Kim (KR).

U.S. 9,120,121 (20150901), Liquid composite compositions using non-volatile liquids and nanoparticles and uses thereof, Seth A. Miller, eSionic Corp.

U.S. 9,120,382 (20150901), Traction battery discharge control, John Paul Gibeau, Ford Global Technologies, LLC.

U.S. 9,120,390 (20150901), Apparatus for transferring energy using onboard power electronics and method of manufacturing same, Robert Dean King and Robert Louis Steigerwald, General Electric Co.

U.S. 9,120,394 (20150901), Battery heating circuits and methods based on battery discharging and charging using resonance components in series and multiple charge storage components, Wenhui Xu, Yaochuan Han, Wei Feng, Qinyao Yang, Wenjin Xia, Shibin Ma, and Xianyin Li, BYD Co. Ltd. (CN).

U.S. 9,120,683 (20150901), Method and device using a ceramic bond material for bonding metallic interconnect to ceramic electrode, Jean Yamanis, Dustin Frame, Lei Chen, and Ellen Y. Sun, Ballard Power Systems Inc. (CA).

U.S. 9,120,725 (20150901), Aromatic perfluoroalkane monomer, Milan Fedurco, Compagnie Generale des Etablissements Michelin (Fr) and Michelin Recherche et Technique SA (Ch).

U.S. 9,120,730 (20150901), Surface modified material, sulfonimide compound for surface modification, and fuel cell, Akihiro Shinohara and Naoki Hasegawa, Kabushiki Kaisha Toyota Chuo Kenkyusho (JP).

U.S. 9,121,002 (20150901), Enzymatic modifications of a cellular monolithic carbon and uses thereof, Nicolas Mano, Victoria Flexer, Nicolas Brun, and Rénal Backov, Centre National de la Recherche Scientifique (FR).

U.S. 9,121,643 (20150901), Heat exchanger, Bernd Schaefer and Markus Wesner, MAHLE Behr GmbH & Co. KG (DE).

U.S. 9,121,907 (20150901), Switch failure detection device, battery pack including the same, and method of detecting failure of electronic switch, Takeyuki Shiraiishi and Takeshi Itagaki, GS Yuasa International Ltd. (JP).

U.S. 9,121,909 (20150901), Method for estimating state-of-charge of lithium ion battery, Fei Liu, Xusong Ruan, and Feng Wen, Huizhou Epower Electronics Co., Ltd. (CN).

U.S. 9,121,910 (20150901), Method and circuitry to adaptively charge a battery/cell using the state of health thereof, Nadim Maluf, Dania Ghantous, Fred Berkowitz, and Christina Peabody, Qnovo Inc.

U.S. 9,121,911 (20150901), Degradation determination device and degradation determination method for lithium ion secondary battery, Kenji Takahashi, Yuji Nishi, Shuji Tomura, Nobuyasu Haga, and Tetsuya Fuchimoto, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,123,475 (20150901), Electric storage device provided with current collecting member, and method for manufacturing current collecting member, Masakazu Tsutsumi, Motoki Hoshino, Jun Nakamura, Shinsuke Yoshitake, Takeshi Sasaki, and Akihiko

Miyazaki, GS Yuasa International Ltd. (JP).

U.S. 9,123,476 (20150901), Tab lead and method of producing the same, Hiroshi Hata and Takurou Watanabe, Showa Denko Packaging Co., Ltd. (JP).

U.S. 9,123,477 (20150901), Ultracapacitors employing phase change materials, Ezekiel Kruglick, Empire Technology Development LLC.

U.S. 9,123,916 (20150901), Rechargeable battery, Jae-Wook Lee, Young-Kee Shin, Yong-Sam Kim, and Yong-Woo Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,917 (20150901), Flat tubular or plate type solid oxide fuel cell, Ji-Haeng Yu, Hee-Lak Lee, In-Sub Han, Doo-Won Seo, Kee-Seog Hong, Se-Young Kim, Sang-Kuk Woo, and Sun-Dong Kim, Korea Institute of Energy Research (KR).

U.S. 9,123,918 (20150901), Electric storage device, Masakazu Tsutsumi and Jun Nakamura, GS Yuasa International Ltd. (JP).

U.S. 9,123,919 (20150901), Rechargeable battery and heat treatment device, Ji-Won Yun, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,920 (20150901), Fuel cell separator material, fuel cell separator using same, and fuel cell stack, Yoshitaka Shibuya, JX Nippon Mining & Metals Corp. (JP).

U.S. 9,123,921 (20150901), Hydrolytically-stable hydrophilic coatings for PEMFC bipolar plate, Richard H. Blunk, Feng Zhong, and Darren R. Dunphy, GM Global Technology Operations LLC.

U.S. 9,123,922 (20150901), Lithium ion battery exterior material, Masayoshi Suzuta, Takashi Jikumaru, and Hidenori Echizen, Toppan Printing Co., Ltd. (JP).

U.S. 9,123,923 (20150901), Use of porous membrane and composite membrane thereof in redox flow energy storage battery, Huamin Zhang, Xianfeng Li, Hongzhang Zhang, and Dingqin Shi, Dalian Institute of Chemical Physics, Chinese Academy of Sciences (CN).

U.S. 9,123,924 (20150901), Battery core and method of manufacturing the same, Ming-Lung Chen, Chien-Ming Chen, Ching-Chou Yu, and Sheng-Fu Wen, AU Optronics Corp. (TW).

U.S. 9,123,926 (20150901), Secondary battery with terminal plate, Tae Won Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,927 (20150901), Secondary battery, Dukjung Kim and Minhyung Guen, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,123,928 (20150901), Method for doping and dedoping lithium into and from negative electrode and method for producing negative electrode for lithium secondary battery, Jiro Iriyama, Tetsuya Kajita, Daisuke Kawasaki, and Tatsuji Numata, NEC Corp. (JP).

U.S. 9,123,929 (20150901), Secondary battery, Chang-Bum Ahn, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,930 (20150901), Dual glass to metal seal cell, Gary Freitag, Greatbatch Ltd.

U.S. 9,123,931 (20150901), Redox flow batteries based on supporting solutions containing chloride, Liyu Li, Soowhan Kim, Zhenguo Yang, Wei Wang, Zimin Nie, Baowei Chen, Jianlu Zhang, and Guanguang Xia, Battelle Memorial Institute.

U.S. 9,123,932 (20150901), Nanofiber supported catalysts as membrane additives for improved fuel cell durability, Ruichun Jiang, Zhiqiang Yu, and Junliang Zhang, GM Global Technology Operations LLC.

U.S. 9,123,933 (20150901), Rechargeable battery pack, Bo-Hyun Byun, Ho-Jae Cho, and Yeong-Mi Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,936 (20150901), Solid oxide fuel cell apparatus, Chie Hayashi, Hiroya Ishikawa, Keizo Furusaki, Yasuo Okuyama, Yusuke Todo, and Daisuke Komatsu, NGK Spark Plug Co., Ltd. (JP).

U.S. 9,123,937 (20150901), Solid oxide fuel cell device, Alan Devoe and Lambert Devoe.

U.S. 9,123,938 (20150901), Nonaqueous-electrolyte battery, Hideki Sasaki and Toru Kojima, Hitachi Automotive Systems, Ltd. (JP).

U.S. 9,123,939 (20150901), Anodes including mesoporous hollow silicon particles and a method for synthesizing mesoporous hollow silicon particles, Qiangfeng Xiao and Mei Cai, GM Global Technology Operations LLC.

U.S. 9,123,940 (20150901), Coating liquid, coating liquid for manufacturing electrode plate, undercoating agent, and use thereof, Takanori Sannan, Shinya Tsuchida, Nobuyuki Kobayashi, and Shinichiro Aoyagi, Dainichiseika Color & Chemicals Mfg Co., Ltd. (JP).

U.S. 9,123,941 (20150901), Protected active metal electrode and battery cell structures with non-aqueous interlayer architecture, Steven J. Visco, Bruce D. Katz, Yevgeniy S. Nimon, and Lutgard C. De Jonghe, PolyPlus Battery Co.

U.S. 9,123,942 (20150901), Method for making separator of lithium ion battery, Xiang-Ming He, Wei-Hua Pu, Li-Chun Zhang, Jian-Guo Ren, Jian-Jun Li, and Jian Gao, Tsinghua University (CN) and Hon Hai Precision Industry Co., Ltd. (TW).

U.S. 9,123,943 (20150901), Synthesis of electroactive ionic liquids for flow battery applications, Travis Mark Anderson, David Ingersoll, Chad Staiger, and Harry Pratt, Sandia Corp.

U.S. 9,123,944 (20150901), Battery cover assembly, Patrick Daniel Maguire, Ford Global Technologies, LLC.

U.S. 9,123,945 (20150901), Fuel cell with electrolyte electrode assembly projections forming reactant gas channel, Hiroshi Ichikawa, Honda Motor Co., Ltd. (JP).

U.S. 9,123,946 (20150901), Fuel cell stack, Hiroki Homma, Honda Motor Co., Ltd. (JP).

U.S. 9,123,947 (20150901), Secondary battery, Chiyoung Lee, Seokyeon Yoo, Yoontai Kwak, Dongwook Kim, Jongseok Moon, and Tatsuya Hashimoto, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,123,948 (20150901), Secondary battery, Chan-Seok Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,949 (20150901), Battery module and battery cell, Sung Kyun Chang, Juil Yum, and Heekook Yang, LG Chem, Ltd. (KR).

U.S. 9,123,950 (20150901), Battery module and battery cell, Sung Kyun Chang, Juil Yum, and Heekook Yang, LG Chem, Ltd. (KR).

U.S. 9,123,951 (20150901), Secondary battery pack having excellent energy density and PCM assembly therefor, Ju-Hwan Baek, Ki Eob Moon, Soonkwang Jung, and Sukjin Song, LG Chem, Ltd. (KR).

U.S. 9,123,952 (20150901), Negative electrode active material, method of preparing the same, negative electrode and lithium secondary battery employing the electrode including the negative electrode active material, Deok-Hyun Kim, Jae-Myung Kim, Kyu-Nam Joo, Soon-Sung Suh, and Yeon-Gap Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,953 (20150901), Method for modifying positive electrode materials for lithium-ion batteries, Jianhong Liu, Dayong Gui, Qianling Zhang, Chuanxin He, and Caizhen Zhu, Shen Zhen University (CN).

U.S. 9,123,954 (20150901), Three-dimensional microbattery having a porous silicon anode, Menachem Nathan, Ramot at Tel Aviv University Ltd. (IL).

U.S. 9,123,955 (20150901), Negative active material, lithium battery including the material, and method for manufacturing the material, Seung-Uk Kwon, Sung-Hwan Moon, Chun-Gyoo Lee, Jae-Hyuk Kim, Soon-Sung Suh, Chang-Ui Jeong, Yo-Han Park, Yury Matulevich, and Jong-Seo Choi, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,956 (20150901), Cell barrier for secondary battery module and secondary battery module, Tae-Yong Kim, Yoon-Cheol Jeon, Gun-Goo Lee, and Soo-Seok Choi, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,957 (20150901), Rechargeable lithium battery, Seon-Hye Kim, Won-Il Jung, and Yong-Chul Park, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,958 (20150901), Cathode active material for lithium secondary battery, Sung-Kyun Chang, Hyelim Jeon, Hong Kyu Park, Sang Uck Lee, and Cheol-Hee Park, LG Chem, Ltd. (KR).

U.S. 9,123,959 (20150901), High energy cathode material, Bin Li, Marissa Caldwell, Wei Tong, Steven Kaye, and Vinay Bhat, Wildcat Discovery Technologies, Inc.

U.S. 9,123,960 (20150901), Solid-state electrolyte battery and cathode activating substance, Yuichi Sabi, Sony Corp. (JP).

U.S. 9,123,961 (20150901), Three-dimensional net-like aluminum porous body, electrode using the aluminum porous body, nonaqueous electrolyte battery using the electrode, and nonaqueous electrolyte capacitor using the electrode, Nobuhiro Ota, Akihisa Hosoe, Masatoshi Majima, Koji Nitta, Hajime Ota, Kazuki Okuno, Koutaro Kimura, Kengo Goto, and Junichi Nishimura, Sumitomo Electric Industries, Ltd. (JP) and Sumitomo Electric Toyama Co., Ltd. (JP).

U.S. 9,123,962 (20150901), Flow battery having electrodes with a plurality of different pore sizes and or different layers, Rachid Zaffou, Michael L. Perry, Arun Pandey, Sergei F. Burlatsky, and Vadim Atrazhev, United Technologies Corp.

U.S. 9,123,963 (20150901), Direct coated membrane electrode assembly on external reinforcement for fuel cells, Ruichun Jiang, Matthew Dioguardi, Scott C. Moose, Craig Gittleman, John P. Healy, and Bradley M. Houghtaling, GM Global Technology Operations LLC.

U.S. 9,123,964 (20150901), Fuel cell electrode and production process thereof, Keiko Waki, Masashi Takano, and Kunchan Lee, Tokyo Institute of Technology (JP) and Showa Denko KK (JP).

U.S. 9,123,965 (20150901), Method of preparing nano-sized catalyst on carbon support, Nak Hyun Kwon, Inchul Hwang, Jae Seung Lee, Yung-Eun Sung, Tae-Yeol Jeon, Sung Jong Yoo, Kug-Seung Lee, and Yong-Hun Cho, Hyundai Motor Co. (KR) and SNU R&DB Foundation (KR).

U.S. 9,123,966 (20150901), Stabilization of battery electrodes using prussian blue analogue coatings, Colin Deane Wessells and Robert Alan Huggins, Alveo Energy, Inc.

U.S. 9,123,967 (20150901), Stepped electrode assembly having predetermined a reversible capacitance ratio in the interface between electrode units, battery cell and device comprising the same, Sung-Jin Kwon, Soon-Ho Ahn, Dong-Myung Kim, Ki-Woong Kim, Young-Hoon Kim, Sung-Han Yoon, and Seung-Min Ryu, LG Chem, Ltd. (KR).

U.S. 9,123,968 (20150901), Lithium ion-sulfur battery and electrode for the same, Hee Yeon Ryu and Sam Ick Son, Hyundai Motor Co. (KR) and Kia Motors Corp. (KR).

U.S. 9,123,969 (20150901), Electric vehicle propulsion system and method utilizing solid-state rechargeable electrochemical cells, Ann Marie Sastry, Fabio Albano, Chia-Wei Wang, Robert Kruse, and Jeffrey Lebrun, Sakti3, Inc.

U.S. 9,123,970 (20150901), Lithium battery binder composition, method for preparing the same and lithium battery including the same, Young-Gi Lee, Kwang Man Kim, Kunyoung Kang, and Dong Ok Shin, Electronics and Telecommunications Research Institute (KR).

U.S. 9,123,971 (20150901), Secondary battery, Midori Shimura, Daisuke Kawasaki, Masahiro Suguro, Yoko Hashizume, and Kazuaki Matsumoto, NEC Corp. (JP).

U.S. 9,123,972 (20150901), Ionic liquid electrolytes comprising an anionic surfactant and electrochemical devices such as accumulators comprising them, Nelly Giroud, Eric Chainet, and Hélène Rouault, Commissariat à l'énergie atomique et aux énergies alternatives (FR) and Centre National de la Recherche Scientifique (FR).

U.S. 9,123,973 (20150901), Electrolyte for lithium secondary battery and lithium secondary battery comprising the same, Bora Lee, Yongbeom Lee, Sinyoung Park, and Sunyoung Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,123,974 (20150901), Li-ion battery with load leveler, John F. Christensen, Boris Kozinsky, Jasim Ahmed, and Nalin Chaturvedi, Robert Bosch GmbH (DE).

U.S. 9,123,975 (20150901), Lithium-sulphur battery with high specific energy, Vladimir Kolosnitsyn and Elena Karaseva, Oxis Energy Ltd. (GB).

U.S. 9,123,976 (20150901), Catalyst including active particles, method of preparing the catalyst, fuel cell including the catalyst, electrode including the active particles for lithium air battery, and lithium air battery including the electrode, Seon-ah Jin, Chan-ho Pak, Kang-hee Lee, and Kyung-jung Kwon, Samsung Electronics Co., Ltd. (KR).

U.S. 9,123,977 (20150901), Charge stop point detecting method, charge stop point detecting device, and a battery pack, Toru Nishikawa and Shinichi Matsuura, SANYO Electric Co., Ltd. (JP).

U.S. 9,123,978 (20150901), Method and device for extending the lifetime of a battery in particular of a vehicle, Jochen Langheim, STMicroelectronics SA (FR).

U.S. 9,124,102 (20150901), Battery system, Tetsuro Shigemizu, Mitsubishi Heavy Industries, Ltd. (JP).

U.S. 9,124,131 (20150901), Dynamic control of the power sourcing capability of a power source, Frederick L. Martin and Edgar H. Callaway Jr., Sunrise Micro Devices, Inc.

U.S. 9,124,192 (20150901), Fuel cell system having a converter which increases an output voltage of a fuel cell, Tomohiko Kaneko, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,126,844 (20150908), Electrode materials for rechargeable battery, Christopher Johnson, UChicago Argonne, LLC.

U.S. 9,126,845 (20150908), Lithium secondary battery, Hiroki Nagai, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,126,847 (20150908), Lithium titanate, electrode active material and electricity storage device each comprising the same, Nariaki Moriyama, Masatoshi Honma, Kazuyoshi Takeshima, Yusuke Okuda, and Naoya Nagahashi, Ishihara Sangyo Kaisha, Ltd. (JP).

U.S. 9,126,893 (20150908), Electrochemical cells, and gas sensor and fuel cell devices comprising same, Andreas Röhr, Honeywell International Inc.

U.S. 9,126,894 (20150908), Electrochemical cells, and gas sensor and fuel cell devices comprising same, Andreas Röhr, Honeywell International Inc.

U.S. 9,126,907 (20150908), Sulphur-containing and sulphonated aromatic perfluoroalkane monomer, Milan Fedurco, Compagnie Generale des Etablissements Michelin (FR) and Michelin Recherche et Technique SA (CH).

U.S. 9,126,908 (20150908), Aromatic sulfonic acid derivative, sulfonic acid group-containing polymer, block copolymer, polymer electrolyte material, polymer electrolyte form article, and polymer electrolyte fuel cell, Daisuke Izuhara, Hiroaki Umeda, Emi Amano, and Tomoyuki Kunita, Toray Industries, Inc. (JP).

U.S. 9,127,023 (20150908), Electrolyte additive and electrolyte including same and rechargeable lithium battery including electrolyte, Vladimir Egorov, Woo-Cheol Shin, Denis Chernyshov, Makhmut Khasanov, Pavel Shatunov, and Alexey Tereshchenko, Samsung SDI Co., Ltd. (KR).

U.S. 9,127,182 (20150908), Polymer dispersion and electrocatalyst ink, Dharshini Chryshantha Fongalland, Pamela Kapila, Chandresh Nemchand Malde, and Michael Ian Petch, Johnson Matthey Fuel Cells Ltd. (GB).

U.S. 9,127,344 (20150908), Thermal evaporation process for manufacture of solid state battery devices, Myoungdo Chung, Hyoncheol Kim, Ann Marie Sastry, and Marc Langlois, Sakti3, Inc.

U.S. 9,127,973 (20150908), Validation method for pressure sensor signal at electrical controlled high pressure gas storage systems, Oliver Maier and Markus Noll, GM Global Technology Operations LLC.

U.S. 9,128,159 (20150908), Plug-in charge capacity estimation method for lithium ironphosphate batteries, Christopher W. Mousseau, Michael Wahlstrom, and Zachary D. Bylisma, GM Global Technology Operations LLC.

U.S. 9,128,161 (20150908), Voltage monitoring device, Hayato

Mizoguchi, Yasuhiro Kamiya, and Takumi Shimizu, DENSO Corp. (JP).

U.S. 9,128,162 (20150908), Estimating state of charge (SOC) and uncertainty from relaxing voltage measurements in a battery, Thomas C. Greening, Jeffrey G. Koller, Nils E. Mattisson, and P. Jeffrey Ungar, Apple Inc.

U.S. 9,128,163 (20150908), Voltage measuring apparatus for plural battery, Satoshi Ishikawa and Masashi Sekizaki, Yazaki Corp. (JP).

U.S. 9,128,164 (20150908), Battery monitoring apparatus, Tomomichi Mizoguchi, DENSO Corp. (JP).

U.S. 9,128,165 (20150908), Battery cell impedance measurement method and apparatus, Matheus Johannes Gerardus Lammers, Datang NXP Semiconductors Co., Ltd. (CN).

U.S. 9,128,166 (20150908), Secondary battery tester, secondary battery testing method, and manufacturing method of secondary battery, Tomomi Akutsu, Daisuke Yamazaki, Nobuhiro Tomosada, Atsufumi Kimura, Makoto Kawano, Souichirou Torai, and Tetsuo Yano, Yokogawa Electric Corp. (JP).

U.S. 9,129,754 (20150908), Electrode for power storage device and power storage device, Kazutaka Kuriki, Mikio Yukawa, and Nobuhiro Inoue, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 9,129,756 (20150908), Composite electrode for lithium ion capacitor, Kishor Purushottam Gadkaree and Xiaorong Liu, Corning Inc.

U.S. 9,130,198 (20150908), Compliant seal structures for protected active metal anodes, Steven J. Visco, Yevgeniy S. Nimon, Lutgard De Jonghe, Bruce D. Katz, and Alexei Petrov, PolyPlus Battery Co.

U.S. 9,130,199 (20150908), Stainless steel for fuel cell having good corrosion resistance and method for producing the same, Shinsuke Ide, Tomohiro Ishii, Naoki Nishiyama, Shin Ishikawa, Takumi Ujio, and Noriko Makiishi, JFE Steel Corp. (JP).

U.S. 9,130,200 (20150908), Polymer fused batteries, Richard Anthony Dipietro, Thomas J. Fleischman, Richard Hutzler, Keith Brian Maddern, and William Maurice Smith Jr., International Business Machines Corp.

U.S. 9,130,201 (20150908), Conductive and hydrophilic surface modification of fuel cell bipolar plate, Richard H. Blunk, Ping Liu, Sky Leigh Van Atta, and Kevin W. Kirby, GM Global Technology Operations LLC.

U.S. 9,130,202 (20150908), Method for controlling fuel cell system with in-stop-mode power generating process and startup process, Yuji Matsumoto and Chihiro Wake, Honda Motor Co., Ltd. (JP).

U.S. 9,130,203 (20150908), Lithium ion battery of crimping shape of increased safety, Sungjong Kim, Jaehan Jung, Bong Tae Kim, and Hong-Jeong Kim, LG Chem, Ltd. (KR).

U.S. 9,130,204 (20150908), System for drying the exhaust gases from a fuel cell system using the existing liquid hydrogen as a heat sink, Claus Hoffmann and Johannes Lauckner, Airbus Operations GmbH (DE).

U.S. 9,130,205 (20150908), Controlling PEM fuel cell voltage during power transitions and idling, Carl A. Reiser, Audi AG (DE).

U.S. 9,130,206 (20150908), Method for manufacturing resin-framed membrane electrode assembly for fuel cell, Hiroshi Sohma, Naoki Mitsuta, and Yukihiro Tanaka, Honda Motor Co., Ltd. (JP).

U.S. 9,130,208 (20150908), Membrane electrode assemblies and fuel cells with long lifetime, Oliver Gronwald, BASF SE (DE).

U.S. 9,130,209 (20150908), Electric storage apparatus including inter-electric storage device air passages between electric storage devices and air vent portion formed at end of electric storage devices, Seiji Nemoto, Minoru Watanabe, and Yoshihiro Masuda, GS Yuasa International Ltd. (JP).

U.S. 9,130,210 (20150908), Battery pack, Karuki Hamada, Tadashi Shoji, Yukari Tadokoro, and Taichi Oyama, Nissan Motor Co., Ltd. (JP).

U.S. 9,130,212 (20150908), Positive electrode active material for nonaqueous electrolyte secondary batteries, method for manufacturing the same, and nonaqueous electrolyte secondary battery using said positive electrode active material, Rei Kokado and Kensaku Mori, Sumitomo Metal Winning Co., Ltd. (JP).

U.S. 9,130,213 (20150908), Compositions and methods for manufacturing a cathode for a secondary battery, Dong Gun Kim, Sa Heum Kim, Young Jun Kim, Jun Ho Song, Woo Suk Cho, Jeom Soo Kim, and Sang Min Kim, Hyundai Motor Co. (KR) and Korea Electronics Technology Institute (KR).

U.S. 9,130,214 (20150908), Electrode material for lithium secondary battery, method for producing the same, and lithium secondary battery including the same, Hiroaki Wakayama, Hiroaki Yonekura, and Yasuaki Kawai, Kabushiki Kaisha Toyota Chuo Kenkyusho (JP).

U.S. 9,130,215 (20150908), Separator, method for producing the same and electrochemical device including the same, Jeong-Min Ha, No-Ma Kim, Byeong-Gyu Cho, Kee-Young Kim, and Sun-Mi Jin, LG Chem, Ltd. (KR).

U.S. 9,130,217 (20150908), Fluidic architecture for metal-halogen flow battery, Russell Cole, Rick Winter, Jonathan Hall, Pallavi Pharkya, Gerardo Jose la O', Lauren Wessel Hart, Paul Kreiner, and Peter Tennessen, Primus Power Corp.

U.S. 9,130,218 (20150908), Hybrid energy storage systems utilizing redox active organic compounds, Wei Wang, Wu Xu, Liyu Li, and Zhenguo Yang, Battelle Memorial Institute.

U.S. 9,130,219 (20150908), Method of making redox materials for solid oxide redox flow battery, Kevin Huang and Xue Li, University of South Carolina.

U.S. 9,130,220 (20150908), Power source apparatus

equipped with a service plug and vehicle carrying that power source apparatus, Wataru Okada, Shinsuke Nakamura, Akinobu Wakabayashi, and Tomoyuki Ohmura, SANYO Electric Co., Ltd. (JP).

U.S. 9,130,221 (20150908), Squeeze pin and secondary battery using the same, Bum-Kuk Choi, Samsung Sdi Co., Ltd. (KR).

U.S. 9,130,222 (20150908), Hydrazine fixing detection system, Koichiro Asazawa, Koji Yamada, and Hirohisa Tanaka, Daihatsu Motor Co., Ltd. (JP).

U.S. 9,130,223 (20150908), Mandrel for electrode assemblies, Jay T. Rassat, Michael J. Nidelkoff, Jeffrey J. Clayton, Seth M. Humphrys, Paul B. Aamodt, and Steven J. May, Medtronic, Inc.

U.S. 9,130,224 (20150908), Battery pack and method of manufacturing battery pack, Seongjoon Lee and Youngho Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,130,225 (20150908), Seawater battery of dissolved oxygen type, Gongquan Sun, Erdong Wang, and Shaohua Yang, Dalian Institute of Chemical Physics, Chinese Academy of Sciences (CN).

U.S. 9,130,226 (20150908), Surface stabilized electrodes for lithium batteries, Michael M. Thackeray, Sun-Ho Kang, and Christopher S. Johnson, UChicago Argonne, LLC.

U.S. 9,130,227 (20150908), Photonic crystal electrical property indicator, Andre Arsenault and Geoffrey Alan Ozin, Opalux Inc. (CA).

U.S. 9,130,228 (20150908), Lithium ion oxygen battery, Takuya Taniuchi, Kiyoshi Tanaami, Hiroshi Sakai, Mao Hori, and Yuji Isogai, Honda Motor Co., Ltd. (JP).

U.S. 9,130,229 (20150908), Carbon fluoride cathodes and batteries made therefrom, Kaimin Chen, Parthasarathy M Gomadam, and Gaurav Jain, Medtronic, Inc.

U.S. 9,130,230 (20150908), Negative electrode active material

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with improved safety, and secondary battery comprising same, Do Young Seung, Sang Ick Lee, Tae Hyun Jeon, Ki Joo Hong, Ung Ju Lee, and Dong Shin Kim, GS Caltex Corp. (KR).

U.S. 9,130,231 (20150908), Lithium ion battery, Ion C. Halalay, Stephen J. Harris, and Timothy J. Fuller, GM Global Technology Operations LLC.

U.S. 9,130,232 (20150908), Battery grids and methods for manufacturing same, Richard R. Binder, Johnson Controls Technology Co.

U.S. 9,130,234 (20150908), Stabilization of battery electrodes, Colin Deane Wessells and Robert Alan Huggins, Alveo Energy Inc.

U.S. 9,130,235 (20150908), Cable-type secondary battery capable of wireless charge, Yo-Han Kwon, Hye-Ran Jung, Sang-Wook Woo, and Je-Young Kim, LG Chem, Ltd. (KR).

U.S. 9,130,236 (20150908), Electrode for secondary battery, preparation thereof, and secondary battery and cable-type secondary battery comprising the same, Yo-Han Kwon, Hye-Ran Jung, Eun-Kyung Kim, Je-Young Kim, In-Chul Kim, and Hyo-Mi Kim, LG Chem, Ltd. (KR).

U.S. 9,130,237 (20150908), Restrained battery module made up of cells having rolled electrode bodies, and method of making the same, Akira Kuroda and Sachio Takeda, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,130,238 (20150908), Methods of and hybrid factories for thin-film battery manufacturing, Byung-Sung Kwak, Stefan Bangert, Dieter Haas, and Omkaram Nalamasu, Applied Materials, Inc.

U.S. 9,130,240 (20150908), Ionic liquid, lithium secondary battery electrolyte comprising the ionic liquid, and lithium secondary battery comprising the electrolyte, Fabio Rosciano, Thierry Verbiest, Guy Koeckelberghs, and Lieven De Cremer, Toyota Jidosha Kabushiki Kaisha (JP) and Katholieke Universiteit Leuven (BE).

U.S. 9,130,241 (20150908), Lithium batteries using poly(ethylene oxide)-based nonaqueous electrolytes, Zonghai Chen and Khalil Amine, UChicago Argonne, LLC.

U.S. 9,130,242 (20150908), Gel polymer electrolyte composition, gel polymer electrolyte and electrochemical device comprising the same, Jong-Ho Jeon, Soo-Hyun Ha, and Jeong-Ju Cho, LG Chem, Ltd. (KR).

U.S. 9,130,243 (20150908), Non-aqueous electrolytic solution and lithium secondary battery, Hidenobu Nogi and Akio Hiwara, Mitsui Chemicals, Inc. (JP).

U.S. 9,130,244 (20150908), Nonaqueous electrolyte solution and electrochemical element using same, Koji Abe, Shoji Shikita, Kazuyuki Kawabe, Masahide Kondo, and Tatsuo Fujino, Ube Industries, Ltd. (JP).

U.S. 9,130,245 (20150908), Nonaqueous secondary battery and flame retardant for use in the same, Hisayuki Utsumi, Sharp Kabushiki Kaisha (JP).

U.S. 9,130,246 (20150908), Rechargeable lithium battery having lithium difluorophosphate and a sultone-based compound, Su-Hee Han, Young-Gyu Kim, and Byung-Hwa Kim, Samsung SDI Co., Ltd. (KR) and PANAX ETEC Co., Ltd. (KR).

U.S. 9,130,247 (20150908), Cable-type secondary battery and preparation thereof, Yo-Han Kwon, Byung-Hun Oh, Hye-Ran Jung, and Je-Young Kim, LG Chem, Ltd. (KR).

U.S. 9,130,248 (20150908), Modeling changes in the state-of-charge open circuit voltage curve by using regressed parameters in a reduced order physics based model, Patricia M. Laskowsky, Brian J. Koch, Damon R. Frisch, Ramesh Rebba, and Kurt M. Johnson, GM Global Technology Operations LLC.

U.S. 9,130,249 (20150908), Battery cell design and method of cooling battery cells, Badri Narayan Ramamurthi, Satoshi Atsuchi, Andrey I. Meshkov, Mohamed Rahmane, and Svetlana Selezneva, General Electric Co.

U.S. 9,130,377 (20150908), System and method for battery pack management using predictive balancing, Yevgen Pavlovich

Barsukov, Yandong Zhang, Jason M Battle, and Konstantin Galburt, Texas Instruments Inc.

U.S. 9,130,378 (20150908), Systems and methods for balancing battery cells, William Densham, Constantin Bucur, Flavius Lupu, Jiun Heng Goh, and Stefan Maireanu, O2Micro, Inc.

U.S. 9,130,381 (20150908), Systems and methods for identifying and monitoring a battery charger, Guoxing Li and Xiaofei Gong, O2Micro, Inc.

U.S. 9,130,391 (20150908), Charge balancing system for batteries, Laurent Garnier, Daniel Chatroux, and Matthieu Desbois-Renaudin, Commissariat a l'energie atomique et aux energies alternatives (FR).

U.S. 9,130,405 (20150908), Secure battery element, Daniel Chatroux, Jeremy Dupont, and Sebastien Carcouet, Commissariat a l'energie atomique et aux energies alternatives, Paris (FR).

U.S. 9,132,465 (20150915), System for manufacturing membrane electrode assembly of fuel cell stack, Hee Dong Son and Joo Ok Park, Hyundai Motor Co. (KR).

U.S. 9,136,032 (20150915), Cathode material, Yuji Isogai, Shintaro Aoyagi, and Kaoru Omichi, Honda Motor Co., Ltd. (JP).

U.S. 9,136,034 (20150915), Polymer electrolyte membrane for a fuel cell, and method for preparing same, Moo-Seok Lee, Yong-Cheol Shin, Jae Hee Ryu, Na Young Kim, Kyoung-Ju Kim, Chul Ki Kim, Yong Hwan Lee, and Yun Kyung Kang, Kolon Industries, Inc. (KR) and Kolon Fashion Material, Inc. (KR).

U.S. 9,136,039 (20150915), Cell connector, Armin Diez, Hubertus Goesmann, Axelle Hauck, and Christian Zachar, ElringKlinger AG (DE) and Bayerische Motoren Werke Aktiengesellschaft (DE).

U.S. 9,136,062 (20150915), Method for sealing an impregnation opening of an energy storage assembly, Erwan Vigneras, Blue Solutions (FR).

U.S. 9,136,063 (20150915), Vent assemblies for electrochemical double-layer capacitors, Todd Marshall Wetherill, Corning Inc.

U.S. 9,136,064 (20150915), Carbon for high voltage EDLCs, Kishor Purushottam Gadkaree, Andrew Fleitz Husted, and Xiaorong Liu, Corning Inc.

U.S. 9,136,065 (20150915), Diatomaceous energy storage devices, Vera N. Lockett, John G. Gustafson, Mark D. Lowenthal, and William J. Ray, NthDegree Technologies Worldwide Inc.

U.S. 9,136,066 (20150915), Method for assembling a hybrid lithium supercapacitor, Meriem Anouti, Daniel Lemordant, Grzegorz Lota, Celine Moeza-Decaux, Encarnacion Raymundo-Pinero, Francois Beguin, and Philippe Azais, Blue Solutions (FR) and Centre National de la Recherche Scientifique (FR).

U.S. 9,136,507 (20150915), Can and lithium secondary battery using the same, Sang-Woo Lee, Min-Ho Song, and Kwang-Su Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,508 (20150915), Secondary battery with enhanced contact resistance, Seong-Yong Kim, Ji-Hyun Kim, and Han-Ho Lee, LG Chem, Ltd. (KR).

U.S. 9,136,509 (20150915), Battery cell with an integrated pouch metal foil terminal, Ching Yu John Tam and Craig C. Birrell, Apple Inc.

U.S. 9,136,510 (20150915), Sealing and folding battery packs, Christopher M. Werner, Apple Inc.

U.S. 9,136,511 (20150915), Battery pack, Ki-Sung Hong and Seung-II Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,512 (20150915), Battery pack having parallel connector, Youngbae Song, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,513 (20150915), Battery pack, Taeyong Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,515 (20150915), Heat-resistant microporous film and battery separator, Akiko Kakibe, Sung-kil Lee, and Kazuhiro Okamoto, Sony Corp. (JP).

U.S. 9,136,516 (20150915), Hybrid materials using ionic particles, Jason Fang, Li-Duan Tsai, Yueh-Wei Lin, and Cheng-Liang Cheng, Industrial Technology Research Institute (TW).

U.S. 9,136,517 (20150915), Microporous film, process for production of the film, and use of the film, Takeshi Ishihara, Koichi Kono, Satoshi Miyaoka, and Patrick Brant, Toray Battery Separator Film Co., Ltd. (JP).

U.S. 9,136,518 (20150915), Terminal for accumulator cells, Axel Krause and Andrea Meier, BRUSA Elektronik AG (CH).

U.S. 9,136,519 (20150915), Cap assembly and battery pack having the same, Dae-Yon Moon, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,520 (20150915), Battery module, Sung-Bae Kim, Yong-Sam Kim, Dae-Won Han, Sang-Won Byun, and Byung-Kyu Ahn, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,521 (20150915), Bus bar having novel structure and battery module including the same, Jin Kyu Lee, Jun Yeob Seong, Tae Hyuck Kim, Jung Mo Kim, Myung Ki Park, and Hyung Jin Hwang, LG Chem, Ltd. (KR).

U.S. 9,136,522 (20150915), Protection circuit module and rechargeable battery including the same, Myung-Jun Lee, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,523 (20150915), Rechargeable battery, Jang-Hyun Song and Yong-Sam Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,524 (20150915), Secondary battery, Dukjung Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,525 (20150915), Negative-electrode active material, and method for production of negative-electrode active material, Hideyuki Yamamura, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,136,526 (20150915), Method of manufacturing anode active material, and anode and lithium battery using the anode active material, Sukeun Yoon, Kyung-Hee Shin, Chang soo Jin, Kyu-Nam Jung, Bum-Suk Lee, Myung-Seok Jeon, Sun-Hwa Yeon, Jae-Deok Joen, Jun-Mook Shim, Jung-Hoon Yang, and Myung-Hyun Ryu, Korea Institute of Energy Research (KR).

U.S. 9,136,527 (20150915), Electrode thin film, all-solid lithium battery, and method of manufacturing electrode film, Jun Akedo, Daniel Popovici, and Hideyuki Nagai, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,136,528 (20150915), Magnesium secondary battery, use of electrolytic solution in magnesium secondary battery and electrolytic solution for magnetic secondary battery, Yanna Nuli, Qingsong Zhao, Jun Yang, and Yongsheng Guo, Toyota Jidosha Kabushiki Kaisha (JP) and Shanghai Jiao Tong University (CN).

U.S. 9,136,529 (20150915), Method of charging and discharging a non-aqueous electrolyte secondary battery, Hideki Kitao, Yoshinori Kida, and Toyoki Fujihara, SANYO Electric Co., Ltd. (JP).

U.S. 9,136,530 (20150915), Energy storage device and manufacturing method thereof, Shunpei Yamazaki, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 9,136,531 (20150915), Positive electrode for rechargeable lithium battery, method of preparing same and rechargeable lithium battery including same, Jin-Man Jeoung, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,532 (20150915), Active material for battery, nonaqueous electrolyte battery, and battery pack, Yasuhiro Harada, Norio Takami, and Hiroki Inagaki, Kabushiki Kaisha Toshiba (JP).

U.S. 9,136,533 (20150915), Lithium nickel manganese cobalt composite oxide and lithium rechargeable battery, Ryuichi Nagase, Yoshio Kajiya, and Hiroshi Tasaki, JX Nippon Mining & Metals Corp. (JP).

U.S. 9,136,535 (20150915), Cathode active material, cathode, secondary battery and manufacturing methods for the same, Michio Ohkubo, Michihiro Shimada, Naoki Uno, Yosuke Hirayama, Toshio Tani, Hidetoshi Abe, and Miyu Aita, Furukawa Electric Co., Ltd. (JP) and The Furukawa Battery Co., Ltd. (JP).

U.S. 9,136,537 (20150915), Rechargeable lithium battery including heat-treated negative current collector, Sung-Hwan Moon, Jae-Hyuk Kim, Hee-Young Chu, and Jong-Seo Choi, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,538 (20150915), Rechargeable battery having current collection plate with protrusion, Sangwon Byun, Yongsam Kim, Sungbae Kim, Daewon Han, and Byungkyu Ahn, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,539 (20150915), Iron-air accumulator with lithium mediator, Stephane Lascaud and Philippe Stevens, Electricite de France (FR).

U.S. 9,136,540 (20150915), Metal air cathode manganese oxide contained in octahedral molecular sieve, Akshaya Kumar Padhi, Denis D. Carpenter, and Jeffrey A. Poirier, Spectrum Brands, Inc.

U.S. 9,136,541 (20150915), Process for producing fuel cell electrode catalyst, process for producing transition metal oxycarbonitride, fuel cell electrode catalyst and uses thereof, Kunchan Lee, Ryoko Konta, Masaki Horikita, Chunfu Yu, Yasuaki Wakizaka, Kenichiro Ota, Ryuji Monden, Kazunori Ichioka, Takashi Sato, and Takuya Imai, Showa Denko KK (JP).

U.S. 9,136,543 (20150915), Battery system having battery module, thermal switch, heating source and pin structure, Sang-Cheol Nam, Ho-Young Park, Young-Chang Lim, Ki-Chang Lee, Kyu-Gil Choi, Ho-Sung Hwang, Gi-Back Park, Sung-Back Cho, Seung-Ho Kang, and Hyun-Jin Ji, GS Energy Corp. (KR) and Agency for Defense Development (KR).

U.S. 9,136,544 (20150915), Dual layer solid state batteries, Lawrence W. Shacklette and Louis J. Rendek Jr., Harris Corp.

U.S. 9,136,545 (20150915), Low cost fuel cell bipolar plate and process of making the same, Gayatri Vyas Dadheech, Thomas A. Trabold, and Mahmoud H. Abd Elhamid, GM Global Technology Operations LLC.

U.S. 9,136,546 (20150915), Fuel cell stack, manufacturing method of fuel cell stack and replacement method of module as constituent of fuel cell stack, Fumishige Shizuku, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,136,547 (20150915), Fuel cell system, Toshihiko Ichinose, Dong-Rak Kim, and Hyun Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,548 (20150915), Method for operating a fuel cell and a fuel cell arrangement, Lars Johansen and Peter Jozsa Mårdberg, Volvo Technology Corp. (SE).

U.S. 9,136,549 (20150915), Fuel cell cooling system with coupling out of heat, Dirk Vollmer and Oliver Pfeil, Robert Bosch GmbH (DE).

U.S. 9,136,550 (20150915), Interpenetrating network of anion-exchange polymers, production method thereof and use of same, Philippe Stevens, Fouad Ghamouss, Odile Fichet, and Christian Sarrazin, Electricite de France (FR) and Universite de Cergy Pontoise (FR).

U.S. 9,136,551 (20150915), Sulphonate based compound, polymer electrolyte membrane comprising same and fuel cell comprising same, Hyejin Kwon, Seong Ho Choi, Min-Jong Lee, Sergey Ulyakhin, and Chong Kyu Shin, LG Chem, Ltd. (KR).

U.S. 9,136,553 (20150915), Electrolyte for cost-effective, electrolyte-supported hightemperature fuel cell having high performance and high mechanical strength, Ralph Otterstedt, Joerg Laube, Marianne Gottschling, and Michael Svec, Sunfire GmbH (DE).

U.S. 9,136,554 (20150915), Fuel cells, Kathryn Knuckey and Andrew Creeth, ACAL Energy Ltd. (GB).

U.S. 9,136,555 (20150915), Rechargeable battery, Duk-Jung Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,136,556 (20150915), Electrode assembly of novel structure and process for preparation of the same, Jihoon Cho, Dongmyung Kim, Kiwoong Kim, Sung-Min Hwang, Hyun-Chul Jung, Sungjin Kwon, Hyeong Kim, and Ki Hong Min, LG Chem, Ltd. (KR).

U.S. 9,136,557 (20150915), Semi-automatic method for manufacturing an electrochemical Li-ion battery, Michael Bouvier, Commissariat à l'énergie atomique et aux énergies alternatives (FR).

U.S. 9,136,558 (20150915), Impact resistant battery, Justin Peskar, Martin E Olson Gunderson, and Majid Entezarian, Philips Plastics Corp.

U.S. 9,136,559 (20150915), Non-aqueous electrolyte and lithium secondary battery including the same, Li-Duan Tsai, Yueh-Wei Lin, Chia-Chen Fang, Cheng-Liang Cheng, Jing-Pin Pan, and Tsung-Hsiung Wang, Industrial Technology Research Institute (TW).

U.S. 9,136,560 (20150915), Nonaqueous electrolyte solution and lithium secondary battery using same, Minoru Kotato, Kunihisa Shima, Shinichi Kinoshita, Asao Kominato, Takashi Fujii, and Teppei Yamada, Mitsubishi Chemical Corp. (JP).

U.S. 9,136,562 (20150915), Multiple electrolyte electrochemical cells, Mohit Singh, Ilan Gur, Hany Basam Eitouni, and Nitash Pervez Balsara, Seeo, Inc.

U.S. 9,136,563 (20150915), Rechargeable batteries, Martyn John Hucker, Michael Dunleavy, Amy Elizabeth Dyke, and Sajad Haq, BAE Systems Plc (GB).

U.S. 9,136,564 (20150915), Battery pack system and liquid leakage detection method thereof, Congming Yang, Zhiming Tong, and Xiang Li, Microvast Power Systems Co., Ltd. (CN).

U.S. 9,136,565 (20150915), Secondary battery, Cheol-Hong Kim, Pil-Goo Jun, and Jun-Sub Lee, Samsung SDI Co., Ltd. (KR).

U.S. 9,136,566 (20150915), Battery system, Kenji Takeda, Koichi Yokoura, and Takashi Takeuchi, Hitachi, Ltd. (JP).

U.S. 9,136,567 (20150915), Chuck mechanism of charge-discharge test device for thin secondary battery, Takashi Nishihara, Takahiro Kawasaki, Tsutomu Okazaki, Takeshi Yasooka, and Yoshikazu Niwa, Nissan Motor Co., Ltd. (JP).

U.S. 9,136,568 (20150915), Protected lithium electrodes having tape cast ceramic and glass-ceramic membranes, Steven J. Visco and Yevgeniy S. Nimon, PolyPlus Battery Co.

U.S. 9,136,569 (20150915), Microwave rapid thermal processing of electrochemical devices, Daoying Song, Chong Jiang, and Byung-Sung Leo Kwak, Applied Materials, Inc.

U.S. 9,136,617 (20150915), Battery connector formed of plural materials, and production method, Akira Sakae, Kobe Steel, Ltd. (JP).

U.S. 9,136,705 (20150915), Scalable method of proportional active state of charge balancing for managing variations in the state of health of batteries, Andrew J. Namou, Christopher A. Schlaupitz, Todd F. Mackintosh, and John Reed, GM Global Technology Operations LLC.

U.S. 9,136,713 (20150915), Proactive and highly efficient active balance apparatus for a battery power system, Win Cheng and Jeff Yeu-Farn Hsieh.

U.S. 9,136,714 (20150915), Method and apparatus for performing active balancing control with aid of voltage information sharin, Fu-Sheng Tsai, Fu-Sheng Tsai (TW).

U.S. 9,136,715 (20150915), Rechargeable battery pack and method of charge/discharge equalizing, Yuebin Wu, Yuebin Wu (CN).

U.S. 9,136,716 (20150915), Bottom based balancing in lithium ion system, Daniel J. White, Lyle Matson, and Nathan Cruise, Black & Decker Inc.

U.S. 9,138,691 (20150922), Copolymers comprising phosphonate and/or phosphonic acid groups, usable for forming fuel cell membranes, Russell Tayouo, Ghislain David, Bruno Ameduri, Stéphanie Roualdes, Hervé Galiano, and Jannick Bigarre, Commissariat à l'énergie atomique et aux énergies alternatives (FR) and Centre National de la Recherche Scientifique (FR).

U.S. 9,138,932 (20150922), Electrode-separator integral segment for a lithium ion battery, Xiaosong Huang, GM Global Technology Operations LLC.

U.S. 9,139,103 (20150922), Battery cell capacity balancing system and method, Bruce Carvell Blakemore, Allan Roy Gale, and Larry Dean Elie, Ford Global Technologies, LLC.

U.S. 9,139,104 (20150922), U-type battery pack for electric vehicle, Chae-Ho Chung, Ye-Hoon Im, Dal-Mo Kang, and Jong-Moon Yoon, LG Chem, Ltd. (KR).

U.S. 9,139,429 (20150922), High performance cathode material LiFePO₄, its precursors and methods of making thereof, Guiqing Huang.

U.S. 9,139,441 (20150922), Porous silicon based anode material formed using metal reduction, Yogesh Kumar Anguchamy, Charan Masarapu, Haixia Deng, Yongbong Han, Subramanian Venkatachalam, Sujeet Kumar, and Herman A. Lopez, Envia Systems, Inc.

U.S. 9,139,450 (20150922), Process for producing fuel cell catalysts, and fuel cell catalyst, Takuya Imai, Ryuji Monden, and Toshikazu Shishikura, Showa Denko KK (JP).

U.S. 9,140,501 (20150922), Battery module having a rubber cooling manifold, Mark Niedzwiecki, William Koetting, Josh Payne, Igor Isayev, and Venkatachala Moorthi Natarajan, LG Chem, Ltd. (KR).

U.S. 9,140,523 (20150922), Method and apparatus for armor having integrated battery power, Gary F. Wahlquist, Charles L. Horvath, Timothy J. Imholt, and H. Barteld Van Rees, Raytheon Co.

U.S. 9,140,759 (20150922), Electric vehicle battery pack voltage monitoring, Robert J. Bolduc, Ford Global Technologies, LLC.

U.S. 9,140,760 (20150922), Resistance measurement for battery cells, Alexander Covasala, Flextronics AP, LLC.

U.S. 9,140,761 (20150922), Battery pack failure detection device, Teruo Ishishita, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,141,923 (20150922), Optimizing contractual management of the total output of a fleet of fuel cells, James Smith, David Weingaertner, Pramod Vachhani, Brent Miller, Ram Ramanan, Arne Ballantine, Swaminathan Venkataraman, and Deepak Shukla, Bloom Energy Corp.

U.S. 9,142,357 (20150922), Separator for electric storage device and electric storage device, Kazuaki Matsumoto, NEC Corp. (JP).

U.S. 9,142,358 (20150922), Power storage device and electric device, Kazutaka Kuriki, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 9,142,361 (20150922), Electric storage cell, Takayuki Tsuchiya and Shigemitsu Kobayashi, UD Trucks Corp. (JP).

U.S. 9,142,809 (20150922), Battery module, Myung-Chul Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,142,810 (20150922), Rechargeable battery, Seok Koh, Kyungho Park, Jeongdeok Byun, Eunok Kwak, and Pilho Jung, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,811 (20150922), Current collector having built-in sealing means, and bipolar battery including such a collector, Marianne Chami, Commissariat à l'énergie atomique et aux énergies alternatives (FR).

U.S. 9,142,812 (20150922), Battery pack, Yu-Sik Hwang and Jae-Seung Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,813 (20150922), Secondary battery, Dae-Kyu Kim and Takao Abe, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,814 (20150922), Rechargeable battery, Sang-Won Byun, Byung-Kyu Ahn, and Chi-Young Lee, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,142,815 (20150922), Method for manufacturing a porous nanoweb, Moo-Seok Lee, Kolon Industries, Inc. (KR).

U.S. 9,142,816 (20150922), Alkaline battery separator and alkaline battery using separator, Tomohiro Hayakawa, Koichi Kambe, and Hiroyuki Kawai, Kuraray Co., Ltd. (JP).

U.S. 9,142,817 (20150922), Battery separator and battery using the same, Shunsuke Noumi, Hiroyoshi Take, and Kinkou Sho, Nitto Denko Corp. (JP).

U.S. 9,142,818 (20150922), Battery separator and battery using the same, Shunsuke Noumi, Hiroyoshi Take, and Kinkou Sho, Nitto Denko Corp. (JP).

U.S. 9,142,819 (20150922), Separator having porous coating layer, and electrochemical device containing the same, Yoon-Jung Bae, In-Chul Kim, Seung-Taek Hong, Jong-Hwan Kim, and Han-Ho Lee, LG Chem, Ltd. (KR).

U.S. 9,142,820 (20150922), Lithium secondary battery cell structure, Tae-Young Kim, Hee-Yeon Ryu, Sam-Ick Son, and Ju-Young Sung, Hyundai Motor Co. (KR).

U.S. 9,142,821 (20150922), Electrode assembly and secondary battery using the same, Seung-Min Yang, LG Chem, Ltd. (KR).

U.S. 9,142,822 (20150922), Core pack manufacturing apparatus, Jintae Hong and Jaeuk Ryu, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,823 (20150922), Rechargeable battery and module of the same, Jong-Seok Moon, Hui-Jun Lee, Joong-Heon Kim, and Hee-Sang Nam, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,824 (20150922), Plate-like battery pack and battery pack group composed of plural plate-like battery packs, Hisashi Tsukamoto, CONNEX SYSTEMS Corp. (JP).

U.S. 9,142,825 (20150922), Electrode lead comprising protection layer for anticorrosion and secondary battery comprising the same, Seung Su Cho, Seung Don Choi, Ho Jin Jeon, Dae Sik Choi, Dae Hong Kwon, and You Rim Yoon, LG Chem, Ltd. (KR).

U.S. 9,142,826 (20150922), Battery pack, Hanjun Wang and Daeyon Moon, Samsung SDI Co., Ltd. (KR).

U.S. 9,142,827 (20150922), Rechargeable battery having desirable safety performance, Ru lai Cai, Quan kun Li, Ping hua Deng, and Peng Wang, Ningde Amperex Technology Ltd. (CN).

U.S. 9,142,828 (20150922), Fuse unit for vehicles, Yusuke Matsumoto, Yazaki Corp. (JP).

U.S. 9,142,829 (20150922), Passive safety device and internal short tested method for energy storage cells and systems, Matthew Keyser, Eric Darcy, Dirk Long, and Ahmad Pesaran, Alliance for Sustainable Energy, LLC.

U.S. 9,142,830 (20150922), Phase separated silicon-tin composite as negative electrode material for lithium-ion batteries, Xingcheng Xiao, Anil K Sachdev, Mark W Verbrugge, Ping Liu, and John S. Wang, GM Global Technology Operations LLC.

U.S. 9,142,831 (20150922), Nonaqueous electrolyte secondary battery, Hideaki Morishima, Takashi Kobayashi, Masaomi Nakahata, and Kazuhiko Mori, Kabushiki Kaisha Toshiba (JP).

U.S. 9,142,832 (20150922), Graphite material for negative electrodes of lithium ion secondary battery, manufacturing method for said material, and lithium ion secondary battery using same, Takashi Suzuki, Noriyo Ishimaru, Takashi Oyama, Tamotsu Tano, Toshiyuki Oda, Ippei Fujinaga, Tomoaki Urai, Seiji Okazaki, Katsuaki Kurata, Toshiaki Hiramoto, Akino Sato, and Wataru Oda, JX Nippon Oil & Energy Corp. (JP) and Toda Kogyo Corp (JP).

U.S. 9,142,833 (20150922), Lithium ion batteries based on nanoporous silicon, Sarah H. Tolbert, Eric J. Nemanick, and Chris Byung-Hwa Kang, The Regents of the University of California.

U.S. 9,142,834 (20150922), Magnesium ion batteries and magnesium electrodes employing magnesium nanoparticles synthesized via a novel reagent, Rana Mohtadi, Michael Paul Rowe, and Ryan Daniel Desautels, Toyota Motor Engineering & Manufacturing North America, Inc.

U.S. 9,142,835 (20150922), Separator film for batteries including oxidation resistant vinyl alcohol copolymer, Richard Vicari and Bret F. Hann, Sekisui Specialty Chemicals America, LLC.

U.S. 9,142,836 (20150922), Anode for secondary battery, Sung-Kyun Chang, Won Seok Chang, Jung Min Han, and Hong Kyu Park, LG Chem, Ltd. (KR).

U.S. 9,142,837 (20150922), Lithium ion secondary battery and preparation process of same, Masakazu Sanada, SCREEN Holdings Co., Ltd. (JP).

U.S. 9,142,838 (20150922), Anode on a pretreated substrate for improving redoxstability of solid oxide fuel cell and the fabrication method thereof, Chang-Sing Hwang, Chun-Huang Tsai, Jen-Feng Yu, Chun-Liang Chang, Jun-Meng Lin, and Shih-Wei Cheng, Institute of Nuclear Energy Research, Atomic Energy Council, Executive Yuan (TW).

U.S. 9,142,839 (20150922), Electrochemical battery integrated in a piece of clothing and using a physiological fluid as an electrolyte, Frédéric Revol Cavalier, Commissariat à l'énergie atomique et aux énergies alternatives (FR).

U.S. 9,142,840 (20150922), Method of reducing tabbing

volume required for external connections, David Gerard Rich, Taha Shabbir Husain Sutarwala, and Andre John Van Schynde, BlackBerry Ltd. (CA).

U.S. 9,142,841 (20150922), Micro-tubular solid oxide fuel cell arrangement, Georgios Tsotridis, The European Union (BE).

U.S. 9,142,842 (20150922), Composite membrane for polymer electrolyte membrane fuel cell, Anima B. Bose, Ohio University.

U.S. 9,142,843 (20150922), Cooling device for a functional system, Markus Beylich, Michael Fasold, Peter Teuschel, Wolfgang Schwiendbacher, and Christoph Koch, MANN+HUMMEL GmbH (DE) and Daimler AG (DE).

U.S. 9,142,845 (20150922), Solid oxide fuel cell stack heat treatment methods and apparatus, Matthias Gottmann, Stephen Couse, James McElroy, Ryan Hallum, Jakob Hilton, Kurt Risic, Ram Ramanan, and Michael Gasda, Bloom Energy Corp.

U.S. 9,142,846 (20150922), Fuel cell system and fuel cell activation method, Takeshi Maenaka and Atsushi Imai, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,142,847 (20150922), Fuel cell load controller, David Higdon, Bloom Energy Corp.

U.S. 9,142,849 (20150922), Pump assembly for a fuel cell system, Daniel Braithwaite, Tibor Fabian, Tobin J Fisher, Jonathan Louis Glassmann, Andrew Gust Peterson, Adam Rodriguez, and Russell H Barton, Intelligent Energy Ltd. (GB).

U.S. 9,142,850 (20150922), Tri-block copolymer and electrolyte membrane made from the same, Seong Ho Choi, Hyuk Kim, Sang Woo Lee, Tae Geun Noh, and Ji Soo Kim, LG Chem, Ltd. (KR).

U.S. 9,142,851 (20150922), Composite membranes having a hydrophilic material and a conductive material susceptible to dehydration and their use in electrochemical cells, Donald James Highgate, ITM Power (Research) Ltd. (GB).

U.S. 9,142,852 (20150922), Bicarbonate and carbonate as hydroxide carriers in a biological fuel cell, Bruce E. Rittmann, César I. Torres, and Hyung-Sool Lee, Arizona Board of Regents for and on Behalf of Arizona State University.

U.S. 9,142,853 (20150922), Fuel cell stack and electronic device provided with the same, Masashi Muraoka, Toshiyuki Fujita, Tomohisa Yoshie, and Hironori Kambara, Sharp Kabushiki Kaisha (JP).

U.S. 9,142,854 (20150922), Battery having enhanced electrical insulation capability, Jin Soo Lee, Kil Young Lee, and Dong Myung Kim, LG Chem, Ltd. (KR).

U.S. 9,142,855 (20150922), Electrolyte for electrochemical device, method for preparing the electrolyte and electrochemical device including the electrolyte, Yo-Han Kwon, Je-Young Kim, Sang-Young Lee, Byung-Hun Oh, Ki-Tae Kim, and Hyo-Jeong Ha, LG Chem, Ltd. (KR).

U.S. 9,142,856 (20150922), Liquid hydrophobic phase transition substance, and battery comprising same, Hirofumi Nakamoto, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,142,858 (20150922), Non-aqueous electrolyte secondary battery, negative electrode, negative electrode material, and preparation of Si-O-Al composite, Tetsuo Nakanishi and Koichiro Watanabe, Shin-Etsu Chemical Co., Ltd. (JP).

U.S. 9,142,859 (20150922), Polymer-silicon composite particles, method of making the same, and anode and lithium secondary battery including the same, Sun Jung Hwang, Dong Seok Shin, Yoon Kyung Kwon, Geun Chang Chung, and Jung Seok Choi, LG Chem, Ltd. (KR).

U.S. 9,142,860 (20150922), Mixed metal oxide and sodium secondary battery, Satoru Kuze, Masami Makidera, and Taketsugu Yamamoto, Sumitomo Chemical Co., Ltd. (JP).

U.S. 9,142,861 (20150922), Lithium ionic conductor and fabrication method thereof, and all-solid lithium secondary battery, Kenji Homma, Tamotsu Yamamoto, and Tsutomu Tanaka, Fujitsu Ltd. (JP).

U.S. 9,142,862 (20150922), Nonaqueous electrolyte

secondary battery, Yoshinori Yokoyama, Takayuki Hattori, and Yasuhiro Yamauchi, SANYO Electric Co., Ltd. (JP).

U.S. 9,142,864 (20150922), Electrolytes for rechargeable batteries, Gregory Alan Roberts, Rainer J. Fasching, and Constantin I Stefan, Amprius, Inc.

U.S. 9,142,865 (20150922), Cable-type secondary battery, Yo-Han Kwon, Byung-Hun Oh, Hye-Ran Jung, and Je-Young Kim, LG Chem, Ltd. (KR).

U.S. 9,142,959 (20150922), Fuel cell system, Andreas Kaupert, Valentin Notemann, and Karsten Reiners, Eberspächer Climate Control Systems GmbH & Co. KG (DE).

U.S. 9,142,977 (20150922), Method of controlling battery state using constant-voltage discharge, Samuel Yeong-Shi Chang, Albert Liu, Wilson Liu, and Steve Diamond, Atieva, Inc.

U.S. 9,142,979 (20150922), Active balancing circuit for balancing battery units, Fu-Sheng Tsai, Fu-Sheng Tsai (TW).

U.S. 9,142,980 (20150922), Apparatus and method for controlling charge capacity balancing operation of secondary battery cell, Sang-Hoon Lee, LG Chem, Ltd. (KR).

U.S. 9,142,981 (20150922), Cell balance control unit, Seiji Kamata and Eishin Matsumoto, Keihin Corp. (JP).

U.S. 9,144,781 (20150929), Fuel processing device, Yuki Mita, Panasonic Intellectual Property Management Co., Ltd. (JP).

U.S. 9,145,059 (20150929), Method and system for estimating cell resistances within a vehicle battery, James C. Gibbs, Joseph Bisbing, Kurt M. Johnson, Damon R. Frisch, and Brian J. Koch, GM Global Technology Operations LLC.

U.S. 9,145,064 (20150929), Battery cell capacity balancing system and method, Bruce Carvell Blakemore, Allan Roy Gale, and Larry Dean Elie, Ford Global Technologies, LLC.

U.S. 9,146,280 (20150929), Method and system for estimating a capacity of a battery, Chein-Chung Sun, Ying-Hao Hsu, Chiu-Yu Liu, and Shou-Hung Ling, Industrial Technology Research Institute (TW).

U.S. 9,146,281 (20150929), Electric vehicle battery contactor switch monitoring, Robert J. Bolduc, Ford Global Technologies, LLC.

U.S. 9,147,526 (20150929), Protector for electrochemical element, Takahiro Asai, Meidensha Corp. (JP).

U.S. 9,147,529 (20150929), Energy storage device and method thereof, Ashok Kumar Shukla, Musuwathi Krishnamoorthy Ravikumar, and Shaik Abdul Gaffoor, Indian Institute of Science (IN).

U.S. 9,147,863 (20150929), Secondary battery, Seok Koh, Youngcheol Jang, and Kyungho Park, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,864 (20150929), Protective circuit module and secondary battery including the same, Youngcheol Jang, Eunok Kwak, and Kyungwon Seo, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,865 (20150929), System and method for closing a battery fill hole, Jason D. Fuhr and Xugang Zhang, Johnson Controls Technology LLC.

U.S. 9,147,867 (20150929), Electric storage device, Syun Ito, Shogo Tsuruta, and Seichi Irie, GS Yuasa International Ltd. (JP).

U.S. 9,147,868 (20150929), Microporous films, methods for their production, and applications thereof, Takeshi Ishihara and Kohtaro Kimishima, Toray Battery Separator Film Co., Ltd. (JP).

U.S. 9,147,869 (20150929), Rechargeable battery, Jong-Seok Moon, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 9,147,870 (20150929), Rechargeable battery, Yoshihiro Tsukuda, Kazuo Yamada, Kazuya Sakashita, and Yuki Watanabe, Sharp Kabushiki Kaisha (JP).

U.S. 9,147,871 (20150929), Automotive battery connection system, Gerald A. Kowalski.

U.S. 9,147,872 (20150929), Overcharge prevention device of battery, Hae Kyu Lim, Jeong Hun Seo, Suk Hyung Kim, Yoon Cheol Jeon, Jun Seok Choi, and Eun Kyung Kim, Hyundai Motor Co. (KR) and Kia Motors Corp. (KR).

U.S. 9,147,873 (20150929), Method of producing amorphous carbon material for the negative electrode of lithium ion secondary battery, and lithium ion secondary battery, Takashi Suzuki, Noriyu

Ishimaru, Takashi Oyama, Tamotsu Tano, Toshiyuki Oda, Ippei Fujinaga, Tomoaki Urai, Seiji Okazaki, Katsuaki Kurata, Toshiaki Hiramoto, Akino Sato, and Wataru Oda, JX Nippon Oil & Energy Corp. (JP) and Toda Kogyo Corp (JP).

U.S. 9,147,874 (20150929), Rechargeable lithium cell having a meso-porous conductive material structure-supported phthalocyanine compound cathode, Guorong Chen, Yanbo Wang, Aruna Zhamu, and Bor Z Jang, Nanotek Instruments, Inc.

U.S. 9,147,875 (20150929), Interconnect for battery packs, Kevin Michael Coakley and Malcolm Brown, CelLink Corp.

U.S. 9,147,876 (20150929), Method for lithium predoping, method for producing electrodes, and electric energy storage device using these methods, Hisashi Satake, Masanori Fujii, Hajime Kinoshita, and Shizukuni Yata, KRI, Inc. (JP).

U.S. 9,147,877 (20150929), Process for the preparation of crystalline lithium-, iron- and phosphate-comprising materials, Hartmut Hibst, Brian Roberts, Jordan Keith Lampert, and Kirill Bramnik, BASF SE (DE).

U.S. 9,147,878 (20150929), Secondary battery comprising at least a first and second electrode each coated with an active material layer, Chanho Lee, Kiwoon Kim, Youngju Ahn, Jinho Lee, and Junpyo Park, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,879 (20150929), Composite nano porous electrode material, process for production thereof, and lithium ion secondary battery, Isamu Moriguchi and Hirotochi Yamada, Nagasaki University (JP).

U.S. 9,147,880 (20150929), Electrode active material containing polydopamine and lithium secondary battery including the same, Tae Jin Park, Jae Hyun Lee, Seong Min Lee, and Jang Bae Ki, LG Chem, Ltd. (KR).

U.S. 9,147,882 (20150929), Binder for lithium ion secondary battery electrode, slurry obtained using the binder for electrode, electrode obtained using the slurry, and lithium ion secondary battery using the electrode, Mitsuru Hanasaki, Kazunari Fukase, Jiro Uchida, Yasutaka Kono, Yuka Chikugo, and Kou Ishiguchi, Showa Denko KK (JP) and NEC Energy Devices, Ltd. (JP).

U.S. 9,147,883 (20150929), Method for producing a carbon-coated lithium sulfide and use thereof, Ulrich Wietelmann, Rockwood Lithium GmbH (DE).

U.S. 9,147,884 (20150929), Fuel cell catalyst including carbon support particles with metal carbide layer and catalytic material and fuel cell using the same, Belabbes Merzougui, Minhua Shao, Lesia V. Protsailo, and Jingguang Chen, Audi AG (DE).

U.S. 9,147,885 (20150929), Electrocatalytic composite(s), associated composition(s), and associated process(es), Marjan Bele, Miran Gaberscek, Gregor Kapun, Nejc Hodnik, and Stanko Hocevar, Kemijski Institut (SI).

U.S. 9,147,886 (20150929), Electrode catalyst for fuel cell, method of preparing the same, membrane electrode assembly, and fuel cell including the same, Chan-ho Pak, Seon-ah Jin, Sung-hyeon Park, Seong-ihui Woo, and Chang-hyuck Choi, Samsung Electronics Co., Ltd. (KR) and Korea Advanced Institute of Science and Technology (KR).

U.S. 9,147,887 (20150929), Fuel cell module, Jun-Won Suh, Jan-Dee Kim, Seung-Tae Lee, and Ho-Jin Kweon, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,888 (20150929), Fuel cell system with interconnect, Zhien Liu and Richard Goettler, LG Fuel Cell Systems Inc.

U.S. 9,147,889 (20150929), Composite separator for polymer electrolyte membrane fuel cell and method for manufacturing the same, Dai Gil Lee, Ha Na Yu, Byoung Chul Kim, Bu Gi Kim, Jun Woo Lim, and Jung Do Suh, Hyundai Motor Co. (KR) and Korea Advanced Institute of Science and Technology (KR).

U.S. 9,147,890 (20150929), Fuel cell with embedded flow field, Alireza Pezhman Shirvanian, GM Global Technology Operations LLC.

U.S. 9,147,891 (20150929), Fuel cell stack, Masaharu Suzuki, Honda Motor Co., Ltd. (JP).

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U.S. 9,147,892 (20150929), Porous material for fuel cell electrolyte membrane, method for producing the same, electrolyte membrane for solid polymer fuel cell, membrane electrode assembly (MEA), and fuel cell, Hiroshi Harada, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,147,893 (20150929), Failure diagnostic device for discharge valve, Norimasa Ishikawa and Naoki Kanie, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,147,894 (20150929), Solid oxide fuel system, Robert J. Braun, Sean C. Emerson, Justin R. Hawkes, Ellen Y. Sun, Jean Yamanis, Tobias H. Sienel, Balbir Singh Bal, Stuart Anthony Astley, Thomas D. Radcliffe, James T. Beals, Walter H. Borst Jr., May L. Corn, Louis Chiappetta Jr., John T. Costello, Robert R. Hebert, and Thomas Henry Vanderspurt, Ballard Power Systems Inc. (CA).

U.S. 9,147,895 (20150929), Fuel cell fuel recycle ejectors disposed in fuel manifold, Matthew P. Wilson, Christopher John Carnevale, Jeffrey G. Lake, and Michael D. Harrington, Audi AG (DE).

U.S. 9,147,896 (20150929), Fuel cell system comprising an anode pressure controller, Susumu Maeshima, Keigo Ikezoe, Yasushi Ichikawa, Takahiro Fujii, Ryoichi Shimoi, Taiji Nishiyama, and Yusuke Ito, Nissan Motor Co., Ltd. (JP).

U.S. 9,147,897 (20150929), In-vehicle fuel cell system, Kazunori Fukuma, Kenji Nagumo, and Takaharu Sato, Honda Motor Co., Ltd. (JP).

U.S. 9,147,898 (20150929), Control system for a sealed coolant flow field fuel cell power plant having a water reservoir, Robert M. Darling, Audi AG (DE).

U.S. 9,147,899 (20150929), Fuel cell system having an air quality sensor suite, Samuel B. Schaevitz, Armin B. Kusig, Alan P. Ludwizewski, John A. Rule, and Michael C. Bradford, Lilliputian Systems, Inc.

U.S. 9,147,900 (20150929), Fuel cell apparatus and fuel cell system, Takuya Hashimoto and Hideki Kubo, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 9,147,901 (20150929), Fuel cell system, Karsten Reiners, Christian Weiss, and Andreas Kaupert, Eberspächer Climate Control Systems GmbH & Co. KG (DE).

U.S. 9,147,902 (20150929), Microbial fuel cell stack, Shungui Zhou, Guangdong Institute of Eco-environmental and Soil Sciences (CN).

U.S. 9,147,903 (20150929), Separator for redox flow battery and redox flow battery, Hee-Tak Kim, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,904 (20150929), Rechargeable energy storage unit, Horst Greiner and Alessandro Zampieri, Siemens Aktiengesellschaft (DE).

U.S. 9,147,905 (20150929), Lithium composite metal oxide and positive electrode active material, Kenji Takamori and Cedric Pitteloud, Sumitomo Chemical Co., Ltd. (JP).

U.S. 9,147,906 (20150929), Battery electrolyte solutions containing phosphorus-sulfur compounds, Houxiang Tang, William J. Kruper Jr., Ravi B. Shankar, Deidre A. Strand, Peter M. Margl, Andrew J. Pasztor Jr., David R. Wilson, and Jeremy R. Stajd, GM Global Technology Operations LLC.

U.S. 9,147,907 (20150929), Nonaqueous electrolyte and lithium ion rechargeable battery, Hisayuki Utsumi, Sharp Kabushiki Kaisha (JP).

U.S. 9,147,908 (20150929), Lithium secondary battery, Huntae Ro, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,909 (20150929), Battery management system and method for synchronizing voltage and current of battery, Se-Sub Sim, Samsung SDI Co., Ltd. (KR).

U.S. 9,147,910 (20150929), Method and system for controlling energy storage device, Christopher James Chuah, Roger Bull, James Sudworth, Vincent Boccanfuso, and David James, General Electric Co.

U.S. 9,147,911 (20150929), Method of extending the shelf-life of a coin cell in an application requiring high pulse current, Paul B. O'Sullivan, BAE Systems Information and Electronic Systems

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U.S. 9,147,912 (20150929), Method of producing an electrical potential, John E. Stauffer.

U.S. 9,147,913 (20150929), Diagnosis system and diagnosis method for lithium ion secondary battery, Toshiharu Miwa, Seiji Ishikawa, and Chizu Matsumoto, Hitachi, Ltd. (JP).

U.S. 9,147,914 (20150929), System and method for monitoring electrolyte levels in a battery, Duncan Jones and John Worthington, Philadelphia Scientific LLC.

U.S. 9,147,916 (20150929), Battery cell assemblies, Steven A. Bronczyk, Kwok Tom, and William Koetting, GM Global Technology Operations LLC.

U.S. 9,147,917 (20150929), Battery system, Man Ju Oh, Jae Woong Kim, and Jae Woo Park, Hyundai Motor Co. (KR) and Kia Motors Corp. (KR).

U.S. 9,147,918 (20150929), Effective recovery of lithium from lithium ion battery waste, Masahiro Ueda, Empire Technology Development LLC.

U.S. 9,147,919 (20150929), Methods of producing sulfate salts of cations from heteroatomic compounds and dialkyl sulfates and uses thereof, Cody A. Friesen, Derek Wolfe, and Paul Bryan Johnson, Fluidic, Inc.

U.S. 9,147,920 (20150929), Metal oxygen battery containing oxygen storage materials, Andrea Pulskamp, Andrew Robert Drews, Jun Yang, Shinichi Hirano, and Michael Alan Tamo, Ford Global Technologies, LLC.

U.S. 9,148,025 (20150929), System and method for a rechargeable battery, Richard Scott Bourgeois and Vincent Boccanfuso, General Electric Co.

U.S. 9,148,028 (20150929), Apparatus and method for battery equalization, Masaaki Suzuki and Shinji Hirose, Kabushiki Kaisha Toyota Jidoshokki (JP).

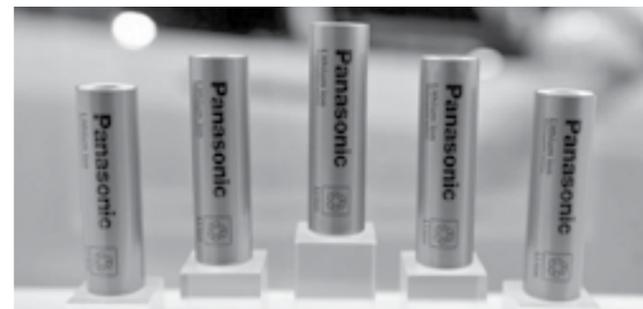
U.S. 9,148,029 (20150929), Active balancing circuit for balancing battery units, Fu-Sheng Tsai, Fu-Sheng Tsai (TW).

U.S. 9,148,085 (20150929), Apparatus and method for high efficiency operation of fuel cell systems, Robert Dean King and Timothy Gerard Richter, General Electric Co.

RESEARCH AND DEVELOPMENT

Lithium Air Batteries Could Replace Li-ion

In the U.K., researchers at the University of Cambridge have created a battery prototype that overcomes some of the challenges to making lithium air technology commercially



viable, including size and amount of energy lithium oxygen batteries can discharge. The new battery has the potential to store up to 10 times the amount of energy held in heavier Li-ion cells of comparable size, the inventors say. The

concept battery – still easily a decade away from a market-ready prototype – would be one fifth the weight and cost of current Li-ion batteries.

“What we’ve achieved is a significant advance for this technology and suggests whole new areas for research – we haven’t solved all the problems inherent to this chemistry, but our results do show routes forward towards a practical device,” says Prof. Clare Grey of Cambridge’s Department of Chemistry. The results were published in *Science*.

The battery prototype relies on graphene, a lattice of carbon atoms that has the potential to radically change the way objects are made if the cost of making it can be cut. The team used a different chemistry from previous lithium oxygen studies and found it to be more efficient.

The oxygen-based energy storage has the potential – albeit possibly 20 years down the road – to sideline the Li-ion batteries used in everyday gadgets.

Redox-Flow Battery Key To Future

A team of researchers have created a type of new redox-flow battery that can withstand up to 10,000 charging cycles without losing a crucial amount of capacity. The synthetic batteries were created based on organic polymers and water, according to the study.

“What’s new and innovative about our battery is that it can be produced at much less cost, while nearly reaching the capacity of traditional metal and acid containing systems,” says Dr. Martin Hager of the Friedrich Schiller University Jena in Germany.



The research team and its new battery (left to right): Prof. Dr. Ulrich S. Schubert, Tobias Janoschka und Dr. Martin Hager.

The researchers’ new redox-flow batteries are made from organic polymers and a harmless saline solution, according to a news release. Some examples of organic polymers are carbohydrates, nucleic acids, proteins, and rubber. Unlike traditional batteries, the redox-flow battery

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is not made from solid materials like metals or metal salts – it's in a dissolved form. The electrolyte solutions are stored in two tanks, which form the positive and negative terminals of the battery. Two pumps of the polymer solutions are transferred to an electrochemical cell, in which the polymers are electrochemically reduced, or oxidized, thereby charging or discharging the battery, according to the researchers. The cell is divided into two compartments by a membrane to avoid electrolytes from merging.

“In these systems the amount of energy stored as well as the power rating can be individually adjusted. Moreover, hardly any self-discharge occurs,” Hager says. “This is not only extremely expensive, but the solution is highly corrosive, so that a specific membrane has to be used and the lifespan of the battery is limited.”

In the first tests, the redox-flow battery could withstand up to 10,000 charging cycles with losing its capacity. The energy density is 10Wh/l. The scientists are working on creating a more efficient and larger system. They are considering the new development to be a potentially marketable product.

ELECTRIC VEHICLE NEWS

Toyota Sees Even Split Between Prius Batteries

Toyota has revealed more details of its new Prius, the automaker's first hybrid to be powered by a Li-ion battery as well as the nickel-metal-hydride battery nearly exclusive to the car's three previous generations.



Chief engineer Kouji Toyoshima told *WardsAuto* that production will be divided evenly between Li-ion and NiMH batteries. Sales of cars with the two battery types will be further split 50-50 in North America and Japan, while Toyota will offer only NiMH-equipped Priuses in Europe. China and Southeast Asia still are being decided.

Model grade will determine which type of battery is used, Toyoshima says. Only the Prius Plug-In Hybrid and one grade of the Prius v (sold in Japan as the Prius Alpha) now use Li-ion batteries. The NiMH battery pack is 10%

smaller and holds 28% more energy than the current unit. The Li-ion pack is smaller still by an estimated 15% and significantly lighter, by nearly 15.8 lbs. (7.2 kg).

The fourth-generation Prius goes on sale in Japan in December, followed by North America in early 2016.



Polaris Updates GEM Low-Speed Electric Vehicles

After purchasing GEM several years ago, Medina, Minnesota-based Polaris is updating the GEM line of low-speed electric vehicles. Polaris will offer six GEM variants, including the e2, 4, and e6 passenger models with seating for two, four, and six, respectively. There is also an eL XD variant with a flatbed, as well as more utility-focused eM 1400 and eM 1400 LSV models.



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GEM notes that its vehicles have car-like safety features, including automotive-glass windshields, fairly substantial suspension, and roofs that meet SAE crush standards. The vehicles should be street legal on most roads with speed limits up to 35 mph, GEM says. All vehicles have a top speed of 25 mph except the eM 1400, which is limited to 19 mph. These limits qualify them as “low-speed” or “neighborhood” electric vehicles, which are subject to far fewer Federal regulations than conventional cars and trucks. Their electric motors vary in output from 5.0 to 6.5kW, depending on the model.

For the first time, GEM is also offering the option of Li-ion battery packs as well as conventional lead-acid batteries. The 8.9-kWh and 12.4kWh packs can be combined with Level 1 or Level 2 AC charging capability. GEM also offers a rooftop solar panel to generate renewable electricity.

PRODUCT NEWS

Electric Buses: Technology Winners and Losers

IDTechEx Research's report, *Electric Buses 2015-2025* finds winners emerging in new bus technology. Pure electric powertrains based on Li-ion batteries win.

Dr. Peter Harrop of IDTechEx finds that fast charging wins. Wireless charging removes hassle and personnel issues such as holding a heavy, wet power terminal. It will evolve into semi-dynamic charging where the bus battery is smaller because it is topped up at traffic lights and bus stops using solar roads etc. Wireless charging will be popular when turnaround time for full charge matches contacted versions. Structural electronics such as solid-state supercapacitors, batteries and circuitry replacing bodywork may eventually win. See IDTechEx Research's, *High Power Energy Harvesting 2016-2026*, *Structural Electronics 2015-2025* and the brand new report *Wireless Charging 2016-2026: Phones & Small Electronics, Electric Cars & Other Vehicles*.

“Unlikely to be adopted in the majority of buses are fuel cells or battery swapping because of total cost of ownership and operational issues,” says Harrop.

For more information, visit www.IDTechEx.com.

Certain Battery Technologies to Plunge

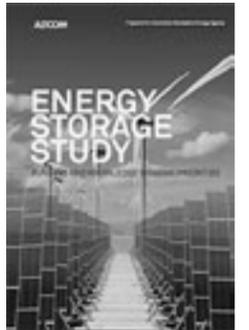
An energy storage study claims that prices for certain battery technologies will plunge by as much as 60% over the next five years. The report was prepared by Australian consultancy AECOM and published by the Australian Renewable Energy Agency (ARENA).

The 130-page study expects all battery technologies to drop in price. However, the largest reductions are forecast for Li-ion and flow-battery technologies, which are expected to plummet by 60% and 40%, respectively by 2020.

Li-ion batteries will drop from \$550/kWh in 2014 to \$/ kWh by 2020; and flow battery prices will drop from \$/ \$350 per kWh during the same time.

According to the ARENA report, energy storage adoption is likely to occur as a ‘megashift’ rather than incremental impact on the electricity industry, “due to the rapidly changing economic proposition as well as the disruptive influence on the market.”

Download the report at <http://arena.gov.au/files-/2015/07/AECOM-Energy-Storage-Study.pdf>.



UPCOMING EVENTS

Meetings and Symposia

November 17-18 – Electric & Hybrid Aerospace Technology Symposium, Messe Bremen, Bremen, Germany.

Topics include aeronautic battery integration; a hybrid HT-PEM fuel cell and NiCd battery aircraft electrical generator; hybrid turbine-SOFCs for propulsion and power; leveraging auto electric/hybrid challenges for aerospace success; and Li-ion battery safety progress.

Info: Andrew Boakes, UKIP Media & Events, Abinger House, Church St., Dorking, Surrey, RH4 1DF, U.K., phone: +44 1306 871209, or visit www.electriconhybridspacetechnology.com.

November 17-18 – Lithium Battery Power, Hyatt Regency Baltimore, Baltimore, Maryland.

Explores new ideas for battery design, battery trends and chemistries; novel materials and components to systems design and integration; electrode and electrolyte materials and technologies; Li-ion; lithium-air/lithium oxygen; lithium-sulphur; metal air; and EV to stationary applications.

Info: Craig Wohlers, Knowledge Foundation, phone: 1-781-972-5400, or visit www.knowledgefoundation.com.

November 18-19 – Battery Safety Conference, Hyatt Regency Baltimore, Baltimore, Maryland.

Includes impact of battery materials on safety; internal shorts, thermal runaway and stability, aging, and catastrophic failure; abuse tolerance and advanced testing procedures and protocols; cell research and safety, Li-based battery safety at systems level; and safety standards and regulatory issues.

Info: Craig Wohlers, Knowledge Foundation, phone: 1-781-972-5400, or visit www.knowledgefoundation.com.

November 17-20 – 3rd Zing Hydrogen and Fuel Cells Conference 2015, Omni Cancun Hotel & Villas, Cancun, Mexico.

Focuses on modern aspects and new developments of hydrogen, fuel cells, and their applications. Includes recent work on PGM based and non-platinum based nanomaterials to systems for portable stationary and automotive sectors.

Info: Visit <http://www.zingconferences.com/conferences/3rd-zing-hydrogen-fuel-cells-conference/>.

December 1-4 – European Battery, Hybrid and Fuel Cell Electric Vehicle Congress, Diamant Centre, Brussels, Belgium.

Fosters exchange between R&D, industry, authorities, end-users and the NGO's actors to develop synergies in eMobility. Helps define the most promising solutions for market introduction and take-off. Policy aspects, new mobility concepts, noise and health factors are also issues to be discussed.

Info: Visit www.eevc.eu.

2016

January 25-28 – AABC Europe: Advanced Automotive and Industrial Battery Conference, Rheingoldhalle Congress Centrum, Mainz, Germany.

Discuss recent progress in advanced battery technology implementation in automotive, industrial and specialty applications. Includes three technology-focused symposia covering Li-ion chemistry, Li-ion engineering and EC capacitor developments, and an application-focused symposia with two parallel tracks on high-volume and industrial/specialty automotive, as well as three tutorials.

Info: Visit www.advancedautobat.com.

March 21-24 – 33rd International Battery Seminar & Exhibit, Broward County Convention Center, Ft. Lauderdale, Florida.

Ideal for battery and small fuel cell manufacturers, users, OEMs, product designers, component, equipment and material suppliers, applications engineers, marketing analysts, patent attorneys, investors and those interested in the battery and small fuel cell industries.

Info: Craig Wohlers, Knowledge Foundation, phone: 1-781-972-5400, or visit www.internationalbatteryseminar.com.

May 1-3 – BCI's 128th Convention + Power Mart, San Antonio Marriott Rivercenter and Riverwalk Hotel, San Antonio, Texas.

Includes the latest technologies, environmental issues, and the impact of global economy on the battery marketplace. Network with renowned industry experts, share experiences and challenges with your peers, and hear worldwide regulatory and legislative issues affecting battery manufacturing and distribution.

Info: Phone: 1-312-644-6610 or visit www.batterycouncil.org.

May 10-12 – Battcon, Boca Raton Resort and Spa, Boca Raton, Florida.

Noncommercial, technical event for storage battery users from the power, telecom, UPS and other industries. End-users, engineers, battery and battery test equipment manufacturers, installers, and standards and safety experts gather to discuss storage battery innovations and solutions for existing systems; everyday applications; technical advances; and industry concerns. A trade show features storage power related vendors.

Info: Jennifer Stryker, Emerson Network Power, 7775 West Oakland Park Blvd, Sunrise, FL 33351, phone: 1-954-623-6660 Ext 23806, or visit www.battcon.com.

June 19-22 – EVS29, Palais des Congres de Montreal, Montreal, Quebec, Canada.

Covers research, market and government activities across all fields related to hybrid, plug-in hybrid, battery, and fuel cell technologies as well as associated infrastructure and services.

Info: Visit www.evs29.org.

September 13-15 – The Battery Show 2016, The Suburban Collection Showplace, Novi, Michigan.

Showcases the latest advanced battery technology for electric and hybrid vehicles; utility and renewable energy support; portable electronics; medical technology; military; and telecommunications.

Info: Visit www.thebatteryshow.com.

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