ADVANCED BATTERY TECHNOLOGY

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Representing Maccor at the 32nd International Battery Seminar in sunny Fort Lauderdale are Dave Smith, Bryan Satterfield, Anna Balding, and Mark Hulse. **See photo feature on pages 12 and 13.**

AROUND THE INDUSTRY

SunEdison Acquires Battery Startup

Solar developer SunEdison has acquired a young startup called Solar Grid Storage, which develops battery projects in conjunction with solar projects, reports *Gigaom*. The deal includes Solar Grid Storage's four operating storage projects, as well as its project team and pipeline.

Solar Grid Storage is a three-and-a-half-year-old startup based in Philadelphia, Pennsylvania, that is run by CEO Tom Leyden, a former executive at PowerLight and SolarCity. In a 2013 interview with *Gigaom*, Leyden compared the company to a SunEdison of storage.

The acquisition shows the emerging interest by solar companies in energy storage projects, and signals the coming growth of the grid storage market, which has large global players vying for it, such as Panasonic, Tesla Motors, AES, and up-and-coming startups like Stem and Advanced Microgrid Solutions.

Solar Grid Storage develops projects that pair solar panel systems with energy storage equipment. The company's storage systems provide backup power and sell energy delivery services to local utilities and grid operators. Now that Solar Grid Storage is part of SunEdison, watch for increasing energy storage projects from the solar developer. "My mandate now at SunEdison is storage deployment, and that means nationwide," Leyden tells Reuters.

Samsung SDI Acquires Magna's Battery Pack Business

Samsung SDI Co. Ltd. has agreed to acquire the battery pack business of Magna International.

The acquisition is expected to enhance Samsung SDI's capabilities in electric vehicles batteries by combining the company's leadership in battery cells and modules with Magna's battery pack expertise. Magna's technology and experience in providing global automakers with battery packs will also help Samsung SDI secure customers in the fast-growing automotive battery markets in Europe, North America and China.

Under the agreement, Samsung SDI will acquire the entire battery pack business from Magna Steyr, an Austria-based operating unit of Magna International, including all 264 employees, production and development sites and existing contracts of the business.

BASF Scientists Boost NiMHs

Scientists at BASF are exploring the possibilities of nickel-metal hydride (NiMH) batteries, used in hybrids, as an EV alternative. They recently doubled the amount of energy that the batteries can store, making them comparable to Li-ions. The BASF researchers hope to increase energy storage by an additional eight times and are aiming for batteries that cost $146/kWh, roughly half as much as the cheapest Li-ion electric car batteries.

Nickel-metal hydride batteries have been used in hybrids for decades due to their significant advantages in cars. To these inherent advantages, the BASF scientists added improvements to the nickel-based materials used in the batteries. Changing the microstructure helped make them more durable, which allowed changes to the cell design that saved considerable weight, enabling storage of 140Wh/kg.

East Penn Promotes Miksiewicz

East Penn Manufacturing Co. of Lyon Station, Pennsylvania, has promoted Lawrence (Larry) Miksiewicz to the senior vice president of manufacturing and purchasing. He will be reporting directly to Robert Flicker, chief operating officer.

Miksiewicz will oversee each of the company's manufacturing divisions including automotive, industrial (reserve power and motive power), and diversified (wire, cable, accessories, and injection molding). His oversight also includes East Penn International.

Prior to this position, he held the title of vice president of manufacturing and purchasing for the industrial division. Miksiewicz joined East Penn in 1987 as a project engineer, and received a B.S. in industrial engineering from Lehigh University.

East Penn is a leading manufacturer of high quality lead-acid batteries for the automotive, marine, commercial, UPS, telecommunications and industrial markets.

NorthStar and Eternity Announce Collaboration

Sweden-based NorthStar Battery and Eternity Technologies of the United Arab Emirates, will jointly launch a new tubular 2VOPzV battery range with capacities from 300-3000Ah, to be sold exclusively by NorthStar for the telecom market.

For more than a decade, NorthStar has designed and manufactured high performance AGM batteries in the U.S. for telecom power systems, uninterruptible power supplies and engine start applications in more than 120 countries. Eternity Technologies is a leader in the 2V motive market, with a brand new state-of-the-art facility in the UAE, and a global customer base that includes several worldwide material handling equipment suppliers. NorthStar CEO Hans Lidén says the modern approach and strong customer focus of both companies will breathe new life into the standby power market. "We're very excited about the possibilities of this partnership – it's a natural fit."

The new OPzV range will be built by Eternity in the UAE based on collaborative designs between the NorthStar and Eternity engineering teams, with deliveries starting Q1/Q2 2015 depending on model.

Nexeon Board Changes Announced

Ian Jenks joins U.K.-based Nexeon's board as a non-executive director (NED), while Nexeon Board Director Christina McComb becomes senior independent director.

Jenks was formerly an advisor to Nexeon, and brings extensive experience of growing leading edge technology businesses. He is currently a board director of Optimal Payments, Birdstep Technology and Econic Technologies. He has a degree in aeronautical engineering from the University of Bristol.

McComb has an extensive background in venture capital and investment in fast growing companies, and now holds a number of senior positions including senior independent director of the British Business Bank and chair of Engage Mutual Assurance. She is also a non-executive director of Baronsmead VCT2 and Standard Life European Private Equity Trust.

Nexeon's silicon anode technology is being used to develop higher performance rechargeable batteries for automotive and consumer electronics applications.

Axion Signs Agreement with Pacific Energy

Axion Power International Inc. of New Castle, Pennsylvania, a developer of advanced lead-carbon PbC® batteries and energy storage systems, reports a strategic marketing, sales and reselling agreement with privately owned Portland, Oregon-based Pacific Energy Ventures LLC (PEV), a technology and project development firm specializing in the renewable energy and energy storage sectors. Under the agreement, PEV will represent Axion Power and its PbC-based products nationally on a non-exclusive basis, initially focused in the area that comprises the power grid of PJM Interconnection LLC, a Regional Transmission Organization serving all or parts of 13 states in the Northeast and the District of Columbia. PEV will promote the sale of PbC and PowerCube products for use with renewable energy and energy storage projects.

"This is not an agreement that will lead to a new layer of testing before something happens," says Axion Power COO, Phil Baker. "We believe PEV will hit the ground running right away."

Serving the Battery Industry Since 1965

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Dyson Invests $15M in Smartphone Technology

Dyson is investing $15 million in a new type of battery that promises to double smartphone battery life and allow EVs to drive over 600 miles per charge. The British vacuum company was alerted to the University of Michigan spin-off called Sakti3, which has developed next generation solid-state technology that can store twice as much energy as traditional rechargeable batteries.

As part of the investment, Dyson has entered into a joint development agreement to commercialize Sakti3's solid-state battery technology. The new batteries promise to store twice as much energy as today's liquid-based Li-batteries, that are used in everything from smartphones and tablets to cars, robots, and renewable energy sources such as solar panels and wind turbines.

"Sakti3 has achieved leaps in performance, which current battery technology simply can't," says company founder James Dyson. "It's these fundamental technologies – batteries, motors – that allow machines to work properly."

RIT Opens Battery Prototyping Center

The Rochester Institute of Technology (RIT) recently cut the ribbon on its new $1.5 million Battery Prototyping Center. The center includes a garage-sized room with two of its walls lined with high-tech manufacturing workstations, as well as adjacent "dry room" space for outside companies to use as their own workshop – the dry room keeping the humidity at a fraction of what one would find in a desert, due to how moisture can effect battery performance.

The aim is to turn out prototypes for and specialized services to start-ups and researchers. The center comes as battery development in the past decade has made such computer tablets feasible, says Bill Acker, executive director of the New York Battery and Energy Storage Technology Consortium. Meanwhile, the electric vehicle industry and the electric grid – in storage for solar panels and wind turbines – both seem to be on the verge of similar major technological advancements, Acker says.

Matthew Ganter, co-director of RIT's Battery Prototyping Center, explains some of the equipment to Lt. Gov. Kathy Hochul following the ribbon cutting ceremony.

The New York State Energy Research Development Authority provided $750,000 and the Empire State Development provided $400,000 to help fund the center.

Lescuyer Becomes Saft Management Board Chairman

Ghislain Lescuyer has been appointed as Saft's chairman of the management board. Lescuyer has been a member of Saft Groupe's supervisory board for the last 10 years and chairman of its strategy and technologies committee, and has worked closely with the current management team. He is now senior vice president of the Alstom Group in charge of information systems and technology.

He will begin in this new role on May 4. Bruno Dathis, group financial director, has been acting chairman of the management board, since John Searle's sudden death in September last year and will continue in this role until that date.

Ghislain Lescuyer, age 57, holds an engineering degree from Télécom ParisTech and an MBA from INSEAD. He joined Alstom/ Areva T&D in 2007 as executive vice-president of the grid products business until June 2010 when he was appointed senior vice-president of strategy and development for the Alstom Group. In May 2012, he became Alstom's chief information officer.

Apple Hires Engineers in Automotive Battery Area

A year and a half ago, Apple Inc. had applied for just eight patents related to auto batteries. Recently, it hired a bevy of engineers, just one of whom had already filed for 17 in his former career, according to a *Thomson Reuters* analysis. The recent spate of hires and patent filings reviewed by *Reuters* shows that Apple is fast building its industrial Li-ion battery capabilities, adding to evidence the iPhone maker may be developing a car.

Apple has filed far fewer of these patents than rivals, perhaps adding impetus to its recent hiring binge as it seeks to get up to speed in battery technologies and other car-building related expertise.

As of 18 months ago, Apple had filed for 290 such patents. By contrast, Samsung, which has been providing electric vehicle batteries for some years, had close to 900 filings involving auto battery technology alone.

The U.S. government makes patent applications public only after 18 months, so the *Reuters* figures do not reflect any patents filed in 2014.

Demand Energy To Install Energy Storage In NYC

New York City, New York-based property developer Glenwood is deploying the first megawatt of distributed energy storage systems across a select group of buildings in its real estate portfolio.

Glenwood has contracted with Liberty Lake, Washington-based Demand Energy for installation and systems-integration work using battery systems from EnerSys.

The energy storage systems are expected to be operational for the summer peak load season and will support the Indian Point Demand Management Program that Con Edison and the New York State Energy Research and Development Authority are offering to commercial customers.

Glenwood says the deployment of an aggregated 1MW of energy storage across its properties represents the first example of a networked distributed energy storage portfolio in NYC that is capable of managing individual building loads in real time or responding as an aggregated asset to a critical power event called by Con Edison or the New York Independent System Operator.

BYD Takes Aim at Tesla in Battery Factory Race

Chinese automaker BYD Co. Ltd, backed by Warren Buffett's Berkshire Hathaway Inc., aims to triple its production of batteries as it takes on Tesla Motors in the race to supply electric vehicles and boost energy storage.

Shenzhen-based BYD plans to add 6GWh of global production for batteries in each of the next three years. That means BYD could ramp up from 10GWh capacity at the end of this year to about 34GWh of batteries by the beginning of 2020. This would put it about even with Tesla's planned $5 billion Nevada gigafactory.

The companies are fast emerging as two of the key players in the nascent electricity storage sector.

BYD ended last year with 4GWh of capacity and will be at 10GWh later this year. The U.S. energy storage market is expected to triple this year to 220MW.

Most of BYD's production is in China, but the company is opening a major new factory in Brazil this year that will contribute meaningfully to output next year, says company spokesperson Matthew Jurjevich.

TECHNICAL ARTICLE

Taking Rapid Battery Charging From Fanciful Claims to Real World Applications

Lou Josephs, CEO
Chargetek Inc.
Camarillo, California

In our battery-powered world, charging your batteries in minutes rather than hours is the Holy Grail of modern consumer and industrial electronics. From forklifts to electric automobiles and portable defibrillators to cell phones, rapid charging saves money, saves time and can even save lives. During the last few years, many companies have reported the development of rapid battery charging technologies. But have they really done so?

The Warpcharge technology was developed as a joint venture between Chargetek Inc. and Potential Difference Inc. (PDI). Although there have been dubious 'rapid charging' claims and products in recent years, our new Warpcharge algorithm is a true state-of-the-art, market-ready advance in battery charging technology. Based on proven patents, chemical analysis, and confirmed with extensive testing, Warpcharge will outperform any other technology available on the market today. It will safely charge lithium ion batteries to 80% capacity in just 20 minutes as well as producing similar results with lead acid batteries.

Covered by two patented innovations, The Warpcharge algorithm is equally effective in dramatically reducing charging time for all dominant battery technologies in use today. These include lithium cobalt oxide, lithium iron phosphate, lead-based chemistries such as flooded, maintenance-free, AGM and SLA.

Prior to the development of Warpcharge technology, the challenge for rapid charging was maintaining a significant battery charge acceptance while charging at an elevated current. Exceeding maximum battery voltage and temperature during charge will cause overheating or physical degradation, resulting in severely reduced battery life and unsafe conditions. The battery damaging consequence of existing high current charging technology results in concentration polarization and electrochemical polarization.

Concentration polarization is a condition wherein the battery solution (electrolyte) has a higher concentration

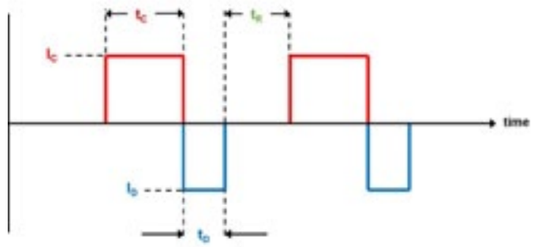
at one electrode than the other. This results in excessive voltage that damages the battery. Electrochemical polarization is an imbalance of ions and a difference in electrochemical reaction speed between the two battery electrodes. This reduces the charge acceptance and causes excessive battery temperature.

The technical hurdle, now overcome with Warpcharge technology, is to provide the proper current required while maintaining both battery safety and battery life. The Warpcharge algorithm accomplishes this by utilizing two patented battery-charging mechanisms:

- Warpcharge reduces electrochemical polarization by providing regular rest periods to allow the ions to disperse evenly between the two electrodes
- Warpcharge eliminates concentration polarization by applying a comparatively short duration reverse pulse

The following is a brief explanation of the Warpcharge algorithm that is comprised of three fundamental components:

- **Charge current pulse:** The amplitude (I_C) and duration (t_C) are depicted in red. A charge current of two to four times the amp hour rating of the battery is typically employed
- **Discharge current pulse:** The amplitude (I_D) and duration (t_D) are depicted in blue. The magnitude of this current is equal or greater to the magnitude of the charge current. The time duration is a fraction of the charging current
- **Rest time:** The battery current is zero (t_R) cooling and settling of the electrolyte occurs (t_R)



During the entire charging process, battery temperature, voltage and current are continually monitored and modulated by the proprietary Warpcharge software which automatically adjusts the parameters of the algorithm in real time during the charge.

20 Minute recharge…a major competitive market advantage for OEMs. By reducing charging time in excess of 65%, electric automobile manufacturers, using

Warpcharge technology, can charge batteries in time frames that mirror gas-refueling times. Solar and wind power generators will be able to use maximum power storage when available and can be power-scalable depending upon weather conditions. Concurrent charging provides the ability to charge two forklifts simultaneously, reducing both the need and cost of extra vehicles while minimizing downtime of personnel and equipment. Users of cell phones, laptops, portable medical devices and power tools are often stranded while waiting several hours for their equipment to recharge. This 20-minute recharge can solve that problem from 110VAC or from an automobile socket.

Available to OEMs as a deliverable product or through licensing the technology. The design and implementation of the Warpcharge algorithm and its family of charging products is the result of a lengthy collaboration between Chargetek Inc. and PDI. Chargetek serves as the OEM product design, manufacturing partner and chief architect of all Warpcharge products. PDI manages all licensing rights for the technology. During the development of the technology, PDI was responsible for testing several Warpcharge battery charging prototypes, modifications of the charging algorithm and conducting real world testing of chargers.

About Chargetek Inc. The privately owned company based in Camaillo, California, designs and manufactures a broad range of standard and custom power electronics including battery chargers, custom power conversion systems, as well as battery monitoring and control equipment. Chargetek's manufacturing facility is located in Taipei, Taiwan (ATCT Co., Ltd.). This facility is ISO9001: 2008 certified and employs the latest technology in automated testing and material management systems. Phone: 1-866-482-7930 or visit www.chargetek.com.

About Potential Difference Inc. (PDI). The privately owned company based in Las Vegas, Nevada, has developed and tested battery charging prototypes and modifications of the charging algorithm. PDI has also conducted successful real world charger testing. PDI has two patents and two patents pending for rapid battery charging techniques.

PRODUCT NEWS

Bitrode Improves FTF Pack Testers Rise Time 300%

In response to evolving needs of the electric vehicle and energy storage industry, Bitrode has significantly improved the rise time of their FTF line of pack testing equipment. A reduced rise time provides the battery chemist, pack designer, or testing laboratory with the ability to aggressively test battery pack and product designs to performance levels expected during actual use.

The transient time for the current ramp in a Bitrode FTF from 10%-90% of full charge has been decreased dramatically from approximately 15 milliseconds (ms) to less than 4ms. Similarly, the 0%-100% charge decreased from approximately 15ms to less than 8ms with no over-shoot. When operating in battery simulator mode and regulating output voltage, Bitrode's FTF products accommodate fast load current transitions from 0%-100% in less than 3ms. The result is the ability to test sudden and demanding load changes from motor drives, or similar as part of drive cycle stress testing of batteries and EV packs, as well as charging/discharging banks of ultra-capacitors.

This 300% improvement in rise time performance enhances the entire FTF product line's ability to more accurately model real-life demands on Units Under Test (UUT's). All new orders received for Bitrode's FTF products will have this performance enhancement incorporated as a standard feature.

For more information regarding Bitrode's FTF line of pack testing equipment, contact Christie Williams at 1-636-343-6112 x146, email: marketing@bitrode.com, or visit www.bitrode.com.

For customers with existing FTF units, who are interested in acquiring this upgrade in product performance, contact Bitrode Technical Service and Support, phone: 1-888-343-6112 or email: service1@bitrode.com.

Rayovac FUSION Long-Lasting Alkaline Battery

Rayovac, a worldwide leader in battery power and innovation, introduces its highest-performing alkaline battery, FUSION.

This battery lasts 35% longer than Energizer Max. Rayovac's new FUSION is developed to meet the growing power demands of today's "Always On" consumer. Made in Fennimore, Wisconsin, Rayovac's FUSION features an innovative new slim seal technology and optimized chemistry which increases battery performance.

FUSION is available for purchase online and at retail stores nationwide. For more information, visit www.rayovac.com.

Emerson Introduces New GVX Vibration Welders

Branson Ultrasonics Corp., an Emerson business, has launched its new GVX Series of vibration welders for advanced industrial assembly applications that delivers greater precision, consistency and speed.

The company introduced the GVX-3H as the first product in the new lineup with additional models planned. These welders provide numerous performance benefits, an improved operator experience and are globally supported by Branson.

Powered by Industrial PC-Controlled Servo Drives, the GVX Series welders offer a variety of performance benefits, including improved flexibility and control through closed-loop feedback with differentiated control levels, as well as reduced cycle times. The GVX Series provides operators with an improved experience with its exceptionally user-friendly Human Machine Interface developed using multiple-user personas, an improved sequence editor, intuitive navigation and enhanced screen display.

The vibration welders also are available with Branson's exclusive, infrared pre-heating feature for applications requiring clean welds that are virtually free of particulates, angel hair, or other visible contaminants.

"As a pioneer in vibration welding, Branson continues to innovate and provide solutions for the needs of advanced industrial assembly with its new GVX vibration welders that deliver unprecedented welding performance," says John Paul Kurpiewski, director, global product management, non-Ultrasonics for Branson.

The GVX joins Branson's global product platform, which provides multinational customers with the benefits of faster, more economical delivery; globally uniform tooling interface; tool interchangeability in 90% of applications; and local supply, customer service and maintenance.

Visit www.BransonUltrasonics.com for more information.

U.S. BATTERY AND FUEL CELL PATENTS

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U.S. 8,926,860 (20150106), Cathode active material with whole particle concentration gradient for lithium secondary battery, method for preparing the same, and lithium secondary battery having the same, Yang-Kook Sun and Hyung Joo Noh, Industry-University Cooperation Foundation Hanyang University (KR).

U.S. 8,927,068 (20150106), Methods to fabricate variations in porosity of lithium ion battery electrode films, Karl M. Brown, Hooman Bolandi, Victor Pebenito, Josef Thomas Hoog, and Connie P. Wang, Applied Materials, Inc.

U.S. 8,927,123 (20150106), Cap assembly of cylindrical rechargeable battery and cylindrical rechargeable battery, Je Jun Lee, Sung Jong Kim, Cha Hun Ku, and Hong-Jeong Kim, LG Chem, Ltd. (KR).

U.S. 8,927,124 (20150106), Battery pack, Dea-Yon Moon and Sang-Hun Park, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,125 (20150106), Quenching system, Majid Keshavarz, Saroj Kumar Sahu, and Ge Zu, Imergy Power Systems, Inc.

U.S. 8,927,126 (20150106), Protection circuit assembly and battery pack having the same, Bong-Young Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,127 (20150106), Square lithium secondary battery, Kunio Hosoya and Kunio Kimura, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 8,927,128 (20150106), Battery unit, Kazunori Kuroda, Honda Motor Co., Ltd. (JP).

U.S. 8,927,129 (20150106), Interconnection-less liquid fin design for battery cooling module, Axel Heise, GM Global Technology Operations LLC.

U.S. 8,927,130 (20150106), Electrolyte for redox flow battery and redox flow battery including the same, Jun-young Mun, Seung-sik Hwang, Doo-yeon Lee, Hyung-tae Kim, Young-gyu Kim, Oh-min Kwon, and Tae-eun Yim, Samsung Electronics Co., Ltd. (KR) and Seoul National University R&DB Foundation (KR).

U.S. 8,927,131 (20150106), Battery thermal interfaces with microencapsulated phase change materials for enhanced heat exchange properties, Xiaohui Jasmine Wang, GM Global Technology Operations LLC.

U.S. 8,927,132 (20150106), Rechargeable battery pack, Moon-Gil Kang, Jung-Seok An, and Jin-Hwan Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,133 (20150106), Temperature dependent ionic gate, Qinbai Fan, Gas Technology Institute.

U.S. 8,927,134 (20150106), Separator having porous coating layer and electrochemical device having the same, Hyung-Kyun Yu,

Jong-Hun Kim, and Jang-Hyuk Hong, LG Chem, Ltd. (KR).

U.S. 8,927,135 (20150106), Microporous foil for batteries having shutdown function, Detlef Busch and Bertram Schmitz, Treofan Germany GmbH & Co. KG (DE).

U.S. 8,927,136 (20150106), Battery cover insulator system for fluid communication with battery vents, Myung-Chul Kim, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,927,137 (20150106), Fail safe damage resistant battery matrix, Ilyas Ayub, Kenneth Habegger, Matthew Umles, William Mark Batts, and Albert Hopfer, MicroSun Technologies LLC.

U.S. 8,927,138 (20150106), Battery pack having improved welding efficiency, Sangdo Heo, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,139 (20150106), Pouch type battery, Jaehyung Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,140 (20150106), Secondary battery, Dae-June Jeong, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,141 (20150106), Rechargeable battery, Hyo-Seob Kim and Chun-Mo Yang, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,927,142 (20150106), Electrochemical device using magnesium elementcontaining negative electrode, Takeshi Kamizono and Gang Xie, Aisin Seiki Kabushiki Kaisha (JP).

U.S. 8,927,143 (20150106), Aluminum storage battery, John E. Stauffer.

U.S. 8,927,144 (20150106), Reinforcing material for battery cell and battery cell including the same, Jun-Sik Kim, Su-Hee Han, and Chong-Hoon Lee, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,145 (20150106), Non-aqueous electrolyte battery and positive electrode, and method for manufacturing the same, Shinya Wakita and Izaya Okae, Sony Corp. (JP).

U.S. **8,927,146 (20150106), Low noise battery,** Andre John Van Schyndel, Blackberry Ltd. (CA).

U.S. 8,927,147 (20150106), Negative electrode base member, Koichi Misumi, Koji Saito, Mitsuhiro Watanabe, and Hideo Honma, Kanto Gakuin School Corp. (JP) and Tokyo Ohka Kogyo Co., Ltd. (JP).

U.S. 8,927,148 (20150106), Power storage device, Takahiro Kawakami, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 8,927,149 (20150106), Negative electrode for lithium ion secondary battery and battery using same, Kenji Ohara, Hiroaki Tanizaki, and Norikazu Mineo, Nissan Motor Co., Ltd. (JP).

U.S. 8,927,150 (20150106), Binder and positive active material composition for rechargeable lithium battery, and rechargeable lithium battery including same, Nam-Soon Choi, Man-Seok Han, Tae-Keun Kim, Jin-Kyu Hong, and Sung-Soo Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,151 (20150106), Binder composition for electrodes and electrode mix slurry, Koji Moriuchi and Yasuaki Takeda, IST Corp. (JP).

U.S. 8,927,152 (20150106), Binder for electrode of lithium rechargeable battery and electrode for rechargeable battery comprising the same, Byungjoo Chung, Namseon Kim, Yangsoo Kim, and Kwangshik Choi, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,153 (20150106), Cathode active material for lithium secondary batteries with core of lithium metal oxide and shell of lithium iron phosphate oxide, method of preparing the same, and lithium secondary batteries comprising the same, Seong-Bae Kim, Woo-Seong Kim, Ji-Jun Hong, Sung-Tae Koh, and Yoon-Jeong Heo, Daejung EM Co., Ltd. (KR) and Kokam Co., Ltd. (KR).

U.S. 8,927,154 (20150106), Lithium titanium oxide, method of preparing lithium titanium oxide, and lithium rechargeable battery including lithium titanium oxide, Jong-Hee Lee, Young-Su Kim, Jae-Myung Kim, Kyu-Nam Joo, So-Ra Lee, Deok-Hyun Kim, Gu-Hyun Chung, Beom-Kwon Kim, and Yong-Mi Yu, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,155 (20150106), Non-aqueous electrolyte secondary battery and producing method of electrode, Junichi Tadano, Sony Corp. (JP).

U.S. 8,927,156 (20150106), Power storage device, Shunpei Yamazaki and Konami Izumi, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 8,927,157 (20150106), Condensed polycyclic aromatic compound, production process of same, and positive electrode active material for lithium ion secondary battery containing same, Osamu Ohmori, Akiko Shima, Hitotoshi Murase, Masataka Nakanishi, Junichi Niwa, and Kimihisa Yamamoto, Kabushiki Kaisha Toyota Jidoshokki (JP) and Keio University (JP).

U.S. 8,927,158 (20150106), Nonaqueous electrolyte secondary battery and nonaqueous electrolytic solution for nonaqueous electrolyte secondary battery, Hidekazu Yamamoto, Kouhei Tuduki, Taizou Sunano, Maruo Kamino, Youichi Ohashi, and Minoru Kotato, SANYO Electric Co., Ltd. (JP) and Mitsubishi Chemical Corp. (JP).

U.S. 8,927,159 (20150106), Non-aqueous electrolyte and lithium secondary battery using the same, Sung-Hoon Yu, Doo-Kyung Yang, Jong-Ho Jeon, and Min-Jung Jou, LG Chem, Ltd. (KR).

U.S. 8,927,160 (20150106), Pentacyclic anion salt and use thereof as an electrolyte, Michel Armand, Sylvie Grugeon, Stephane Laruelle, Maria Bukowska, Przemyslaw Szczecinski, Wladyslaw Wieczorek, Leszek Niedzicky, Bruno Scrosati, Stefania Panero, and Priscilla Realle, Centre National de la Recherche Scientifique (FR), Universite de Rome "La Sapienza" (IT), Universite de Picardie Jules Verne (FR), and Universite de Technologie de Varsovie (PL).

U.S. 8,927,161 (20150106), Fuel cell system, Tomoyoshi Kobayashi, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,927,162 (20150106), Solid oxide fuel cell system performing different restart operations depending on operation temperature, Yousuke Akagi, Naoki Watanabe, Shuichiro Saigan, and Nobuo Isaka, Toto Ltd. (JP).

U.S. 8,927,163 (20150106), Apparatus for portable fuel cells and operating method thereof, Jaeyoung Lee, Suk-Woo Nam, Tae Hoon Lim, In Hwan Oh, Sung Pil Yoon, Seong Ahn Hong, Jonghee Han, Hyoung-Juhn Kim, Eun Ae Cho, Hyung Chul Hahm, and Yeong Cheon Kim, Korea Institute of Science and Technology (KR).

U.S. 8,927,164 (20150106), Fuel cell system with scavenging means and control unit thereof, Shinji Aso, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,927,165 (20150106), Stack cathode inlet RH (relative humidity) control without RH sensing device feedback, Dongmei Chen, Victor W. Logan, and Matthew C. Kirklin, GM Global Technology Operations LLC.

U.S. 8,927,166 (20150106), Indirect internal reforming solid oxide fuel cell and method for shutting down the same, Susumu Hatada, JX Nippon Oil & Energy Corp. (JP).

U.S. 8,927,167 (20150106), Fuel cell system and driving method thereof, Jun-Young Park, Jin-Hwa Lee, Seong-Jin An, Chi-Seung Lee, and Jun-Won Suh, Samsung SDI Co., Ltd. (KR).

U.S. 8,927,168 (20150106), Fuel cell system control during low efficiency operation, Yoshiaki Naganuma, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,927,169 (20150106), Fuel cell system and mobile body, Hiroyuki Yumiya, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,927,170 (20150106), Flow field plate for reduced pressure drop in coolant, Simon Farrington and Richard Fellows, Daimler AG (DE) and Ford Motor Co.

U.S. 8,927,171 (20150106), Method for preventing pressure in vessels from dropping below minimum allowable pressure, Ralph Hobmeyr, Heiko Hrobarsch, and Björn Zörner, GM Global Technology Operations LLC.

U.S. 8,927,172 (20150106), Flat-tubular solid oxide cell stack, Sun-Dong Kim, Ji-Haeng Yu, In-Sub Han, Doo-Won Seo, Kee-Seog Hong, Se-Young Kim, and Sang-Kuk Woo, Korea Institute of Energy Research (KR).

U.S. 8,927,173 (20150106), Porous electrode substrate, method for producing the same, membrane electrode assembly, and polymer electrolyte fuel cell, Kazuhiro Sumioka and Yoshihiro Sako, Mitsubishi Rayon Co., Ltd. (JP).

U.S. 8,927,174 (20150106), Sealing structure of fuel cell, Shinichiro Taguchi and Shigeru Watanabe, NOK Corp. (JP).

U.S. 8,927,175 (20150106), Pump and fuel cell system having a pump, Oliver Harr, Andreas Knoop, Cosimo S. Mazzotta, Patrick L. Padgett, Hans-Joerg Schabel, and Klaus Scherrbacher, Daimler AG (DE).

U.S. 8,927,176 (20150106), Current collector plates of bulk-solidifying amorphous alloys, Trevor Wende, Crucible Intellectual Property, LLC.

U.S. 8,927,177 (20150106), Methods for preparing carbon black sheet with metallic nanoparticle thin layer by electrophoresis deposition and membrane electrode assembly (MEA) for proton exchange membrane fuel cell, Yeon Tae Yu, Industrial Cooperation Foundation Chonbuk National University (KR).

U.S. 8,927,612 (20150106), Composite having ion exchange function and preparation method and use thereof, Yongming Zhang, Junke Tang, Ping Liu, Heng Zhang, and Jun Wang, Shandong Huaxia Shenzhou New Material Co., Ltd. (CN).

U.S. 8,928,174 (20150106), Battery control apparatus, battery control method, and vehicle, Kazuhiro Muto and Masanobu Mera, The Japan Research Institute, Ltd. (JP).

U.S. 8,928,281 (20150106), Battery control apparatus, vehicle, and battery control method, Hiroaki Murase and Kazuhiro Muto, ITOCHU Corp. (JP) and The Japan Research Institute, Ltd. (JP).

U.S. 8,928,282 (20150106), Control system for assembled battery, Akihiko Kudo and Kenji Nakai, Hitachi Automotive Systems, Ltd. (JP).

U.S. 8,928,283 (20150106), Electricity storage system having a plurality of seriesconnected storage cells, Fumiaki Nakao, FDK Corp. (JP).

U.S. 8,928,286 (20150106), Very long cycling of lithium ion batteries with lithium rich cathode materials, Shabab Amiruddin, Bing Li, and Sujeet Kumar, Envia Systems, Inc.

U.S. 8,928,287 (20150106), Control apparatus, control apparatus network and control method, Hiroyuki Abe and Tetsuya Hatta, NGK Insulators, Ltd. (JP).

U.S. 8,928,288 (20150106), Controller, controller network and control method, Hiroyuki Abe and Tetsuya Hatta, NGK Insulators, Ltd. (JP).

U.S. 8,928,326 (20150106), System and method for monitoring electrolyte levels in a battery, Duncan Jones and John Worthington, Philadelphia Scientific LLC.

U.S. 8,928,328 (20150106), Testing device for solid oxide fuel cell, Shih-Wei Cheng, Yaw-Hwa Shiu, Yung-Neng Cheng, and Ruey-Yi Lee, Institute of Nuclear Energy Research Atomic Energy Council, Executive Yuan (TW).

U.S. 8,932,086 (20150113), Battery terminal lug equipped with shunt for measuring battery current, Alain Thimon, Denis Gravat, Sébastien Perard, Nicolas Bogaert, Emmanuel Ryckebusch, Christophe Monteil, and Hugues Gervais, Valeo Equipements Electriques Moteur (FR).

U.S. 8,932,480 (20150113), Stoichimetric lithium cobalt oxide and method for preparation of the same, Jens M. Paulsen, Sun Sik Shin, and Hong-Kyu Park, LG Chem, Ltd. (KR).

U.S. 8,932,481 (20150113), Cathode active material, method of preparing the same, and cathode and lithium battery including the cathode active material, Kyu-sung Park and Young-min Choi, Samsung SDI Co., Ltd. (KR).

U.S. 8,932,482 (20150113), Lead-acid batteries and pastes therefor, Paolina Atanassova, Berislav Blizanac, Miodrag Oljaca, Toivo T Kodas, Geoffrey D. Moeser, Pavel A. Kossyrev, and Ned J. Hardman, Cabot Corp.

U.S. 8,932,509 (20150113), Solid electrolyte membrane, method and apparatus of producing the same, membrane electrode assembly, and fuel cell, Hiroshi Miyachi and Ryo Takeda, Fujifilm Corp. (JP).

U.S. 8,932,738 (20150113), Fuel cell assembly structure, Dung-Di Yu, Yung-Neng Cheng, Ruey-Yi Lee, and Chien-Hsiung Lee, Institute of Nuclear Energy Research (TW).

U.S. 8,932,739 (20150113), Battery pack configuration to reduce hazards associated with internal short circuits, Weston Arthur Hermann, Scott Ira Kohn, and David G. Beck, Tesla Motors, Inc.

U.S. 8,932,740 (20150113), Battery cell and method of manufacturing the same, Noriyoshi Munenaga and Taku Nakamura, GS Yuasa International Ltd. (JP).

U.S. 8,932,741 (20150113), Conductor plate for a vehicle battery module, Martin Eberhard, Rob Sweney, and Tobias Steiner, Volkswagen AG (DE) and Audi AG (DE).

U.S. 8,932,742 (20150113), Battery pack and heatsink frame including heatsink walls and heatsink fins, Jihyoung Yoon, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,932,744 (20150113), Current collector, anode, and battery, Takakazu Hirose, Masayuki Iwama, and Kenichi Kawase, Sony Corp. (JP).

U.S. 8,932,745 (20150113), Method for connecting cell outgoing conductors and battery arrangement, Simon Abraham, Nevzat Guener, Hans-Georg Schweiger, and Stefan Tillmann, Continental Automotive GmbH, (DE).

U.S. 8,932,746 (20150113), Separator for non-aqueous rechargeable lithium battery, Hideaki Maeda, Masaki Koike, Hironari Takase, and Geun-Bae Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,932,747 (20150113), Lithium battery and electrode plate structure, Ping-Yao Wu, Wen-Bing Chu, Chang-Rung Yang, Jen-Jeh Lee, Jing-Pin Pan, Jung-Mu Hsu, Shu- Heng Wen, Hung-Chun Wu, and Chung-Liang Chang, Industrial Technology Research Institute (TW).

U.S. 8,932,748 (20150113), Multi-layer, microporous polyolefin membrane, its production method, and battery separator, Shintaro Kikuchi and Kotaro Takita, Toray Battery Separator Film Co., Ltd. (JP).

U.S. 8,932,749 (20150113), Battery module, Young-Bin Lim, Samsung SDI Co, Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,932,750 (20150113), Aluminum housing with a hermetic seal, John J. Cooley, Riccardo Signorelli, Christopher J. S. Deane, and James Epstein, FastCap Systems Corp.

U.S. 8,932,751 (20150113), Rechargeable battery, Yoon-Cheol Jeon, Samsung SDI Co., Ltd. (KR).

U.S. 8,932,752 (20150113), Battery having a bent case and battery pack including the same, Minhyung Guen and Sangwon Byun, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,932,753 (20150113), Lead alkaline battery, John E. Stauffer.

U.S. 8,932,754 (20150113), Electrode structure and method of manufacturing the same, and battery and method of manufacturing the same, Hironori Shibata, Akira Sasaki, and Kazuhiko Soji, Sony Corp. (JP).

U.S. 8,932,755 (20150113), Spreading means for the active material of a negative electrode, Frank Johns, Johnson Controls Autobatterie GmbH & Co. KGaA (DE).

U.S. 8,932,756 (20150113), Battery including a fluorine resin, Takakazu Hirose, Hideki Nakai, Kenichi Kawase, Hiroyuki Yamaguchi, and Tadahiko Kubot, Sony Corp. (JP).

U.S. 8,932,757 (20150113), Anode for lithium ion secondary battery, lithium ion secondary battery, electric tool, battery car, and electric power storage system, Takashi Fujinaga, Shunsuke Kurasawa, Momoe Adachi, and Kenichi Kawase, Sony Corp. (JP).

U.S. 8,932,758 (20150113), Electrode active material, nonaqueous secondary battery electrode, and nonaqueous secondary battery, Nobuhiro Ogihara and Takao Inoue, Kabushiki Kaisha Toyota Chuo Kenkyusho (JP).

U.S. 8,932,759 (20150113), Method of fabricating structured particles composed of silicon or a silicon-based material, Mino Green and Feng-Ming Liu, Nexeon Ltd. (GB).

U.S. 8,932,760 (20150113), High capacity cathode material

32nd International Battery Seminar & Exhibit

March 9-12, 2015 in Fort Lauderdale, Florida

Held at the Broward County Convention Center and organized by the Knowledge Foundation and CHI with industry expert Shep Wolsky, this is the longest running annual meeting in the battery industry.

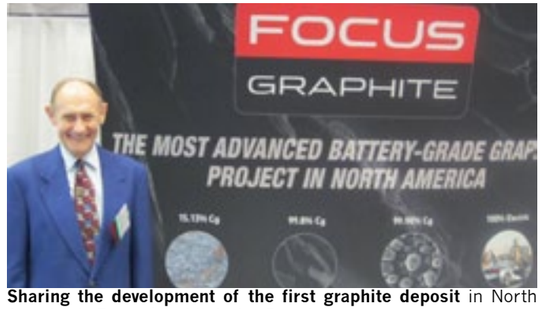
Next year's show will be held March 21-24, 2016. Mark your calendar!

After the awards ceremony for the first annual Battery Innovator of the Year Award are Knowledge Foundation's Craig Wohlers, award recipient Victor Koch, Shep Wolsky, and CHI's Philips Kuhl.

Discussing his start-up business is ALGOLiOn's Alex Nimberger with Steve Pred and Helga Grill of Pred Materials.

Providing precision battery enclosures and seamless battery solutions is John Marfiak of Hudson Technologies.

With Bitrode's FTF-HP high power laboratory testing system at the show is Howard Muchnick.



Sharing the development of the first graphite deposit in North America is Focus Graphite's Joe Donninger.

Visiting in ABT's booth are speaker Rachid Yazami of Nanyang Technological Unversity with the show's founder Shep Wolsky.

Explaining the benefits of Dexmet's new 25 micron thick expanded metal foils are Dexmet's Steve Tucker and John Hart.

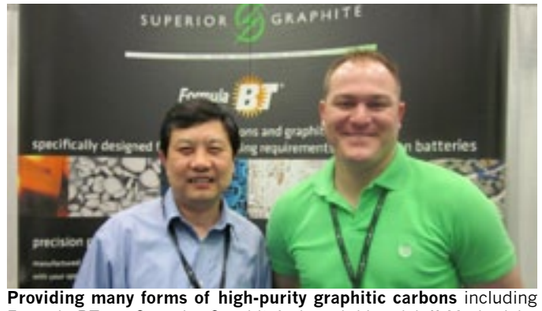
Designing and manufacturing custom dry rooms sized 100 sq. ft. to 75,000 sq. ft. for Li-ion research and production facilities are SCS's Ben Bell and Jeff Mitchell.

Explaining the benefits of the first solid state silicon carbine technology testing equipment is Digatron's Nick Hennen with Argonne's Chistopher Claxton.

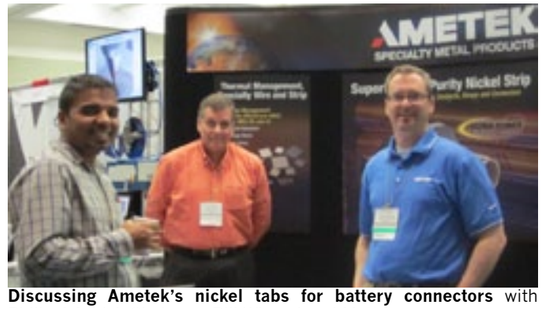
Designing and manufacturing laminators for Li-ions is Innovative Machine's Dan Nielsen visiting with Hibar Systems' Kelvin Gryder.

Demonstrating battery tab welding equipment at the show is Branson Ultrasonic's Joe Stacy.

Sharing the benefits of the standardized and custom options on the BT-2000 test station is Arbin's Stephen Parker (right).



Providing many forms of high-purity graphitic carbons including Formula BT are Superior Graphite's Joseph Li and Jeff Markovich.



Discussing Ametek's nickel tabs for battery connectors with Philips' Ashish Shah, are Bill Wieand and Matt Lappen.

Watch for ABT's meeting report on the 32nd International Battery Seminar written by Rick Howard of Howard Battery Consulting.

for a magnesium battery, Ruigang Zhang and Fuminori Mizuno, Toyota Motor Engineering & Manufacturing North America, Inc.

U.S. 8,932,761 (20150113), Anode and method of manufacturing the same, and battery and method of manufacturing the same, Hiroyuki Yamaguchi, Hiroshi Horiuchi, Kenichi Kawase, Tadahiko Kubota, Hideki Nakai, and Takakazu Hirose, Sony Corp. (JP).

U.S. 8,932,762 (20150113), Active material and positive electrode and lithium-ion second battery using same, Atsushi Sano, Keitaro Otsuki, Yosuke Miyaki, Takeshi Takahashi, and Akiji Higuchi, TDK Corp. (JP).

U.S. 8,932,763 (20150113), Anode active material, non-aqueous lithium secondary battery including the same, and manufacturing method thereof, Young Jun Kim, Yong Nam Jo, and Min Sik Park, Korea Electronics Technology Institute (KR).

U.S. 8,932,764 (20150113), Core-shell composites for sulfur-based cathodes in metalion batteries, Gleb Nikolayevich Yushin, Bogdan Zdyrko, Igor Luzinov, Vojtech Svoboda, Alexander Thomas Jacobs, Eugene Michael Berdichevsky, and Hyea Kim, Sila Nanotechnologies Inc.

U.S. 8,932,765 (20150113), Electrode assembly for electric storage device and electric storage device, Akihiko Miyazaki, Sumio Mori, Taro Yamafuku, and Minoru Teshima, GS Yuasa International Ltd. (JP).

U.S. 8,932,767 (20150113), Nonaqueous electrolyte lithium secondary battery, Tomoyoshi Ueki, Harunari Shimamura, and Yusuke Fukumoto, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,932,768 (20150113), Cathode material for lithium batteries, Sang-Ho Park and Khalil Amine, UChicago Argonne, LLC.

U.S. 8,932,770 (20150113), Electrodes for use in bacterial fuel cells and bacterial electrolysis cells and bacterial fuel cells and bacterial electrolysis cells employing such electrodes, Ronen Itzhak Shechter, Eytan Baruch Levy, and Lior Eshed, Emefcy Ltd. (IL).

U.S. 8,932,771 (20150113), Cathode architectures for alkali metal/oxygen batteries, Steven J. Visco, Vitaliy Nimon, Lutgard C. De Jonghe, Yury Volfkovich, and Daniil Bograchev, PolyPlus Battery Company.

U.S. 8,932,772 (20150113), Fuel cell system and method of stopping fuel cell system, Hideyuki Kumei, Manabu Kato, and Michihito Tanaka, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,932,775 (20150113), Method and apparatus for controlling the operation of a fuel cell, Shigetaka Hamada, Robert M. Darling, and Shampa Kandoi, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,932,776 (20150113), Solid oxide fuel cell device and system, Alan Devoe and Lambert Devoe.

U.S. 8,932,777 (20150113), Fuel supply system with compressed gas and liquid fuel chambers for fuel cells, Andrew J. Curello and Paul Spahr, Société BIC (FR).

U.S. 8,932,778 (20150113), Fuel cell with fuel gas outlets, Koji Dan and Yukihiko Kiyohiro, Honda Motor Co., Ltd. (JP).

U.S. 8,932,779 (20150113), Device for solid oxide fuel cell or solid oxide electrolysis cell comprising integral one-piece current collector and manifold, Sun-Dong Kim, Doo-Won Seo, In-Sub Han, Ji-Haeng Yu, Se-Young Kim, and Sang-Kuk Woo, Korea Institute of Energy Research (KR).

U.S. 8,932,780 (20150113), Fuel cell, Steven J. Eickhoff, Honeywell International Inc.

U.S. 8,932,781 (20150113), Chemical compositions, methods of making the chemical compositions, and structures made from the chemical compositions, Lei Yang, Zhe Cheng, Ze Liu, and Meilin Liu, Georgia Tech Research Corp.

U.S. 8,932,782 (20150113), Process for the preparation of sol-gel modified alternative Nafion-Silica composite membrane useful for polymer electrolyte fuel cell, Akhila Kumar Sahu, Ganesh Selvarani, Sethuraman Pitchumani, Parthasarathi Sridhar, and Ashok Kumar Shukla, Council of Scientific and Industrial Research (IN).

U.S. 8,932,783 (20150113), Solid oxide fuel cell or solid oxide fuel cell sub-component and methods of preparing same, Merrill Ruth Watts, Sudath Dharma Kumara Amarasinghe, and Jonathan Gerald Love, Ceramic Fuel Cells Ltd. (AU).

U.S. 8,932,784 (20150113), Fuel cell, Kouji Matsuoka and Shigeru Sakamoto, JX Nippon Oil & Energy Corp. (JP).

U.S. 8,933,661 (20150113), Integrated inductive and conductive electrical charging system, Troy A. Nergaard and Jeffrey Brian Straubel, Tesla Motors, Inc.

U.S. 8,933,662 (20150113), Charging apparatus for lead storage battery, Shuzo Nishino, Daifuku Co., Ltd. (JP).

U.S. 8,933,665 (20150113), Balancing voltages between battery banks, William C. Athas and Thomas C. Greening, Apple Inc.

U.S. 8,933,666 (20150113), Device and method for continuously equalizing the charge state of lithium ion battery cells, Paul D Schwartz, Mark N Martin, and Lewis M Roufberg, The Johns Hopkins University.

U.S. 8,933,667 (20150113), Apparatus and method for controlling connection of battery packs, Jong-Min Park, Woo-Jung Kim, and Eung-Yong Kim, LG Chem, Ltd. (KR).

U.S. 8,933,669 (20150113), Reclaiming energy stored in rechargeable batteries for charging other batteries, Chieh Luo and Derek Justin Goldberg, Peak Power & Mfg, Inc and Easy Field Corp. (TW).

U.S. 8,933,671 (20150113), System and method for allocating identifier to multi-BMS, Hyun-Chul Lee, Jong-Min Park, and Yeong-Ju Kang, LG Chem, Ltd. (KR).

U.S. 8,933,672 (20150113), Charging management method and apparatus for storage battery, Baohang Zhou, Mingming Liu, Yanni Meng, Lingqiao Teng, and Shuwang Wei, ZTE Corp. (CN).

U.S. 8,933,673 (20150113), Method and system for charging batteries using a kinetic model, Zafer Sahinoglu, Xusheng Sun, and Koon Hoo Teo, Mitsubishi Electric Research Laboratories, Inc.

U.S. 8,933,701 (20150113), Mass distribution indication of flow battery state of charge, Peter Tennessen, Alisa Peterson, Paul Kreiner, Lauren Wessel Hart, Ryan Larsen, and Jonathan Hall, Primus Power Corp.

U.S. 8,933,702 (20150113), Battery monitor with correction for internal OHMIC measurements of battery cells in parallel connected battery strings, Edward W. Deveau and Xiaoquan Bie, Liebert Corp.

U.S. 8,935,029 (20150113), Method for cooling an electricity storage means, Julien Sabrie, Stephane Rimaux, and Thomas Cadilhac, Peugeot Citroën Automobiles SA (FR).

U.S. 8,935,113 (20150113), Battery system for secondary battery comprising blended cathode material, and apparatus and method for managing the same, Won-Tae Joe, Geun-Chang Chung, and Sun-Young Cha, LG Chem, Ltd. (KR).

U.S. 8,935,194 (20150113), Clustering cookies for identifying unique mobile devices, Anirban Dasgupta, Liang Zhang, Maxim Gurevich, Achint Oommen Thomas, and Belle Tseng, Yahoo! Inc.

U.S. 8,936,653 (20150120), Pouch-type battery and method of assembling for the same, Joongheon Kim, Hyungbok Lee, Changsik Kim, and Jeongwon Oh, Samsung SDI Co., Ltd. (KR).

U.S. 8,936,775 (20150120), Cathode active material (higher oxides of silver), George William Adamson, Hongxia Zhou, and Kyunghee Cho, ZPower, LLC.

U.S. 8,936,860 (20150120), Battery pack with reinforcing member, Cheon-Soo Kim, Samsung SDI Co, Ltd. (KR).

U.S. 8,936,861 (20150120), Sealed battery, Akira Kiyama and Tadayoshi Yamada, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,936,862 (20150120), Cylindrical nonaqueous electrolyte battery, Yuta Kobayashi, Hisashi Tsujimoto, Masaki Kuratsuka, and Yuzuru Fukushima, Sony Corp. (JP).

U.S. 8,936,863 (20150120), Secondary battery, Chang-Bum Ahn, Samsung SDI Co., Ltd. (KR).

U.S. 8,936,864 (20150120), Batteries with phase change materials, Jihui Yang and Steven Cai, GM Global Technology Operations LLC.

U.S. 8,936,865 (20150120), Bus bar holder and battery pack including the same, Myung-Chul Kim, Samsung SDI Co, Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,936,866 (20150120), Lithium secondary battery for improving bondability of tab to polymer film, Jeon Keun Oh, Eun Sung Park, and Eun Joo Lee, SK Innovation Co., Ltd. (KR).

U.S. 8,936,867 (20150120), Secondary battery pack having PCM assembly and insulating mounting member of novel structure, Ju-Hwan Baek, Ki Eob Moon, Soonkwang Jung, and Cheol Woong Lee, LG Chem, Ltd. (KR).

U.S. 8,936,868 (20150120), Rechargeable battery, Changseob Kim, Samsung SDI Co., Ltd. (KR).

U.S. 8,936,869 (20150120), Sealed cell and method of manufacture thereof, Katsunori Suzuki, Mikio Oguma, and Sho Matsumoto, Hitachi Automotive Systems, Ltd. (JP).

U.S. 8,936,870 (20150120), Electrode structure and method for making the same, John D. Affinito and Gregory K. Lowe, Sion Power Corp.

U.S. 8,936,871 (20150120), Active material and positive electrode and lithium-ion second battery using same, Atsushi Sano, Keitaro Otsuki, Yosuke Miyaki, Takeshi Takahashi, and Akiji Higuchi, TDK Corp. (JP).

U.S. 8,936,872 (20150120), Lithium-ion secondary battery, Mayumi Fukumine, Zeon Corp. (JP).

U.S. 8,936,873 (20150120), Cathode active material and lithium secondary battery containing them, Ji Heon Ryu, Min Su Kim, Jung Eun Hyun, Jaepil Lee, Eun Ju Lee, and Youngjoon Shin, LG Chem, Ltd. (KR).

U.S. 8,936,874 (20150120), Conductive nanocomposite-based electrodes for lithium batteries, Jinjun Shi, Aruna Zhamu, and Bor Z Jang, Nanotek Instruments, Inc.

U.S. 8,936,875 (20150120), Negative electrode containing graphite for lithium ion secondary battery, Koji Takahata and Hideki Sano, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,936,876 (20150120), Carbon material for nonaqueous secondary battery, negative electrode using carbon material and nonaqueous secondary battery, Shunsuke Yamada, Tooru Fuse, and Nobuyuki Ishiwatari, Mitsubishi Chemical Corp. (JP).

U.S. 8,936,878 (20150120), Methods of making single-layer lithium ion battery separators having nanofiber and microfiber components, Brian G. Morin, Dreamweaver International, Inc.

U.S. 8,936,879 (20150120), Composite cathode active material, cathode and lithium battery containing the material and method of preparing the same, Myung-Hun Bae and Naoyuki Hase, Samsung SDI Co., Ltd. (KR).

U.S. 8,936,880 (20150120), Cylindrical lithium secondary battery with pressure activated current interruptive device, Mi-Young Son, Jeong-Ju Cho, Ho-Chun Lee, and Jong-Ho Jeon, LG Chem, Ltd. (KR).

U.S. 8,936,881 (20150120), Rechargeable lithium battery, Su-Hee Han, Samsung SDI Co., Ltd. (KR).

U.S. 8,936,882 (20150120), Electrolyte compositions for lithium and lithium-ion batteries, Daniel P. Abraham and Gang Cheng, UChicago Argonne, LLC.

U.S. 8,936,884 (20150120), Device and method for controlling the humidification of a fuel cell, Nicolas Karst and Vincent Faucheux, STMicroelectronics (Tours) SAS (FR) and Commissariat a l'Energie Atomique et aux Energies Alternatives (FR).

U.S. 8,936,885 (20150120), Fuel cell system, Mitsunori Matsumoto and Takatsugu Koyama, Honda Motor Co., Ltd. (JP).

U.S. 8,936,887 (20150120), Composite electrolyte membrane for fuel cell, method of manufacturing the membrane, and fuel cell including the membrane, Seong-woo Choi, Dae-jong Yoo, and Ki-hyun Kim, Samsung Electronics Co., Ltd. (KR).

U.S. 8,936,888 (20150120), Fuel cell system with flame protection member, Aaron T. Crumm and Timothy LaBreche, Adaptive Materials, Inc.

U.S. 8,937,105 (20150120), Expandable functional TFE copolymer fine powder, expanded products and reacted products therefrom, Ping Xu, Jack J. Hegenbarth, Xin Kang Chen, Rachel Radspinner, Paul D. Drumheller, William B. Johnson, and Wen K Liu, W. L. Gore & Associates, Inc.

U.S. 8,937,452 (20150120), Method of controlling a state-of-charge (SOC) of a vehicle battery, Jonathan R. Schwarz, Gregory E. Smith, Ian L. Hanna, and Damon R. Frisch, GM Global Technology Operations LLC.

U.S. 8,937,457 (20150120), Power management circuit of rechargeable battery stack, Sehat Sutardja and Pantas Sutardja, Marvell World Trade Ltd. (BM).

U.S. 8,937,458 (20150120), Battery heating circuits and methods with resonance components in series using voltage inversion based on predetermined conditions, Wenhui Xu, Yaochuan Han, Wei Feng, Qinyao Yang, Wenjin Xia, and Xianyin Li, BYD Co. Ltd. (CN).

U.S. 8,937,459 (20150120), Apparatus and method for estimating state of health of battery, Kyu-Ha Park and Cheol-Taek Kim, LG Chem, Ltd. (KR).

U.S. 8,937,461 (20150120), System for controlling charging of battery and battery pack comprising the same, Chilsung Park, Samsung SDI Co., Ltd. (KR).

U.S. 8,939,801 (20150127), Connector between battery modules and battery system comprising the same, Zhiwei Tong, Qing Lai, Jia Lu, and Jianhua Zhu, Shenzhen BYD Auto R&D Co. Ltd. (CN) and BYD Co. Ltd. (CN).

U.S. 8,940,112 (20150127), Method for solid oxide fuel cell fabrication, Emad El Batawi, Patrick Munoz, and Dien Nguyen, Bloom Energy Corp.

U.S. 8,940,145 (20150127), Graphene-based electrode for a supercapacitor, Bin Chen and Meyya Meyyappan, The United States of America (NASA).

U.S. 8,940,192 (20150127), Process for producing carbon particles for electrode, carbon particles for electrode, and negative-electrode material for lithium-ion secondary battery, Takuya Toyokawa, Sekisui Chemical Co., Ltd. (JP).

U.S. 8,940,196 (20150127), Silicon based shape memory alloy negative active material, negative active material composition including same, rechargeable lithium battery including same, and method of preparing same, Byung-Joo Chung and Chun-Gyoo Lee, Samsung SDI Co., Ltd. (KR).

U.S. 8,940,420 (20150127), Rechargeable battery, Min-Yeol Han, Sang-Won Byun, and Hae-Kwon Yoon, Samsung SDI Co., Ltd. (KR) and Robert Bosch GmbH (DE).

U.S. 8,940,421 (20150127), Battery module, Weiping Zhao and Young Geun Park, Tyco Electronics Corp. and Tyco Electronics AMP Korea Ltd. (KR).

U.S. 8,940,422 (20150127), Sealed battery, Masanori Ito, Tomohiro Matsuura, and Toyohiko Eto, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,940,423 (20150127), Vehicle battery pack container, Thomas J. Gadawski, LG Chem, Ltd. (KR).

U.S. 8,940,424 (20150127), Accumulator assembly for a battery of an electric or hybrid vehicle, provided with a deformable connector support, Olivier Joye and Thierry Auguet, Compagnie Generale des Etablissements Michelin (FR) and Michelin Recherche et Techniques SA (CH).

U.S. 8,940,425 (20150127), Plastic liquid heat exchanger for battery cooling system, Stefan Toepfer, GM Global Technology Operations LLC.

U.S. 8,940,426 (20150127), Apparatus for electrical energy storage, Bruno Gebhard, Alexander Hahn, Norbert Huber, Michael Meinert, and Karsten Rechenberg, Siemens Aktiengesellschaft (DE).

U.S. 8,940,428 (20150127), Separator, a lithium rechargeable battery using the same and a method of manufacture thereof, Soonki Woo, Samsung SDI Co., Ltd. (KR).

U.S. 8,940,429 (20150127), Construction of non-rectangular

batteries, Bradley L. Spare, Apple Inc.

U.S. 8,940,430 (20150127), Metallic zinc-based current collector, Jeffrey Phillips, Samaresh Mohanta, Zhen Gang Fan, Ru Jun Ma, Feng Feng, Lou Uzel, Chi Yau, Jason Zhao, and Zeiad M. Muntasser, PowerGenix Systems, Inc.

U.S. 8,940,431 (20150127), Battery and current collector, Syun Ito and Shogo Waki, GS Yuasa International Ltd. (JP).

U.S. 8,940,432 (20150127), Method for preventing erroneous loading of component-tobe- loaded on main body side apparatus, component-to-be-loaded and battery pack, Toshio Takeshita, Nobuhito Ebine, Yoshiyuki Katsuno, and Kei Tashiro, Sony Corp. (JP).

U.S. 8,940,433 (20150127), Thiazole compounds as additives in electrolyte solutions in electrochemical cells and batteries, Xiao Steimle, Itamar Michael Malkowsky, and Klaus Leitner, BASF SE (DE).

U.S. 8,940,434 (20150127), Electrolyte additive and electrolyte and lithium rechargeable battery including same, Makhmut Khasanov, Woo-Cheol Shin, Denis Chernyshov, Alexey Tereshchenko, Vladimir Egorov, and Pavel Shatunov, Samsung SDI Co., Ltd. (KR).

U.S. 8,940,435 (20150127), Tape, Sung Jong Kim, Byungkyu Jung, and Cha-Hun Ku, LG Chem, Ltd. (KR).

U.S. 8,940,436 (20150127), Sulfur-modified polyacrylonitrile, manufacturing method therefor, and application thereof, Takuhiro Miyuki, Tetsuo Sakai, Junichi Niwa, and Hitotoshi Murase, National Institute of Advanced Industrial Science and Technology (JP) and Kabushiki Kaisha Toyota Jidoshokki (JP).

U.S. 8,940,437 (20150127), Method of fabricating structured particles composed of silicon or a silicon-based material and their use in lithium rechargeable batteries, Mino Green and Feng-Ming Liu, Nexeon Ltd. (GB).

U.S. 8,940,438 (20150127), Negative electrode including group 14 metal/metalloid nanotubes, lithium battery including the negative electrode, and method of manufacturing the negative electrode, Han-su Kim, Un-gyu Paik, Jae-man Choi, Moon-seok Kwon, Tae-seob Song, and Won-il Park, Samsung Electronics Co., Ltd. (KR) and Industry-University Cooperation Foundation Hanyang University (KR).

U.S. 8,940,439 (20150127), Secondary battery, electronic device, electric power tool, electrical vehicle, and electric power storage system, Atsumichi Kawashima, Hiroshi Imoto, Tomoyuki Shiratsuchi, Takuma Sakamoto, Naoto Ueda, Atsushi Nishimoto, Tadahiko Kubota, and Masayuki Ihara, Sony Corp. (JP).

U.S. 8,940,440 (20150127), Lithium ion secondary battery active material, lithium ion secondary battery electrode, lithium ion secondary battery, electronic device, electric power tool, electric vehicle, and power storage system, Asuki Yanagihara, Satoshi Fujiki, Yosuke Hosoya, and Guohua Li, Sony Corp. (JP).

U.S. 8,940,441 (20150127), Anode and battery, Takakazu Hirose, Kenichi Kawase, Isamu Konishiike, Masayuki Iwama, and Koichi Matsumoto, Sony Corp. (JP).

U.S. 8,940,442 (20150127), Porous film and secondary battery electrode, Mayumi Fukumine and Yasuhiro Wakizaka, Zeon Corp. (JP).

U.S. 8,940,443 (20150127), Polyvinylpyridine additives for nonaqueous electrolytes activating lithium rechargeable electrochemical cells, Chi-Kyun Park, Greatbatch Ltd.

U.S. 8,940,444 (20150127), Hybrid radical energy storage device and method of making, Thomas Gennett, David S. Ginley, Wade Braunecker, Chunmei Ban, and Zbyslaw Owczarczyk, Alliance for Sustainable Energy, LLC.

U.S. 8,940,445 (20150127), Vanadium-zinc battery, John E. Stauffer.

U.S. 8,940,446 (20150127), Solid state lithium-air based battery cell, Tim Holme and Niall Donnelly, QuantumScape Corp.

U.S. 8,940,447 (20150127), Oxygen cell, Kiyoshi Tanaami, Takuya Taniuchi, Mao Hori, Hiroshi Sakai, and Yuji Isogai, Honda Motor Co, Ltd. (JP).

U.S. 8,940,448 (20150127), Fuel cell system, Kengo Ikeya, Suzuki Motor Corp. (JP).

U.S. 8,940,449 (20150127), Fuel cell, Atsuhito Yoshizawa and Kentaro Nagai, Canon Kabushiki Kaisha (JP).

U.S. 8,940,450 (20150127), Membrane electrode assembly for fuel cell and fuel cell stack, Hee-Tak Kim, Sung-Yong Cho, Tae-Yoon Kim, Kah-Young Song, Sang-Il Han, Myoung-Ki Min, Geun-Seok Chai, and Soon-Cheol Shin, Samsung SDI Co., Ltd. (KR).

U.S. 8,940,451 (20150127), Planar high-temperature fuel cell, Robert Fleck, Horst Greiner, and Alessandro Zampieri, Siemens Aktiengesellschaft (DE).

U.S. 8,940,452 (20150127), Electrode catalyst substrate and method for producing the same, and polymer electrolyte fuel cell, Kazuma Shinozaki, Atsuhito Okamoto, Tatsuya Hatanaka, Hiroaki Takahashi, Tomoaki Terada, and Takahiro Nagata, Toyota Jidosha Kabushiki Kaisha (JP) and Cataler Corp. (JP).

U.S. 8,940,453 (20150127), Electrode catalyst for fuel cell, method of manufacturing the same, and fuel cell using the electrode catalyst, Seon-ah Jin, Chan-ho Pak, Kyung-jung Kwon, Kang-hee Lee, Dae-jong Yoo, and Jong-won Lee, Samsung Electronics Co., Ltd. (KR).

U.S. 8,940,454 (20150127), Carbon-based fuel cell, Steven S. C. Chuang, The University of Akron.

U.S. 8,940,455 (20150127), Fuel cell, Ayano Kobayashi, Shinji Fujisaki, and Makoto Ohmori, NGK Insulators, Ltd. (JP).

U.S. 8,940,456 (20150127), Fuel cell and manufacturing method of the same, Jan-Dee Kim, Jun-Won Suh, Young-Sun Kwon, and Ho-Jin Kweon, Samsung SDI Co., Ltd. (KR).

U.S. 8,940,457 (20150127), Flexible graphite/metal distribution plate for a fuel cell assembly, Antonio Delfino, David Olsommer, and Felix Buchi, Compagnie Generale des Etablissements Michelin (FR) and Michelin Recherche et Techniques SA (CH).

U.S. 8,940,458 (20150127), Fuel supply for a fuel cell, Daniel Braithwaite, Jesse Thomas, Adam Rodriguez, Tobin Fisher, and Tibor Fabian, Intelligent Energy Ltd. (GB).

U.S. 8,940,459 (20150127), Alkaline fuel cell electrode catalyst, alkaline fuel cell, manufacture method for alkaline fuel cell electrode catalyst, and manufacture method for alkaline fuel cell, Haruyuki Nakanishi and Yusuke Kuzushima, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,940,460 (20150127), Catalyst ink preparation for fuel cell electrode fabrication, Nilesh Dale, Gregory DiLeo, Taehee Han, and Kevork Adjemian, Nissan North America, Inc.

U.S. 8,940,461 (20150127), Method for membrane electrode assembly fabrication and membrane electrode assembly, Junliang Zhang, Matthew Dioguardi, and Frederick T. Wagner, GM Global Technology Operations LLC.

U.S. 8,940,610 (20150127), Electrode for energy storage device and method for manufacturing the same, Kazutaka Kuriki, Tamae Moriwaka, Satoshi Murakami, and Shunpei Yamazaki, Semiconductor Energy Laboratory Co., Ltd. (JP).

U.S. 8,940,850 (20150127), Energy storage device, David R. Carver, Robert G. Carver, Sean W. Reynolds, Sean Claudius Hall, and Noah Anthony Davis, Carver Scientific, Inc.

U.S. 8,941,354 (20150127), Battery system, Byung-Il Song, Han-Seok Yun, Tetsuya Okada, Jong-Woon Yang, and Eui-Jeong Hwang, Samsung SDI Co., Ltd. (KR).

U.S. 8,941,355 (20150127), Cell balance control device that prevents temperature increase of bypass circuit substrate, Seiji Kamata and Eishin Matsumoto, Keihin Corp. (JP).

U.S. 8,941,507 (20150127), Automatic flight-safe indicator and method of use for batteries, Steve Carkner, Panacis Inc. (CA).

U.S. 8,942,075 (20150127), Battery management device, battery apparatus, disk array apparatus and battery management method, Yutaka Yoda, NEC Corp. (JP).

U.S. 8,942,855 (20150127), Power distribution system, Kei Kawaguchi and Hiroaki Koshin, Panasonic Corp. (JP).

U.S. 8,942,871 (20150127), Moving body with fuel cells mounted thereon, Naohiro Yoshida, Toshiyuki Kondo, Masahiko Hibino, Osamu Yumita, and Yoshihiro Funayama, Toyota Jidosha

Kabushiki Kaisha (JP).

U.S. 8,942,873 (20150127), Safety control system and method for hydrogen charging of fuel-cell vehicle, Hyung Ki Kim, Ki Ho Hwang, and Sang Hyun Kim, Hyundai Motor Co. (KR) and Kia Motors Corp. (KR).

U.S. 8,943,335 (20150127), Battery management and protection system using a module in a sleepwalking mode to monitor operational characteristics of a battery, Eivind Holsen, Andreas Onsum, Odd Jostein Svendsli, and Arne Aas, Atmel Corp.

RESEARCH AND DEVELOPMENT

UCR Researchers Design Next Generation of Batteries

University of Calfornia Riverside researchers have made strides in preparing a battery with 10 times more power than conventional batteries for commercialization. The research team has found a way to combat the lithium-sulfur (Li-S) battery's short lifespan, one of the major obstacles to Li-S batteries becoming widely available.

A Li-S battery's lifespan is so short because the polysulfide dissolves in the battery's electrolyte – the liquid in the battery that conducts electricity and lies between the two electrodes – and travels to the anode permanently where it becomes insoluble. This phenomenon, called polysulfide shuttling, causes the battery's capacity to

decrease over time, lasting for only a few tens of charges.

The team, managed by engineering professors Mihri and Cengiz Ozkan, created microscopic glass-coated sulfur particles to trap the polysulfide product, rendering it unable to travel to and deposit itself on the anode. Graphene oxide was later added to hold the glass and sulfur together, since the glass showed a tendency to break during the cycle. This eliminates the problem of polysulfide shuttling, increasing the battery's lifespan from 10% to 50% of a conventional battery's.

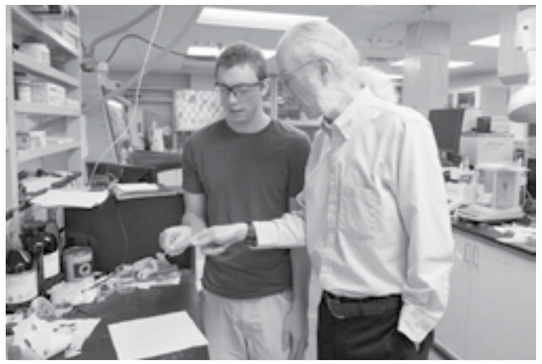
Despite the team's successes, there are other issues standing in the way of these batteries' commercialization.

"Safety is a major concern in any battery system, especially for batteries to be used in electric vehicles," says Mihri Ozkan.

Regardless, the team remains optimistic about their commercial future. "Li-S batteries are the next wave of high performing batteries," says Ozkan.

Researchers Explore Longer Life Cycle for Batteries

Researchers at Arizona State University are exploring new energy storage technology that could give batteries a longer life cycle.



Led by Dan Buttry, professor and chair of ASU's Department of Chemistry and Biochemistry (right), the research also involves former undergraduate researcher Jarred Olsen and current graduate student Tylan Watkins (left). The research, just published in *Nature Communications*, brings together scientists from Arizona State University, University of Colorado at Boulder, Sandia National Labs, Boulder Ionics Corp. and Seoul National University, Korea.

Room temperature ionic liquids have attracted a great deal of interest in recent years due to their remarkable physicochemical properties, including high thermal stability, wide electrochemical window and low vapor pressure.

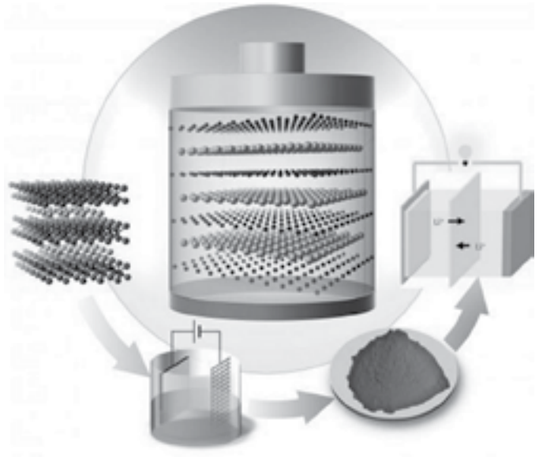
"We used a device called a quartz crystal microbalance to measure very tiny mass changes in thin films at the surface of the battery material during charging and discharging," says Buttry. "One of the key features of successful lithium battery materials is that they develop thin films that protect the surface of the battery electrodes, which prolongs the life of the battery. This study documents the development of just such a film in a new type of battery formulation that has many more attractive features than existing commercial lithium batteries."

"The hope is that this new formulation will find its way into commercial use," adds Buttry.

Study into Two-Dimensional Battery Materials

In Philadelphia, Pennsylvania, Drexel's Department of Materials Science and Engineering nanomaterials research group led by Distinguished University and Trustee Chair Professor Yury Gogotsi, and colleagues at Aix-Marseille University, has created for the first time a 2D carbon/sulfur, C/S, nanolaminate through selectively extracting titanium (Ti) from Ti2SC MAX phase, one of a family of layered ceramics discovered two decades ago by Drexel Materials Distinguished Professor Michel Barsoum. The researchers found that C/S nanolaminates have covalent bonding between C and S and an extremely uniform distribution of sulfur between the atomically thin carbon layers, contributing to their great potential for being used as electrode materials for lithium-sulfur (Li-S) batteries.

The international research team published their results, *Synthesis of Carbon/Sulfur Nanolaminates by Electrochemical Extraction of Titanium from Ti2SC* in the prestigious chemistry journal Angewandte Chemie as a VIP paper – only a small percentage of all articles receive this designation recognizing their importance.



One of the major challenges for the practical application of Li-S batteries is to find cathode materials offering long-term stability. Currently, sulfur infiltrated carbon nanomaterials have demonstrated to be the most promising cathode materials for Li-S batteries, in which the uniform distribution of sulfur in carbon matrix and

the strong interaction between carbon and sulfur are two important factors that affect the performance. In the C-S nanolaminates synthesized by Gogotsi's group, the sulfur is uniformly distributed in the carbon matrix as atomically thin layers and a strong covalent bonding between carbon and sulfur is observed. As a result, the C-S nanolaminates possess great potential as cathode materials for Li-S batteries. This may have a significant impact on increasing the life-span of next generation batteries.

ELECTRIC VEHICLE NEWS

Koenigsegg's Super Hybrid Unveiled at Geneva

The Koenigsegg Regera is the latest supercar from the small, Swedish brand. The two-seat, mid-motor, carbon fiber machine, whose name means "to reign" in Swedish, features a unique plug-in hybrid powertrain with a total output of 1,500 horsepower, and can reach its top speed 249 mph in less than 20 seconds.

Instead of a traditional transmission, the Regera uses a hydraulic coupling to connect its 1,100-horsepower, flex-fuel, twin-turbocharged 5.0-liter V8 to the 2.85 ratio rear axle, which it drives directly. Three powerful electric

motors, one for each wheel and one for the crankshaft, help fill in any torque gaps as the engine runs through its rev range. The coupling slips to about 30 mph, then is fully locked all the way up to the V8's 8,250rpm redline at the Regera's top speed.

A compact, liquid-cooled 9.27kWh battery pack recovers wasted energy under acceleration and braking, and can also be charged through a port hidden behind the rear license plate. Along with the performance aspects, it can also provide pure electric drive for up to 22 miles with a full charge.

Koenigsegg is limiting production to 80 cars at a starting price of around $1.9 million.

Porsche To Expand With EV to Challenge Tesla

Porsche AG may expand its growing lineup with a battery-powered vehicle to cater to demand for cleaner luxury vehicles and counter the rise of Tesla Motors Inc.

Porsche previously said it might expand the Panamera coupe line with a smaller version or a more spacious shooting brake variant. Porsche has also been considering a sports car between the 911, which costs $151,100 for the Turbo version, and the $845,000 918 Spyder hybrid supercar. The new sports car model would be designed to challenge autos made by Ferrari SpA.

Porsche plans to sell more than 200,000 vehicles for the first time this year, driven by demand for the $49,900 Macan compact sport-utility vehicle it introduced in April 2014. The increase comes amid a rising tide for most luxury-car makers, with Porsche, its sister brands Audi and Bentley, Daimler AG's Mercedes-Benz and BMW AG all reporting fresh sales records last year.

Porsche's deliveries rose 17% to 189,849 cars in 2014 and surged 34% in February to 14,836 cars. Demand for luxury autos is forecast to rise further this year thanks to growth in China and the U.S.

UPCOMING EVENTS

Call for Papers

Deadline: April 4

16th Asian Battery Conference, September 8-11, Centara Grand & Bangkok Convention Centre, Bangkok, Thailand.

Submit a 250-word maximum abstract describing the proposed paper's main points, conclusion, title and contact information with a biography to http://16abc.conferenceworks.com.au/presentation/call-for-papers/.

Contact Dr. David Rand, technical program chair, email: e. david@csiro.au or visit http://16abc.conferenceworks.com.au/presentation/call-for-papers/.

Deadline: August 6

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

Submit abstract describing the proposed paper's main points, conclusion, title and contact information with a biography using the template at http://www.zingconferences.com/abstract-submission/.

Contact Stewart Whitehill, email: stewart.whitehill@zingconferences.com or visit: http://www.zingconferences.com/abstract-submission/.

Meetings and Symposia

April 21-22 – Next Generation Batteries 2015, San Diego Marriott La Jolla, San Diego, California.

Includes next generation battery materials, chemistries and technologies; lithium battery safety, and grid-scale energy storage.

Info: Craig Wohlers, Knowledge Foundation, phone: 1- 1-781-972-5400, or www.knowledgefoundation.com/Next-Generation-Batteries.

April 27-29 – 7th Advanced Battery Power Conference, Eurogress Aachen, Aachen, Germany.

Topics include Li-ion materials and improvements on properties; battery systems; production of battery systems and cells; stationary battery systems; and automotive and mobile applications. Also includes an exhibition.

Info: Contact Haus der Technik E.V., phone: +49 20118031 or visit www.battery-power.eu.

May 3-6 – 127th Battery Council Convention + Power Mart Expo, Savannah Westin Hotel, Savannah, Georgia.

Dedicated to advancing the lead-acid battery industry's products and companies successfully into the future. Keep up with emerging technologies and changing regulations to do business more effectively in the global marketplace. At the expo, meet people and learn about the tools that can improve your products, streamline your processes and drive profit margins.

Info: Battery Council International, 330 N. Wabash Ave., Suite 200, Chicago, IL 60611, phone: 1-312-644-6610, or visit www.batterycouncil.org.

May 3-6 – 28th International Electic Vehicle Symposium and Exhibition, KINTEX, Goyang, South Korea.

Themed "e-Motional Technology for Humans," EVS28 discusses the next steps needed to make the automobile industry "green" and "sustainable." Drawing boards showcase innovations from low speed battery electric vehicles to fuel cell electric buses. Includes exhibition, Drive & Ride and technical visit.

Info: Visit www.evs28.org.

May 12-16 – Battcon, Hilton Bonnet Creek, Orlando, 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, Albercorp, 3103 N. Andrews Ave. Ext., Pompano Beach, FL 33064, (954) 623-6660 ext 23806, or visit www.battcon.com.

May 20-21 – 5th Israeli Power Sources Conference, Daniel Hotel, Herzelia, Israel.

Conference for batteries, fuel cells, power sources and EVs provides a platform for technological innovations and business opportunities. Discusses the latest advances that support the electrochemical, E-mobility and smart grid industries.

Info: Visit www.sdle.co.il.

May 24-26 – 227th ECS Meeting, Hilton Chicago, Chicago, Illinois.

Sponsored by the Electrochemical Society, topics include batteries and energy storage; corrosion; electrodeposition for micro-and nano-battery materials; electrochemical engineering; fuel cells, electrolyzers and energy conversions; and durability in low temperature fuel cells.

Info: The Electrochemical Society, 65 South Main St., Pennington, Building D, New Jersey, 08534-2839, phone: 1-609-737-1902, fax: 1-609-737-2743, e-mail: ecs@electrochem.org, or visit www.electrochem.org/meetings/biannual/227/

June 15-19 – International Advanced Automotive & Stationary Battery Conference, Detroit Marriott at the Renaissance Center, Detroit, Michigan.

International forum for automakers and energy-storage system developers discuss the recent progress in advanced battery technology and its implementation in automotive, stationary, and industrial applications. New this year – a symposium on the emerging market for advanced batteries in utility, telecom and industrial applications, an OEM battery pavilion in the exhibit hall, and Ride & Drive with the latest xEVs!

Info: Contact Jo Anna Mortensen, phone: 1-530-692-0140 ext. 102 or visit http://advancedautobat.com/conferences/automotive-battery-conference-2015/ index.html.

June 16-17 – The International Flow Battery Forum, Venue Glasgow Marriott Hotel, Glasgow, Scotland.

Researchers from universities and commercial research groups, large and small development companies, materials, components and equipment suppliers, users and project developers to discuss the latest scientific, engineering and commercial aspects of flow batteries. Includes a visit to a flow battery manufacturer.

Info: Visit www.flowbatteryforum.com.

June 22-23 – Batteries & Fuel Cells Seminar 2015, Genport, srl, Vimercate, Italy.

Focuses on primary, rechargeable, reserve, commercial,

industrial and military batteries as well as fuel cells. Includes application energy requirements, power source electrical and mechanical design, cells selection, cells evaluation tests, battery prototype, acceptance tests, design and manufacturing techniques, testing, mass production, safety, transportation, use and disposal.

Info: Visit www.genport.it/news/battery-and-fuel-cell-seminar-2015/.

June 23-25 – Electric & Hybrid Machine World Expo, Venue TBA, Amsterdam, The Netherlands.

Topics include battery safety, integration, and charging technologies as well as fuel cells. With about 70 speakers, open panel sessions, a free technology demonstration area and free exhibition with over 120 exhibits, the show attracts over 3,000 attendees.

Info: Visit www.electricandhybridmarineworldexpo.com.

June 30 - July 3 – 11th European SOFC Forum, Kultur- und Kongresszentrum, Lucerne, Switzerland.

Includes hydrogen fuel cells (PEFC, PEM, AFC, PAFC), direct alcohol fuel cells (DMFC), microbial fuel cells, and hydrogen production, storage and infrastructure. Engineering, materials, systems, testing, applications and markets include catalysts and membranes; durability and mitigation; diagnostics and modeling; stack and system integration; and electrolysis techniques.

Info: Visit www.efcf.com.

July 14-16 – Electrical Energy Storage at Intersolar North America, Moscone Center, San Francisco, California.

This event for suppliers, manufacturers, distributors and users of stationary and mobile electrical energy storage solutions covers the entire value chain of battery and energy storage technologies. Approximately 18,000 attendees and 50 exhibitors anticipated.

Info: Visit www.ees-northamerica.com.

August 5-6 – Battery Power, Hyatt Denver Tech Center, Denver, Colorado.

Includes new battery designs, improving power management, predicting battery life, regulations and standards, safety and transportation, battery authentication, charging technology, emerging chemistries and market trends.

Info: Visit www.batterypoweronline.com.

September 8-11 – 16th Asian Battery Conference, Centara Grand & Bangkok Convention Centre, Bangkok, Thailand.

Technical and scientific format also addresses the commercial and socio economic aspects of a growing, developing battery industry. Designed for battery industry executives, customers, marketers, academia, researchers, sales teams, reseller networks and suppliers.

Info: Visit http://16abc.conferenceworks.com.au/asian-battery-conference/about-the-conference/

September 15-17 – The Battery Show 2014, 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.

September 23-25 – 20th International Congress for Battery Recycling ICBR 2015, Fairmont Le Montreux Palace, Montreux, Switzerland.
Includes legislation impacts on worldwide battery collection and recycling; new battery manufacturer and recycling challenges; fast developing battery markets and collection opportunities; and recycling plants/processes.
Info: Visit www.imc.ch.

October 11-16 – 228th ECS Meeting, Hyatt Regency Phoenix & Phoenix Convention Center, Phoenix, Arizona. Cancun, Mexico.

Sponsored by the Electrochemical Society, topics include batteries and energy storage; corrosion; electrodeposition

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Info: The Electrochemical Society, 65 South Main St., Pennington, Building D, New Jersey, 08534-2839, phone: 1-609-737-1902, fax: 1-609-737-2743, or visit www.electrochem.org.

November 16-19 – Fuel Cell Seminar & Energy Exposition, Westin Bonaventure, Los Angeles, California.

Includes fuel cell development; commercialization, development technology and validation of all types of fuel cell applications; industry status and analysis; and fuels and renewable energy. Demonstrations and Ride-and-Drive are planned.

Info: Visit www.fuelcellseminar.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/.

2016

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.

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