FCT ADVANCED FUEL CELL TECHNOLOGY

Volume 17 Number 6 ISSN: 1095-1415 June 2013

SFU student researchers carry out tests to improve fuel cell durability at Ballard Power Systems.

AROUND THE INDUSTRY

Tests May Lead to Doubling of Fuel Cell Life

Researchers working to improve durability in fuel cell powered buses, including a team from Canada's Simon Fraser University, have discovered links between electrode degradation processes and bus membrane durability. The team is quantifying the effects of electrode degradation stressors in the operating cycle of the bus on the membrane lifetime.

The findings of the study, led by SFU graduate student Natalia MaCauley, are the latest in a long-term study at Burnaby-based Ballard Power Systems and funded by Automotive Partnership Canada that aims to make fuel cell buses competitive with diesel hybrids.

To improve fuel cell module durability and predict longevity, researchers are studying the degradation mechanisms of the fuel cells that occur under real-world transit bus conditions.

"Our strong multi-disciplinary collaboration between chemistry and mechatronic systems engineering (MSE) is bearing fruit," says SFU project lead Erik Kjeang. "The fuel cell is a mechatronic device, and the bandwidth of this project allows advances in chemistry to be engineered and implemented into Ballard's products."

Acta Confirms First Sale of Power Backup System

Acta S.p.A. of Pisa, Italy, a clean energy products company, has sold its first Acta Power backup power system, only six weeks after the initial launch of this new product at the Hannover Messe. The system is to be placed on trial with a major international mobile telecom company, at a base station located in Africa.

The Acta Power is a self-recharging back-up power system incorporating a fuel cell and low cost on-board hydrogen generation. It has been developed to meet the back-up requirements of telecom base stations in off-grid or bad grid locations, avoiding the cost and logistical barriers of hydrogen delivery to base stations in remote or inaccessible sites. This initial sale is for a system incorporating a 4kW fuel cell and 1,000L/hr hydrogen generator, and has a list price of €35,000.

The Acta Power system produces compressed hydrogen directly from renewable energy and is designed to replace diesel gensets which are traditionally used to provide backup power at remote telecom sites.

Intelligent Energy and Etisalat Device Collaboration

Intelligent Energy is currently collaborating with the telecommunications company Etisalat Nigeria. The companies will test personal energy devices powered by Intelligent Energy's proven fuel cell technology, with an Etisalat user trial to commence in this quarter.

Reliable off-grid energy is becoming increasingly important with the growth in demand for mobile services and data. The scope of the Etisalat trial will include in-field testing of a new, cutting-edge solution, based on Intelligent Energy's clean energy technology with selected customers across various devices.

As electronic devices become more sophisticated advances in battery power have lagged behind, leading to consumer disappointment and creating a need for practical

Proceedings Available

30th INTERNATIONAL BATTERY SEMINAR & EXHIBIT
Primary & Secondary Batteries - Other Technologies

MARCH 11 - 14, 2013

THE ONLY PRACTICAL CONFERENCE THAT
COMPARES AND CONTRASTS ALL PERTINENT ENERGY SYSTEMS
70+ SPEAKERS FROM AROUND THE WORLD
PRE-SEMINAR TUTORIALS * POSTER SESSION
THE LARGEST TRADE EXHIBIT

PREMIER SPONSOR
Toyota

INDUSTRY SPONSORS
ABT • FCT • Battery Power • Celgard
CIAPS (China Industrial Association of Power Sources)

$400.00 – 30TH Battery Proceedings flash drive

$325.00 - Cui Tutorial Flash Drive – Materials Selection and Design for Batteries with Significantly Higher Energy Density and Ultralong Cycle Life Towards Vehicle and Grid Scale Applications

$325.00 - Pillot Tutorial flash drive - The Rechargeable Battery Market and Main Trends 2012 - 2025

Plan Early to Sponsor, Exhibit and Speak at the
31st INTERNATIONAL BATTERY SEMINAR & EXHIBIT
Primary & Secondary Batteries - Other Technologies

MARCH 10 – 13, 2014

Seminar Info and Proceedings Order Form available at
www.POWERSOURCES.net

Name: _____
Company: _____
Address: _____
City: _____ State: _____ Country: _____ Zipcode: _____
Telephone: _____ Fax: _____ Email: _____

PLEASE SEND INFORMATION REGARDING:
□ Sponsorship Opportunities
□ Exhibiting
□ Speaking
□ Poster Paper
□ Conference Registration
□ Seminar Proceedings CD

The International Battery Seminar LLC
Tel 561-367-0193 • Fax 561-367-8429 • Email: info@powersources.net

and cost-effective alternatives. Intelligent Energy's portable power technology has been developed to address this need, providing greater amounts of on-the-go power so that mobile operators can deliver better user experience and increased average revenue per user.

ORNL Researcher Wins DOE R&D Award

Karren L. More, a researcher at Oak Ridge National Lab in Tennessee, has received the 2013 DOE Hydrogen and Fuel Cells Program R&D Award in recognition of her leadership of ORNL's project on microstructural characterization of fuel cell materials and for her role as a subcontractor on multiple DOE-funded fuel cell research and development projects.

More's experience with a variety of electron microscopy techniques has enabled unprecedented levels of characterization of a variety of materials used in catalysts, supports, ionomers, gas diffusion layers, and membranes. She has collaborated on numerous fuel cell durability and aging studies with other DOE national laboratories and leading manufacturers such as 3M, General Motors, Ballard, AFCC, Nissan, Nuvera, and UTC.

AlumiFuel System Eyed for Backup Power Market

AlumiFuel Power Corp. of Philadelphia, Pennsylvania, reports that its operating subsidiary, AlumiFuel Power Technologies Inc. is pursuing new 5kW backup power opportunities worldwide. The growing U.S. backup power market, traditionally served by lead-acid batteries and gasoline or diesel generators, is increasingly adopting hydrogen PEM fuel cell systems to replace these earlier technologies. This market is currently $6.4 billion for the emergency response segment with an even larger multi-billion dollar segment for the telecom and financial services industries.

U.S. wireless telecom carriers are continuing to expand the use of hydrogen fuel cells for 5kW backup power systems. According to industry sources, the four major U.S. wireless carriers have approximately 75,000 rooftop tower installations – 20% of which (15,000) will ultimately use hydrogen fuel cells, and 8% of which (6,000) is a reasonable target for using the AlumiFuel hydrogen generation system. The four carriers also have approximately 205,000 ground-based tower sites; applying the same 8% capture rate for the AlumiFuel technology amounts to 16,400 sites.

Serving the Fuel Cell Industry Since 1996,

ADVANCED FUEL CELL TECHNOLOGY (FCT) is published monthly by Seven Mountains Scientific Inc., P.O. Box 650, 913 Tressler St., Boalsburg, PA 16827, USA; Phone: 1-814-466-6559, Fax: 1-814-466-2777, Visit: www.7ms.com

Managing Editor: Josephine Chesworth
Technical Editor: Dr. E. Thomas Chesworth, P.E.
Circulation Manager: Patrick D. Elliott, pat@7ms.com
Production Manager: Brenda Geary-Bucek, brenda@7ms.com
Advertising: Josephine Chesworth and Brenda Geary-Bucek

Annual print subscription rates include First Class or Air Mail postage. USA, Canada and Mexico: US$120; All Other Countries: US$155. Online also available. Pay by MasterCard, Visa, American Express, or check negotiable with a U.S. bank to: Seven Mountains Scientific Inc.

FCT is Available In Print and Online.
To Subscribe, Call 1-814-466-6559
or Visit www.7ms.com.

U.S. Musters Fuel Cell Electric Vehicle Partners

To foster the adoption of fuel cell electric vehicles, the U.S. Energy Department has embarked on a new public-private partnership to develop the country's hydrogen infrastructure. Dubbed H2USA, the new partnership brings together automakers, government agencies, gas suppliers, and the hydrogen and fuel cell industries. The stakeholders will coordinate research and identify cost-effective infrastructure that can deliver affordable, clean hydrogen fuel across the U.S.

Current members of the H2USA partnership include the American Gas Association, Association of Global Automakers, the California Fuel Cell Partnership, the Electric Drive Transportation Association, the Fuel Cell and Hydrogen Energy Association, Hyundai Motor America, ITM Power, Massachusetts Hydrogen Coalition, Mercedes-Benz USA, Nissan North America Research and Development, Proton OnSite, and Toyota Motor North America.

Recent development of the U.S. shale gas resources is helping to reduce the costs of producing hydrogen and operating hydrogen fuel cells.

Japan Oil and Gas Companies Ready for FCVs

Major oil and gas companies in Japan are getting ready for the 2015 rollout of commercial hydrogen fuel cell vehicles. In April, the first fueling station in Japan, operated by JX Nippon Oil & Energy Corp., to offer both

gasoline and compressed hydrogen gas went live.

According to the *Japan Times*, "Oil distributors have started to establish hydrogen station networks, while the government is set to provide financial assistance and is considering deregulation to make it easier to set up the fuel supply networks.

"It's possible that fuel cell vehicles might replace electric vehicles," says Toyota Motor Corp. Vice Chairman Takeshi Uchiyamada. Toyota and Honda Motor Co. plan to release mass-market fuel cell vehicles in 2015, and Nissan Motor Co. will follow suit in 2017.

EPS Expands Into Australia and New Zealand

Torino, Italy-based Electro Power Systems SpA (EPS), a hydrogen fuel cell-based energy storage solution company, has recognized Century Yuasa of Queensland, Australia, as its authorized distributor and installer. EPS and Century Yuasa are currently in the process of deploying two ElectroSelf™ energy storage systems. The ElectroSelf technology was selected for its ability to provide zero emission power in mission critical applications.

Century Yuasa is a key supplier of stored energy systems for automotive, materials handling and industrial applications in Australia and New Zealand. Its industrial division is a leading supplier of DC uninterruptible power systems for mission critical assets. Incorporating expertise in design, assembly, testing, field technical services and project management, Century Yuasa can provide a complete package for the telecommunication carrier, electricity transmission and distribution, rail, mining and other heavy industries.

Century Yuasa's product range includes Yuasa valve regulated lead acid industrial batteries; Enersun remote power systems which include EPS fuel cells; and GS Yuasa industrial lithium ion rechargeable batteries.

Ceramic Fuel Cells Receives Order from EWE

Australia-based Ceramic Fuel Cells Ltd., a leading developer of generators that use fuel cell technology to convert natural gas into electricity and heat for homes and other buildings, received a binding order for 60 integrated mCHP units from German energy service provider EWE. This order starts the final phase of the development and demonstration program for integrated mCHP generators agreed with EWE in 2010. Delivery is scheduled for June to December 2013.

Operating this new fleet will demonstrate the latest product improvements that CFCL and its development partner Gebrüder Bruns Heiztechnik GmbH (Bruns) have incorporated, including enhanced overall control and thermal efficiency. As soon as final design changes are validated, CFCL and its partners will start the certification process and prepare for market introduction. These units will be CFCL's second product offering alongside the already well established BlueGEN generators, which offer a power-led solution.

Partnership to Expand Fuel Cells in Germany

Elcore, a developer of hydrogen fuel cells, has partnered with the Thuga-Group, a conglomeration of German companies and organizations that support renewable eenrgy. Through this partnership, Elcore aims to draw more attention to its Elcore2400 micro-CHP fuel cell systems, which can be used as residential energy systems. Hydrogen fuel cells are not as common in the residential

sector. They are often used for industrial purposes and have become popular in the auto industry. Stationary fuel cells are capable of producing significant amounts of electrical power and heat, making them attractive for residential use.

Through its new partnership with the Thuga-Group, Elcore aims to expand awareness of its hydrogen fuel cell systems. The Thuga-Group represents one of the largest networks of municipal energy and water providers in Germany and the access that the organization provides to this network could be extremely valuable to Elcore. Through this partnership, the Thuga-Group is expected to install more than 2,400 of Elcore's hydrogen fuel cell systems throughout the country.

Nokia Siemens Wins Two Technology Awards

Nokia Siemens Networks' fuel cell solution and liquid applications won the Emerging Technologies award under the Green Telecom and Smart Energy Solutions and Wide Area Network categories at CTIA Wireless® 2013.

Developed jointly by Nokia Siemens Networks of Findland, and Canada-based Ballard Power Systems, the fuel cells enable operators to optimize network downtime in case of a commercial power breakdown. Based on a methanol-water mix, they have a considerably lower carbon footprint in comparison with traditional alternatives.

Liquid Applications turns the base station into an intelligent part of the mobile operator's network, to serve and deliver local content. With this innovation, operators can take advantage of their insight into where and why people are using their smartphones and tablets. By placing useful information right at the edge of their networks, at the point where people connect, operators can deliver a far better service and increase the efficiency of their networks.

Aberdeen Scotland Ups Plans for Hydrogen City

According to the Aberdeen City Council in Scotland, a hydrogen economy for Aberdeen City Region is a strategy framework to reinforce the area's position as the energy city now and in the future. With the transferable oil and gas expertise and infrastructure that the area has, along with renewables capacity, hydrogen offers an exciting opportunity to develop and diversify the energy industry, maximize the capacity and value of renewable energy and give greater energy security.

The strategy framework presents a platform for the city to step from the £20 Million Aberdeen Hydrogen Bus Project, which will bring Europe's largest fleet of fuel cell buses to the region next year, to other ambitious hydrogen projects. A hydrogen economy for Aberdeen City Region is being developed in parallel with a European strategy for a hydrogen transport economy for the North Sea Region (HyTrEc), working in partnership with German, Belgian, Swedish, Norwegian, and U.K. experts.

U.K. Hails H2Mobility Hydrogen Fuel Cell Report

The U.K. H2Mobility consortium published its full first phase results, indicating that over 1.5 million hydrogen powered vehicles could be on U.K. roads by 2030. The first phase of the project looked at potential barriers to overcome and the potential investment required to make the U.K. a leading global FCEV market.

Welcoming the roadmap, U.K. business and energy minister Michael Fallon says, "Securing new economic opportunities for the U.K., diversifying our national energy supply and driving down carbon emissions go to the heart of my job in government. The findings of the report demonstrate hydrogen fuel cell electric vehicles can have a real impact on all three."

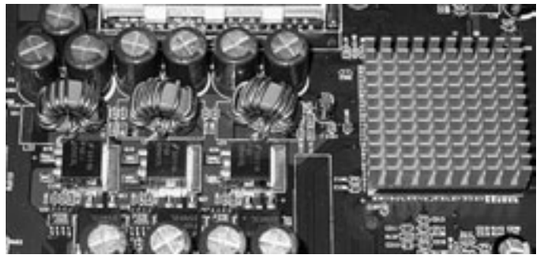
H2Mobility features firms from across the energy, infrastructure and retail sectors including Johnson Matthey, Air Liquide, Intelligent Energy, ITM power, as well as automakers Hyundai, Daimler, Toyota and Nissan.

The findings of the first phase were set into a roadmap to commercialize FCEVs in the U.K. from 2015. Phase 2 aims to develop a business case for realizing this roadmap.

Maxphase Coatings Part of PowerCell's Solution

PowerCell, a Swedish energy company with roots in the Volvo group, has unveiled their PowerPac system. The bipolar plates in the fuel cell have been coated with the Ceramic MaxPhase provided by Impact Coatings, also based in Sweden.

The PowerPac is the first functioning full-scale prototype fuel system in the world running on road diesel. A reformer converts standard road diesel to hydrogen,



after which the fuel cell converts the hydrogen to electric energy. Compared to an internal diesel combustion engine generator, the PowerPac exhibits higher fuel conversion efficiency, produces no emission of NOx, sulfur containing compounds, or particles. The PowerPac unit is also silent and requires less maintenance.

The PowerPac can generate electricity in trucks, marine leisure boats, and other areas where diesel fuel is available and storing hydrogen is not possible.

Connecticut University Installs Fuel Cell System

Western Connecticut State University (WCSU) recently began generating its own power in a Danbury science building using a PureCell 400 stationary phosphoric acid fuel cell system which can produce 400kW of electricity per hour, plus 1.5 milion British thermal units per hour of usable heat. With the new system, the university could save $25,000 per year during the next decade.

"Utilities represent one of our biggest potential sources for savings in operating costs," says Luigi Marcone, WCSU director of facilities operations. "We have done a lot over the past five to seven years in this area, including lighting retrofits, energy efficiency upgrades, expanded building automation and controls. All have been done behind the scenes so that we no longer have to depend on antiquated and inefficient lighting, heating and cooling systems."

The Clean Energy Finance and Investment Authority of Connecticut helped secure federal grants to pay for the system provided by ClearEdge Power of Hillsboro, Oregon.

Funding for U.S. Fuel Cell and Hydrogen Programs

The House Hydrogen and Fuel Cell Caucus reports that 27 representatives have signed on to a house appropriations request letter requesting $147.8 million in funding for fuel cell and hydrogen energy programs. The letter was circulated through the house by Congressmen John Larson (D-CT) and Mike Doyle (D-PA). The programs would be managed by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE).

The U.S. currently leads the world in fuel cell and hydrogen technologies. Japan, Germany, Korea, and China have made this technology a national priority for development, and are working diligently to attract the skills and IP needed to create a domestic clean energy business for export. In the U.S., fuel cell commercialization is within reach. Businesses are making investments to bring fuel cell technology to American customers.

Groundbreaking at North American Power Project

Connecticut Governor Dannel P. Malloy and Bridgeport Mayor Bill Finch recently joined officials from energy company Dominion and FuelCell Energy Inc. of Danbury, Connecticut, to break ground at the largest fuel cell power project in North America. Dominion Bridgeport Fuel Cell will produce 14.9MW – enough to power 15,000 homes – using an electro-chemical process that efficiently converts natural gas into electricity.

Dominion Bridgeport Fuel Cell is part of Project 150, a program sponsored by Connecticut and supported by the Clean Energy Finance and Investment Authority (CEFIA) to increase Connecticut's renewable and clean energy projects by 150MW. The City of Bridgeport has provided a tax incentive development agreement that will be in place for the life of the project.

FuelCell Energy Inc. will build, operate, and maintain the facility under contract to Dominion. FCE is supplying five Direct FuelCell stationary fuel cell power plants and an organic rankine turbine that will convert heat from the fuel cells into additional electricity. The project is scheduled to be completed and placed into operation in late 2013. Dominion will sell the output of the fuel cell power station to Connecticut Light & Power under a 15-year fixed power purchase agreement.

FUEL CELL PATENTS

Compiled by Eddie T. Seo
email: seoeddie@gmail.com
Littleton, CO

Official Gazette, Vol 1389 (April 2013)

U.S. 8,408,246 (20130402), Fuel cartridge for fuel cells, Paul Adams, Andrew J. Curello, and Jens Thomas Mueller, Société BIC (FR).

U.S. 8,408,254 (20130402), Hydrogen filling apparatus, Koichi Shibukawa, Yukio Sato, Yoshinori Kawaharazaki, Yasuhiro Fujita, and Shouichi Sato, The Japan Steel Works, Ltd. (JP).

U.S. 8,408,524 (20130402), Apparatus for humidifying a gas flow, Janusz Blaszczyk, Daimler AG (DE).

U.S. 8,409,331 (20130402), Method and device for purifying air for fuel cells, Ziya Ramizovich Karichev, Dmitry Alexandrovich Blatov, Stanislav Iliich Simanenkov, and Valentina Nikolaevna Shubina, Obschestvo S. Ogranichennoi Otvetstvennostiyu "Intensis" (RU).

U.S. 8,409,543 (20130402), Method for preparing pyrochlore-type oxide and method for producing electrocatalyst for fuel cell, Yasushi Sato and Keitaro Fujii, JX Nippon Oil & Energy Corp. (JP).

U.S. 8,409,659 (20130402), Nanowire supported catalysts for fuel cell electrodes, Xueliang Sun, Madhu S. Saha, Ruying Li, and Mei Cai, GM Global Technology Operations LLC and The University of Western Ontario (CA).

U.S. 8,409,758 (20130402), Fuel cell system with partial external reforming and direct internal reforming, Jeroen Valensa, Modine Manufacturing Co.

U.S. 8,409,759 (20130402), Seal for a fuel cell support, Niels Erikstrup, Niels Christiansen, and Haldor F. A. Topsøe, Topsoe Fuel Cell A/S (DK).

U.S. 8,409,760 (20130402), Method for controlling a water based fuel reformer, Aaron Crumm and Timothy LaBreche, Adaptive Materials, Inc.

U.S. 8,409,761 (20130402), Plate interconnect method for an embedded fuel cell sensor, David D. Rea, Jeffrey A. Rock, and Jeff D. Williams, GM Global Technology Operations LLC.

U.S. 8,409,762 (20130402), Adaptive method to control fuel delivery injector with modeling uncertainties in a fuel cell system, Patrick Frost, Darrell W. Burleigh, and Daniel C. Di Fiore, GM Global Technology Operations LLC.

U.S. 8,409,763 (20130402), Modified planar cell (MPC) and stack based on MPC, Anatoly Demin, Solid Cell, Inc.

U.S. 8,409,764 (20130402), Fuel cell device and system, Alan Devoe and Lambert Devoe.

U.S. 8,409,765 (20130402), Co(II)tetramethoxyphenylporphyrin additive to PFSA PEMS for improved fuel cell durability, Michael R. Schoeneweiss, Timothy J. Fuller, Frank Coms, and Sean M. MacKinnon, GM Global Technology Operations LLC.

U.S. 8,409,767 (20130402), Fuel cell, Masaru Oda, Yasuhiro Watanabe, and Hidetada Kojima, Honda Motor Co., Ltd. (JP).

U.S. 8,409,769 (20130402), Gas diffusion layer for fuel cell, Chunxin Ji and Jeanette E. Owejan, GM Global Technology Operations LLC.

U.S. 8,410,012 (20130402), Catalyst composition, method for fabricating the same and fuel cell including the same, Hong-Ming Lin, Cheng-Han Chen, Wei-Jen Liou, Wei-Syuan Lin, and She-Huang Wu, Tatung University (TW) and Tatung Co. (TW).

U.S. 8,410,747 (20130402), Flexible fuel cell structures having external support, Gerard Francis McLean and Jeremy Schrooten, Société BIC (FR).

U.S. 8,410,749 (20130402), Device and method for controlling the charging and discharging of a battery for supplying power from the battery and a fuel cell, Katsuya Oto, Kabushiki Kaisha Toshiba (JP).

U.S. 8,413,517 (20130409), Fuel cell system and heated pressure sensor, Suriyaprakash Ayyangar Janarthanam and William F. Sanderson, Ford Global Technologies, LLC.

U.S. 8,415,012 (20130409), Carbon nanotube and nanofiber film-based membrane electrode assemblies, Jian-ping Zheng, Zhiyong Liang, Ben Wang, Chun Zhang, and Wei Zhu, Florida State University Research Foundation, Inc.

U.S. 8,415,037 (20130409), Microbial fuel cells, Kenneth H. Nealson, Massoud Pirbazari, and Lewis Hsu, University of Southern California.

U.S. 8,415,059 (20130409), Direct electron transfer using enzymes in bioanodes, biocathodes, and biofuel cells, Shelley D. Minteer, Becky L. Treu, and Rodica Duma, St. Louis University.

U.S. 8,415,060 (20130409), In-vehicle fuel cell system, Kazunori Fukuma, Kenji Nagumo, and Takaharu Sato, Honda Motor Co., Ltd. (JP).

U.S. 8,415,061 (20130409), Fuel cell system and control method of same, Shuya Kawahara, Manabu Kato, Hideyuki Kumei, Tomoaki Uchiyama, and Tsuyoshi Maruo, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,415,062 (20130409), Fuel cell system and method of starting fuel cell system, Kenichiro Ueda, Junji Uehara, and Yuji Matsumoto, Honda Motor Co., Ltd. (JP).

U.S. 8,415,063 (20130409), Fuel cell system, Nobuyuki Orihashi, Tsunemasa Nishida, Hitoshi Hamada, Kenichi Tokuda, Junji Nakanishi, Tsutomu Ochi, Shinji Matsuo, and Takahiro Nitta, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,415,064 (20130409), Fuel cell system, Shinji Miyauchi, Yoshikazu Tanaka, Hitoshi Oishi, and Motomichi Katou, Panasonic Corp. (JP).

U.S. 8,415,065 (20130409), Fuel cell system and method of controlling fuel cell system, Michio Yoshida, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,415,066 (20130409), Pressure regulating valve, fuel cell system using same, and hydrogen generating facility, Takafumi Sarata, Norimasa Yanase, Toru Ozaki, Tsuneaki Tamachi, Kazutaka Yuzurihara, Fumiharu Iwasaki, and Noboru Ishisone, Seiko Instruments Inc. (JP).

U.S. 8,415,067 (20130409), Three-way diverter assembly for a fuel cell system, Glenn W. Skala, Benno Andreas-Schott, and Martin M. Hoch, GM Global Technology Operations LLC.

U.S. 8,415,068 (20130409), Fuel cell, Seiji Sugiura and Shuhei Goto, Honda Motor Co, Ltd (JP).

U.S. 8,415,069 (20130409), Bonding structure of separator and fuel cell, Jiro Aizaki, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,415,070 (20130409), Partially fluorinated cyclic ionic polymers and membranes, Zhen-Yu Yang, E I du Pont de Nemours and Co.

U.S. 8,415,071 (20130409), Electrolyte membrane with anisotopic swelling and aligned filler, Shiro Tanaka, Hiroshi Tabata, and Shuguo Zhang, Nissan Motor Co., Ltd. (JP).

U.S. 8,415,072 (20130409), Membrane electrode assembly for fuel cell, Jung-min Oh, Hae-kyoung Kim, Ji-rae Kim, Joon-hee Kim, Yoon-hoi Lee, and Sang-hoon Joo, Samsung SDI Co., Ltd. (KR).

U.S. 8,415,073 (20130409), Fuel cell and electrode powder constituting the catalytic layer thereof, Tetsuo Nagami, Sozaburo Ohashi, Yuichiro Sugiyama, and Mikihiro Hori, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,415,075 (20130409), Ni-Al alloy anode for molten carbonate fuel cell made by insitu sintering, Sung Pil Yoon, Seong Ahn Hong, In Hwan Oh, Tae Hoon Lim, Suk-Woo Nam, Heung Yong Ha, Jonghee Han, Eun Ae Cho, and Jaeyoung Lee, Korea Institute of Science and Technology (KR).

U.S. 8,415,076 (20130409), Gas diffusion layer preconditioning for improved performance and operational stability of PEM fuel cells, Pinkhas A. Rapaport and Yeh-Hung Lai, GM Global Technology Operations LLC.

U.S. 8,419,866 (20130416), Method of manufacturing transition metal oxide having spinel structure, Takashi Ryu, Toshiyuki Nakamura, and Makoto Ohmori, NGK Insulators, Ltd. (JP).

U.S. 8,419,913 (20130416), Porous electroconductive material and process for production thereof; electrode and process for production thereof; fuel cell and process for production thereof; and electronic instrument, mobile machine, electric power generating system, cogeneration system, and electrode reaction-based apparatus, Atsushi Sato, Hideki Sakai, Mamoru Hatakeyama, and Takaaki Nakagawa, Sony Corp. (JP).

U.S. 8,419,928 (20130416), Hydrocarbon fuel oil for use in fuel cell system, Osamu Kamita and Akihiko Matsuoka, Shell Oil Co.

U.S. 8,419,983 (20130416), Nickel oxide-stabilized zirconia composite oxide, process for production thereof, and anode for solid oxide type fuel cell comprising the composite oxide, Kyosuke Domae, Takeshi Usui, Tadashi Yasui, and Satoshi Watanabe, Tanaka Chemical Corp. (JP) and Daiichi Kigenso Kagaku Kogyo Co., Ltd. (JP).

U.S. 8,420,184 (20130416), Method for preparing surface modification coating of metal bipolar plates, Ching-Yuan Bai, Min-Sheng Wu, and Ming-Der Ger, National Defense University (TW).

U.S. 8,420,256 (20130416), Controlling leakage in an electrochemical cell, Arne W. Ballantine, David Kirchhoff, and Michael P. Gordon, Honda Motor Co., Ltd. (JP).

U.S. 8,420,259 (20130416), Electrodes including an embedded compressible or shape changing component, Xinran Xiao, Adam T. Timmons, and Hamid G. Kia, GM Global Technology Operations LLC.

U.S. 8,420,268 (20130416), Fuel cell system, Tomonori Imamura and Kenichiro Sasamoto, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,420,269 (20130416), Fuel cell system, Takeshi Maenaka and Atsushi Imai, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,420,270 (20130416), Fuel cell system, Katsuki Ishigaki, Hironori Noto, Takashi Yamamoto, and Masataka Ota, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,420,271 (20130416), Method to improve reliability of a fuel cell system using low performance cell detection at low power operation, Tayoung Choi, Sriram Ganapathy, Jaehak Jung, David R. Savage, Balasubramanian Lakshmanan, and Pamela M. Vecasey, GM Global Technology Operations LLC.

U.S. 8,420,272 (20130416), Fuel cell system control device, Masataka Ota and Mikio Kizaki, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,420,273 (20130416), Sealing structure for polymer electrolyte fuel cell, Ho-Suk Kim, Mee-Nam Shinn, Byung-Sun Hong, Sung-Jin Oh, Cheol-Nam Yang, and Yong-Jung Seo, FuelCellPower Co., Ltd. (KR).

U.S. 8,420,274 (20130416), Membrane electrode assembly for fuel cell, method of manufacturing the same, and fuel cell including the membrane electrode assembly, Yoonhoi Lee, Daejong Yoo, and Chanho Pak, Samsung SDI Co., Ltd. (KR).

U.S. 8,420,275 (20130416), Composite membrane, fuel cell, and method for fabricating the composite membranes, Yuko Nowatari and Takahiro Isono, SANYO Electric Co., Ltd. (JP).

U.S. 8,420,276 (20130416), Catalyst layer and preparation process thereof, and membrane-electrode assembly and polymer electrolyte fuel cell using the catalyst layer, Shinji Nakai, Keiji Kubo, Hiroyuki Ohgi, and Tomohiro Ono, Kuraray Co, Ltd. (JP).

U.S. 8,420,277 (20130416), Electrolyte membrane using polybenzoxazine based compound, Myung-jin Lee, Seong-woo Choi, Hee-young Sun, and Woo-sung Jeon, Samsung SDI Co., Ltd. (KR).

U.S. 8,420,278 (20130416), Solid oxide fuel cell having a glass composite seal, Anthony J. De Rose, Subhasish Mukerjee, and Karl Jacob Haltiner Jr., Delphi Technologies, Inc.

U.S. 8,420,701 (20130416), Polymer electrolyte membrane, membrane-electrode assembly for polymer electrolyte fuel cells and process for producing polymer electrolyte membrane, Shinji Kinoshita, Asahi Glass Co. (JP).

U.S. 8,420,767 (20130416), Polyarylene-based polymer, preparation method for the same, and polymer electrolyte membrane for fuel cell using the polymer, Inchul Hwang, Nak Hyun Kwon, Young Taek Kim, Dong Il Kim, Ju Ho Lee, and Jang-Bae Son, Hyundai Motor Co. (KR).

U.S. 8,424,878 (20130423), Sealed flexible link between a metal substrate and a ceramic substrate, method for making such a link, application of the method to sealing high temperature electrolyzers and fuel cells, Magali Reytier and Philippe Bucci, Commissariat a l'energie atomique et aux energies alternatives (FR).

U.S. 8,425,986 (20130423), Composite nanostructure solid acid fuel cell electrodes via electrospray deposition, Sossina M. Haile, Konstantinos P. Giapis, Aron Varga, Nick Brunelli, and Mary Louie, California Institute of Technology.

U.S. 8,426,045 (20130423), Internal-resistance measuring device for response-delay type fuel cell, Akira Yamazawa, Yoshiyuki Ueno, Kazuya Watanabe, and Takefumi Shimoyama, Kajima Corp. (JP).

U.S. 8,426,071 (20130423), Method and apparatus for separating liquid from a gas stream, William Spencer Wheat, David Wayne Harrison Sr., Daniel G. Casey, and Kerry Kennedy Spilker, Texaco Inc.

U.S. 8,426,072 (20130423), Fuel cell system, Sho Usami and Yasushi Araki, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,426,073 (20130423), Fuel cell system and method of controlling same, Kazuaki Kurihara, John David Baniecki, and Masatoshi Ishii, Fujitsu Limited (JP).

U.S. 8,426,074 (20130423), Solid oxide fuel cell, Tsukasa Shigezumi, Toshiharu Ooe, Katsuhisa Tsuchiya, Kiyotaka Nakano, and Yoshiyuki Kawamura, Toto Ltd. (JP).

U.S. 8,426,075 (20130423), Fuel cell system, and operation method for fuel cell, Tohru Morita, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,426,076 (20130423), Fuel cell, Lifun Lin and Jean-Pei Jeanie Cherng, Bose Corp..

U.S. 8,426,077 (20130423), Proton conductors, Truls Norby, Reidar Haugsrud, Stefan Marion, Mari-Ann Einarsrud, Kjell Wiik, Øystein Andersen, Ruth Astrid Strøm, and Tor Grande, Universitetet i Oslo (NO).

U.S. 8,426,078 (20130423), Manufacturing of fuel cell membrane electrode assemblies incorporating photocurable cationic crosslinkable resin gasket, Michael A. Yandrasits, Michael T. Hicks, and Daniel M. Pierpont, 3M Innovative Properties Co.

U.S. 8,426,080 (20130423), Gas replacement method of fuel cell, fuel cell system and device for fuel cell system, Shuichiro Saito, Canon Kabushiki Kaisha (JP).

U.S. 8,426,081 (20130423), Polybenzoxazine-based compound, electrolyte membrane including the same, and fuel cell employing the electrolyte membrane, Seong-woo Choi, Hee-young Sun, Myung-jin Lee, and Woo-sung Jeon, Samsung SDI Co., Ltd. (KR).

U.S. 8,430,560 (20130430), Freezing detection method for fuel cell, Akira Morita, Jun Yamamoto, Kazuyuki Ueda, and Taihei Mukaide, Canon Kabushiki Kaisha (JP).

U.S. 8,430,985 (20130430), Microporous layer assembly and method of making the same, Jeanette E. Owejan and Hubert A. Gasteiger, GM Global Technology Operations LLC.

U.S. 8,431,227 (20130430), Ceramic product and ceramic member bonding method, Yosuke Takahashi, Sumihito Sago, Seiji Yamada, and Masayoshi Hirano, Noritake Co., Ltd. (JP).

U.S. 8,431,261 (20130430), Fuel cell component including an

Staying Informed Is Essential.

Connecting With Customers and Suppliers Is Critical.

ABT and FCT Keep You Informed and Connected

ON LINE and IN PRINT—Every month ABT and FCT provide the latest battery and fuel cell industry news,U.S.patents awarded,products,vehicles, upcoming meetings and seminars. Specialfeatures include technical and meeting reports from industry experts.For 43 years, ABT and now in its 11th year, FCT together are two of the most respected publications in the industry.

To advertise or subscribe call (814)466-6559, or email brenda@7ms.com or visit www.7ms.com

identification display portion, Katsuhiro Kajio, Aisin Seiki Kabushiki Kaisha (JP) and Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,431,274 (20130430), Solid oxide fuel cell device, Naoki Watanabe, Yousuke Akagi, Shuichiro Saigan, and Nobuo Isaka, Toto Ltd (JP).

U.S. 8,431,275 (20130430), Water management of PEM fuel cell stacks using surface active agents, Mahmoud H. Abd Elhamid, Gayatri Vyas, and Youssef M. Mikhail, GM Global Technology Operations LLC.

U.S. 8,431,276 (20130430), Using an effectiveness approach to model a fuel cell membrane humidification device, Yan Zhang and John C Fagley, GM Global Technology Operations LLC.

U.S. 8,431,277 (20130430), Fuel cell system and generation control device, Nobuyuki Orihashi, Toyota Jidosha Kabushiki Kaisha (JP).

U.S. 8,431,278 (20130430), Passive water drain, Steven G. Goebel and William H. Pettit, GM Global Technology Operations LLC.

U.S. 8,431,280 (20130430), Fuel utilisation in electrochemical fuel cells, Scott Baird, Jeremy Stephen Matcham, and Paul Leonard Adcock, Intelligent Energy Ltd. (GB).

U.S. 8,431,281 (20130430), Methods of operating fuel cells, Stephen A. Marsh, Encite, LLC.

U.S. 8,431,282 (20130430), Closed coolant loop with expansion device for a fuel cell system, Manfred Herrmann, GM Global Technology Operations LLC.

U.S. 8,431,283 (20130430), Process for molding composite bipolar plates with reinforced outer edges, John N. Owens and Hamid G. Kia, GM Global Technology Operations LLC.

U.S. 8,431,284 (20130430), Low electrical resistance bipolar plate-diffusion media assembly, Michael K Budinski, GM Global Technology Operations LLC.

U.S. 8,431,285 (20130430), Edge design for ePTFE-reinforced membranes for PEM fuel cells, William H. Pettit, Michael K. Budinski, and Wenbin Gu, GM Global Technology Operations LLC.

U.S. 8,431,286 (20130430), Method for stabilizing polyelectrolyte membrane films used in fuel cells, Timothy J. Fuller and Beba T. Dobulis, GM Global Technology Operations LLC.

U.S. 8,431,288 (20130430), Current collector plates of bulk-solidifying amorphous alloys, Trevor Wende, Crucible Intellectual Property, LLC.

U.S. 8,432,168 (20130430), Fuel cell system, Ayako Kawase, Toyota Jidosha Kabushiki Kaisha (JP).

RESEARCH AND DEVELOPMENT

Scientists Develop Cheaper, More Efficient Fuel Cells

Using the Canadian Light Source (CLS) synchrotron, researchers have discovered a way to create cheaper fuel cells by dividing normally expensive platinum metal into nanoparticles (or even single atoms) for use in everything from automobiles to computers.

The research findings, led by Ontario-based Western University's Xueliang (Andy) Sun and Tsun-Kong (T.K.) Sham, were published recently by Scientific Reports, Nature's online, open access, multidisciplinary publication: *Single-atom Catalysis Using Pt/Graphene Achieved through Atomic Layer Deposition.*

After collaborating with researchers from McMaster University, the CLS synchrotron, and Ballard Power Systems

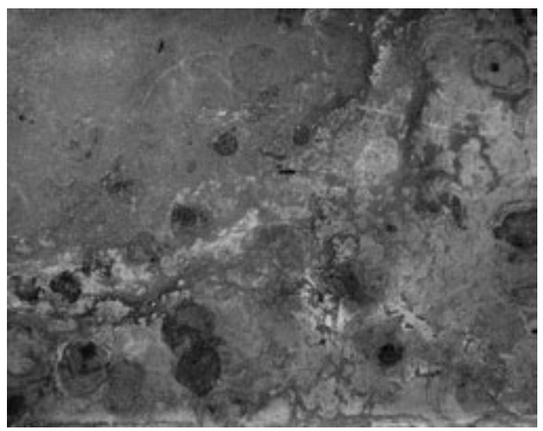
Western University researchers Tsun Kong Sham, Canada Research Chair in Materials and Synchrotron Radiation (left), and Xueliang A Sun, Canada Research Chair in Nanomaterials for Energy Conversion and Storage, are pictured on the university campus.

Inc., Sun and Sham developed a method of utilizing atomic layer deposition (ALD). This surface science technique is used for depositing chemical compounds, to create single atom catalysts. This is a major boon for the three-headed battle against global energy demands, depletion of fossil fuel reserves, and environmental pollution problems.

"Platinum, which is very expensive, is often used as a catalyst but only the surface atoms are doing the work," says Sun, Canada Research Chair in Nanomaterials for Energy Conversion and Storage. "The rest of the atoms, below the surface, have no function as a catalyst so you are basically paying for 100% of the platinum but only using 10 to 20%."

Gold and Rust Unlikely Partners Fuel Cells

Hydrogen fuel cells generate electricity directly from hydrogen and generate zero carbon dioxide emissions,



unlike conventional methods of electricity generation. To accomplish this feat, a catalyst in the hydrogen fuel cell starts and maintains the reaction. The catalyst needs to be resilient to corrosion, which would quickly corrode and render useless most catalyst metals.

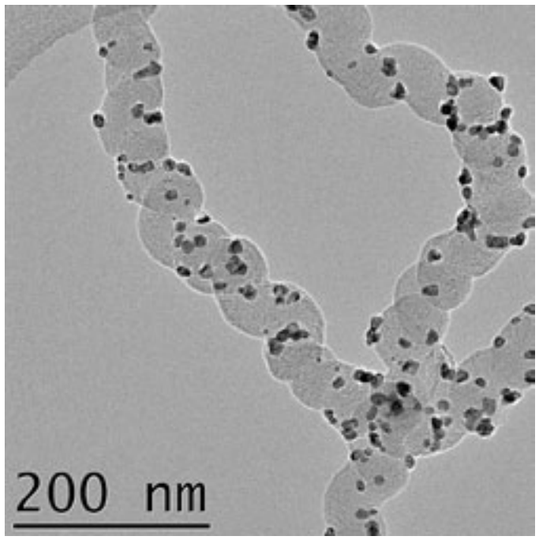
Noble metals, like platinum and gold, are immune to oxidation, but are expensive. Currently, platinum and gold, the typical choice for a hydrogen fuel cell catalyst, cost around $1,400 per ounce, or $44.8 million per ton.

As unlike as gold and rust are, they work well together as a hydrogen fuel cell catalyst. Researchers at Duke University have devised a method to combine the noble properties of gold and near worthless iron oxide, otherwise known as rust, into a hydrogen fuel cell catalyst. The new catalyst is cheaper, which reduces the fuel cell's cost. It is also more efficient, eliminating the production of the poisonous gas carbon monoxide, a byproduct of inefficient hydrogen-to-water reaction.

Formic Acid Fuel Cell Technology Improves

Physicist Florian Nitze, working at Umeå University in Sweden on his thesis, has developed new catalysts to improve the capacity of formic acid fuel cells.

Formic acid is a naturally occurring product and is comparatively safe in a low concentration that's even used in foods. The HCO_2H molecule is also a precursor for some fuel production processes. Rich in hydrogen and a bit of carbon it's a liquid in atmospheric temperatures so it would be a fine fuel product. The formic acid molecule also



comes apart or decomposes with a little heat into simple carbon dioxide and water. That's where the chemistry gets interesting.

Nitze has developed new catalysts based on a combination of material science and nanotechnology, engineering close to the atom level with the goal to reduce the energy loss and to increase the rate of the chemical reactions, which leads to a higher efficiency in the fuel cell.

Nitze explains, "Especially catalysts of palladium-nanoparticles attached to a unique helical formed carbon nanofiber proved to have a long lifetime and a very high potential to be used in formic acid fuel cells. The helical formed carbon nanofiber has a high electrical conductivity and a surface that is very easy to decorate with nanoparticles."

Several of the new catalysts that Nitze have developed are based on palladium. It is a noble metal such as gold or platinum, but it is currently half as expensive.

Fuel Cells Could Offer Cheap CO^2 Storage

The electrochemical reactions that occur inside fuel cells to generate electricity could provide a cheap way to selectively remove carbon dioxide from the exhaust gases of fossil-fuel power plants.

Existing approaches to capturing carbon dioxide would nearly double the cost of electricity from a coal-fired power plant. And although using fuel cells instead would still increase the cost of electricity, that increase might be one-third or less, says Shailesh Vora, a program manager at the U.S. Department of Energy's National Energy Technology Laboratory, which is helping to fund development of the technology with a $2.4 million grant. Researchers have considered using fuel cells for capturing carbon dioxide since at least the early 1990s, but the cells are cheaper now and they last longer, which could make them more practical.

Molten carbonate fuel cells actually rely on carbon dioxide to operate. They take it in at one electrode. That carbon dioxide is then used to form ions that conduct current to the opposite electrode, where the carbon dioxide is emitted. Finally, it is pumped back to the first electrode to be reused, forming a complete loop.

To capture carbon dioxide, this loop would be interrupted. Instead of recycling carbon dioxide, the fuel cell would get the carbon dioxide it needs from the exhaust in a power plant. These exhaust gases contain about 5% to 15% carbon dioxide, diluted by other gases, mostly nitrogen. The fuel cell would selectively take up the carbon dioxide, use it to form ions, and then emit it in a much more

concentrated stream at the opposite electrode. The gases emitted there would be about 70% carbon dioxide. Most of the rest is water vapor, which is easy to condense out, leaving an almost pure stream of carbon dioxide that can be pressurized and pumped underground for storage.

PRODUCT NEWS

Automotive Fuel Cell Technology Report

The Automotive Fuel Cell Technology Report 2013 from Research and Markets examines the key drivers in this sector and details the main fuel cell types as well as the latest advances in technology. The report goes on to consider fuel cells in the electric powertrain and hydrogen fuel and infrastructure, in particular hydrogen production, hydrogen storage and infrastructure, new chemical approaches and integration with renewable energy.

Finally, the report looks at the development of the automotive fuel cell market with the latest developments from the major automotive manufacturers.

Visit www.researchandmarkets.com for more information.

SFC Fuel Cell Generator Charges Li-Ion Batteries

SFC Energy AG of Brunnthal, Germany, launched the new EMILY 3000 fuel cell generator for vehicle based defense applications at the recent Special Operations Forces Industry Conference (SOFIC).

EMILY 3000 provides a 35% power increase to a maximum of 125W nominal power, representing a 3,000Whr charging capacity per day. It implements user experience and requests and features advanced power management for more application flexibility. Like its predecessor, EMILY 3000 has been qualified according to Mil Std. and VG97010-2 in official military tests. EMILY 3000 will replace the EMILY 2200 at the end of 2013 and has the same size, form factor and nearly the same weight.

EMILY 3000's most prominent feature is its new charging flexibility. In addition to conventional batteries, the fully ruggedized fuel cell generator also charges modern Li-ion and lithium polymer batteries.

More information, visit www.sfc-defense.com.

ELECTRIC VEHICLES

Microcab to Use South African Technology

A memorandum of understanding on the joint development of hydrogen and fuel cell vehicle platforms and technologies has been signed between the University of the Western Cape and Coventry University, both of the U.K., and Microcab Industries, which will see Microcab using Hydrogen South Africa (HySA) technologies.

The department is also working closely with the Department of Energy and the International Energy Agency, to finalize the Solar Energy Technology Road Map this year, while the Bioeconomy Strategy, had been finalized and will be presented to the cabinet for approval. It recently launched it's ninth center of excellence which will collaborate with a number of institutions across the country, including the Iziko Museum.

Fuel Cells Power New Submarine in Germany

Germany-based ThyssenKrupp Marine Systems, a shipbuilder and developer of maritime systems, has developed a new submarine that is powered by an innovative hydrogen fuel cell system. The submarine itself is part of an ongoing project from the German Navy, which is meant to incorporate clean technologies into marine vehicles. The submarine has been named U36 and is the second of its kind to be designed for the German Navy.

The submarine incorporates much of the technology that has made its predecessors valued tools in the German military. Instead of relying on nuclear energy or other

forms of power, however, the U36 relies on hydrogen fuel. Fuel cells are able to produce large amounts of electrical power through the use of hydrogen. Hydrogen itself can be extracted from seawater. Moreover, hydrogen fuel cells operate silently, a very valuable quality for submarines.

Fuel Cell-Powered Audi A7 in Development

Audi's technical chief Wolfgang Dürheimer reports that the company is developing a fuel cell-powered A7. The fuel cell-equipped Audi A7 is due to begin trials at the end of August and is believed to be part of Audi's new 'tron' range of sustainable technologies.

It's not the first time that Audi has trialled fuel cells. In 2009, Audi tested the Q5 HFC, which used two high-pressure cylinders of hydrogen to supply a fuel cell powering the Q5 HFC's twin electric motors.

Alternative fuels – including hydrogen and natural gas – are of particular interest to Audi and will remain so until battery technology improves and charging infrastructures expand.

Hydrogen RC Car Completes 2,357 Laps in France

A French hydrogen fuel cell remote control car ran for 2,357 laps, or 212.1km, at the 24 hours of St. Jo green race recently. According to the Air Liquide website, "Mr. Frédéric Cuvillier, French Minister of Transportation, Sea and Fishing, handed out the trophy cup specially made for this challenge, which was to keep a hydrogen-powered car using rain water, with hydrolysis done by solar panels, working under competitive conditions for 24 hours non-stop. Participating students made very interesting measurements, in particular pertaining to the increase in the duration of accumulators thanks to the fuel cell."

UPCOMING EVENTS

Call for Papers

Deadline: January 15, 2014

Battcon, May 5-7, Boca Raton Resort and Club, Boca Raton, Florida.

Submit a brief abstract describing the proposed paper's main points, conclusion, title and contact information with a biography as a Word file attachment to Michael Salokar at michael.salokar@alber.com.

Contact Michael Salokar, Albercorp, 3103 N. Andrews Ave. Ext., Pompano Beach, FL 33064, (954) 623-6660, or visit www.battcon.com.

Meetings and Symposia

June 10-12 – Electric Drive Transportation Association Conference and Annual Meeting, Washington Marriott Wardman Park, Washington, DC.

Provides in-depth, leading-edge information to promote the discussion and development of electric drive technology and power sustainable transportation. Includes electric, extended range electric, plug-in hybrids, hybrids and fuel cell vehicles. Ideal for academic, government, and industry leaders interested in the technical, policy and market challenges. Hundreds of exhibits are anticipated. Ride, drive and charge the latest battery, plug-in hybrid, and fuel cell electric drive vehicles, bikes and scooters.

Info: Visit www.electricdrive.org.

June 24-28 – 4th European Advanced Automotive Battery Conference and Symposia (AABC Europe), Palais des Congres, Strasbourg, France.

Automotive energy-storage experts discuss the technological progress and scenarios for the development of the market. The LLIBTA Symposium includes high-voltage Li-ion cathodes and electrodes; Li-ion anodes and inactive materials; and stationary application advances for large-format batteries.

Info: Carol Chambers, Advanced Automotive Batteries, phone: (530) 692-0140; fax: (530) 692-0142, or visit www.advancedautobat.com.

June 26-27 – IFBF: The International Flow Battery Forum, O'Callaghan Alexander Hotel, Dublin, Ireland.

Promotes the latest developments in flow battery science, technology, and deployment; and flow batteries as a modern and effective electrical energy source.

Info: Visit www.flowbatteryforum.com.

July 12-15 – Hydrogen and Fuel Cells Conference 2013, Silverado Resort and Spa, Napa Valley, California.

Includes hydrogen production and materials; materials for hydrogen storage; fuel cell research and development; hydrogen and fuel cell applications; and hydrogen safety engineering.

Info: Visit http://www.zingconferences.com/ index.cfm?page=conference&intConferenceID=109&fSignup=1&CFID=2267227&CFTOKEN=97972260.

September 1-4 – 4th International Microbial Fuel Cell Conference, Cairns, Queensland, Australia.

Organized by Pennsylvania State University (USA), Gwangju Institute of Science and Technology (Korea), and Wageningen University/WETSUS (The Netherlands) and includes all microbial electrochemical technologies.

Info: Visit www.mfc4.com.au.

September 10-13 – 15th Asian Battery Conference, Shangri-La Hotel, Singapore, China.

Industry C-Level executives, marketers, technical staff and sales teams discuss new and emerging technologies, understand future directions, meet new suppliers, conduct business and network with industry peers.

Info: Visit www.conferenceworks.com/au/15abc/.

September 17-19 – The Battery Show and Electric & Hybrid Vehicle Technology Conference, Suburban Collection Showplace, Novi, Michigan.

Topics include cost reduction of materials, manufacturing and delivery to market; battery safety; increasing energy density; end user perspectives in reliability, maintenance and real-word experience; and charging infrastructure.

Info: www.thebatteryshow.com.

November 17-20 – EVS27, Gran Via, Barcelona, Spain.

Includes planetary sessions, oral sessions in parallels, poster sessions, exhibition, Ride&Drive, and projects dissemination. See the latest battery, hybrid and fuel cell electric vehicles available on the market, prototypes and infrastructures for the electric vehicles as well as all types of components.

Info: Visit www.evs27.org.

2014

February 3-7 – 14th International Advanced Automotive Battery Conference and Symposia (AABC), Hyatt Regency, Atlanta, Georgia.

Automotive energy-storage experts discuss the technological progress and scenarios for the development of the market. The LLIBTA Symposium includes advances in materials, cell and pack designs, and analyzes battery performance, durability and safety in new applications.

Info: Carol Chambers, Advanced Automotive Batteries, phone: (530) 692-0140; fax: (530) 692-0142, or visit www.advancedautobat.com.

March 10-13 – 31st 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: Thomas M. Devita, Seminar Coordinator, Florida Educational Seminars Inc., 2300 Glades Road, Suite 260W, Boca Raton, FL 33431, phone: (561) 367-0193, fax: (561) 367-8429, or visit www.powersources.net.

May 5-7 – Battcon, Boca Raton Resort and Club, 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, Albercorp, 3103 N. Andrews Ave. Ext., Pompano Beach, FL 33064, (954) 623-6660 ext 23806, or visit www.battcon.com.

Advanced Fuel Cell Technology
June 2013
Index of Advertisers

ABT and FCT 9
Electrochemical Society 15
31st International Battery Seminar and Exhibit 2
Tech-Etch 16

To advertise in FCT,
order a media kit by calling
Jo at (814) 466-6559 or
email: jo@7ms.com cc:brenda@7ms.com

ECS Announces Three New Journals

With the ***Journal of The Electrochemical Society*** at its helm, for close to 110 years ECS has recognized the need for researchers to publish technical content with a timely turnaround and have access to resources dedicated to their studies.

Now, to further enhance its mission to encourage research and dissemination of knowledge, ECS has developed two distinct publication channels for scholarly research: **Electrochemical Science & Technology** and **Solid State Science & Technology**, each to include a traditional and a rapid-publication journal.

Electrochemical Science & Technology Journals

Fundamental and applied areas of electrochemistry, including experimental and theoretical aspects of electrodes, interfaces, and devices.

- ***Journal of The Electrochemical Society*** **(JES)**
  JES will continue to accept full length manuscripts at a new website: ecsjournals.msubmit.net. Current lag time of 36 days to first review.
- ***ECS Electrochemistry Letters*** **(EEL)**
  EEL will accept short manuscripts requiring rapid publication at ecsjournals.msubmit.net. Lag time of 16 days to first review, based on current ECS standards for rapid publication journals.

  (EEL and *ECS Solid State Letters* will replace the current rapid publication title, *Electrochemical and Solid-State Letters.*)

EST Technical Editors and Technical Content Areas

Daniel Scherson (Case Western Reserve University, USA)
Editor

Gerald S. Frankel (Ohio State University, USA)
Corrosion Science and Technology

Thomas F. Fuller (Georgia Institute of Technology, USA)
Fuel Cells, Electrolyzers, and Energy Conversion

Andrew A. Gewirth (University of Illinois, USA)
Physical and Analytical Electrochemistry, Electrocatalysis, and Photoelectrochemistry

Charles L. Hussey (University of Mississippi, USA)
Electrochemical/Chemical Deposition and Etching

Rangachary Mukundan (Los Alamos National Laboratory, USA)
Sensors and Measurement Sciences

Dennis G. Peters (Indiana University, USA)
Organic and Bioelectrochemistry

John Weidner (University of South Carolina, USA)
Synthesis and Electrochemical Engineering

Martin Winter (Westfaelische Wilhelms University, Germany)
Batteries and Energy Storage

Solid State Science & Technology Journals

Fundamental and applied areas of solid state science and technology, including experimental and theoretical aspects of the chemistry and physics of materials and devices.

- ***ECS Journal of Solid State Science and Technology*** **(JSS)**
  JSS will accept full-length manuscripts at ecsjournals.msubmit.net. Lag time of 36 days to first review, based current ECS standards for full-length article journals.
- ***ECS Solid State Letters*** **(SSL)**
  SSL will accept short manuscripts requiring rapid publication at ecsjournals.msubmit.net. Lag time of 16 days to first review, based on current ECS standard for rapid publication journals.

  (SSL and *ECS Electrochemistry Letters* will replace the current rapid-publication title, *Electrochemical and Solid-State Letters.*)

SSST Technical Editors and Technical Content Areas

Dennis W. Hess (Georgia Institute of Technology, USA)
Editor

Jennifer A. Bardwell (National Research Council, Canada)
Electronic Materials Processing

Stefan De Gendt (imec, Belgium)
Dielectric Science and Materials

Francis D'Souza (University of North Texas, USA)
Carbon Nanostructures and Devices

Yue Kuo (Texas A&M University, USA)
Electronic and Photonic Devices and Systems

Kailash C. Mishra (Osram Sylvania, USA)
Luminescence and Display Materials, Devices, and Processing

ECS Digital Library

Every ECS journal adds depth to the ECS Digital Library, and features:

- Targeted research and technical content areas (visit www.electrochem.org).
- Immediate and wide dissemination of content to more than 1,000 academic, research, and corporate libraries worldwide, as well as individuals.
- No publication charges.

Accepting manuscripts at: ecsjournals.msubmit.net
For more detailed information about ECS journals visit: www.electrochem.org

Etched Metal Fuel Cell Bipolar Flow Field Plates, Frames, Membrane Support Screens & End Caps

Photoetching metal offers fuel cell designers unique time-saving and cost advantages. Rapid prototyping is automatic, plus only a new phototool is required for design changes.

Photoetched **Stainless Steel** and **Titanium** components are ideal for the fuel cell stack.

- Bipolar Flow Field Plates
- Frames
- Membrane Support Screens
- End Caps

Etched Titanium Fuel Cell Components Stack Up The Best

*Due to their robustness and improved volumetric power density when compared to graphite, extremely corrosion resistant **Stainless Steel** and **Titanium** bipolar flow field plates for PEM fuel cells offer many advantages:*

- Where space is limited, they are thinner producing a shorter stack.
- Metals offer superior electrical and heat conductivity than non-metal solutions.
- For mobile applications, metal plates are less fragile and able to withstand mechanical impact.
- For long-life applications, stainless steel and titanium provide extended life times plus improved electrical performance.

Scan for additional information on etched fuel cell stack components.

Photoetching advantages:

- No expensive tooling or time consuming mold making required.
- Thickness is typically .050" or less.
- Multiple channel levels can be etched onto the fuel cell plate.
- Concept to part in only 3 weeks.
- Smooth surfaces are burr and stress free.
- Prototype to high volume.

Conductive Coating Process

Robotic spray coating process applies conductive coatings to improve electrical contact between active materials and to provide oxidation and corrosion protection.

Tech-Etch

www.tech-etch.com

ISO 9001
REGISTERED

TECH-ETCH, INC., 45 Aldrin Road, Plymouth, MA 02360 • TEL 508-747-0300 • FAX 508-746-9639 • sales@tech-etch.com