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**FUEL CELL CONNECTION – October 2009 Issue**  
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News on U.S. Government Fuel Cell Programs

1. NRL Reports Record 23-Hour Flight for Fuel Cell Powered UAV

The Naval Research Laboratory (NRL) has documented a record 23-hour flight of an Ion Tiger unmanned aerial vehicle (UAV), powered by a fuel cell system from Protonex Technology Corporation. The NRL demonstration was conducted through a program sponsored by the Office of Naval Research.

http://www.associatedcontent.com/article/2288805/ion_tiger_uav_sets_fuel_cell_flight.html

2. NETL Completes Field Testing of SOFC Fueled with Coal Syngas

The National Energy Technology Laboratory (NETL) has completed testing of a solid oxide fuel cell (SOFC) operating on partially cleaned coal syngas. The 450-hour test resulted in collection of test data on twelve separate "specimen" SOFCs that operated in parallel at a variety of power densities. Test results will be used in the design of cleanup systems for integrated gasification/fuel cell applications.

<http://www.ornl.gov/info/news/pulse/no298/story1.shtml>

3. SERC Develops Fuel Cell Curriculum for Educating Local Government Leaders

The Schatz Energy Research Center (SERC) is working with Technology Transition Corporation on a project, funded by the U.S. Department of Energy (DOE), to "inform local government leaders about the long-term benefits and near-term realities of hydrogen and fuel cell technology." SERC has developed a curriculum and delivered it at the annual conference of the Public Technology Institute, which helps local governments with technology development and implementation.

http://www.schatzlab.org/docs/v4n3_dig_sm.pdf

4. ORNL to Host Fourth Annual Global Venture Challenge

Oak Ridge National Laboratory (ORNL) will host the fourth annual Global Venture Challenge, in which graduate student teams compete for cash prizes. This year's challenge features two separate "Idea-to-Product Competitions": Track 1 - Advanced Materials for a Sustainable Energy Future, and Track 2 - Community Resilience and Homeland Security. Track 1 is sponsored by the DOE Industrial Technologies Program. Teams in this competition will present innovative business ideas for sustainable energy using advanced materials. Global Venture Challenge 2010 will be held March 24-26, 2010. Information on how to register can be found at

<http://www.globalventurechallenge.com>.

5. DOE Publishes Report on Vehicle Technologies Program

DOE has published a short report on the state of its Vehicle Technologies Program, which supports research and development of plug-in hybrid vehicles, alternative fuels (including

hydrogen, biodiesel and compressed natural gas), reduction of vehicle weight, and improved combustion technologies.

http://www1.eere.energy.gov/office_eere/pdfs/vehicles_fs.pdf

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**RFP/Solicitation News**  
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6. Missile Defense Agency BAA for Colleges and Universities Lists Fuel Cell Research Interest

The Missile Defense Agency issued its Science and Technology Advanced Research (MSTAR) Broad Agency Announcement (BAA). Fuel cells and battery technology are included under the Research Topic of "Physics, Chemistry, and Materials." The MSTAR program was instituted "to fund relevant advanced research at qualified accredited domestic colleges, universities or institutions of higher learning and to support training of future scientists and engineers in the field of missile defense." Contracts are expected to be funded at a level between \$600,000 and \$800,000 for a period of two or three years. The response date for proposals is November 18, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=c164a22fc06328822d935d6b3396739d&tab=core&_cview=0

7. SRNL Seeks Partners for Energy Program Cooperative Research

The Savannah River National Laboratory (SRNL) seeks "funds-in partners" for cooperative research projects related to its Energy Programs. SRNL's core competencies include hydrogen, materials science, analytical chemistry, and sensor development. SRNL seeks to establish Cooperative Research and Development Agreements (CRADAs) with non-Federal partners. The deadline for responses to this solicitation of interest is November 20, 2009.

https://www.fbo.gov/index?s=opportunity&mode=form&id=4582a1b98074e6ed7cefcd31cbaebac&tab=core&_cview=0

8. NYSERDA to Fund Environmentally Preferred Power System Projects

The New York State Energy Research and Development Authority (NYSERDA) has \$5 million in funding available to support the development, demonstration, and commercialization of environmentally preferred power systems and electric energy storage technologies. The maximum per-project funding under Category 'A' – Early Stage Innovative Product Development Feasibility and Technology Transfer Studies – is \$250,000 per project. The maximum per-project funding under Category 'B' – New Product Development – is \$1.0 million per project. The maximum per-project funding under Category 'C' – Demonstration Projects – is \$1.5 million per project. The deadline for proposals under this Program Opportunity Notice is December 10, 2009.

<http://www.nyserda.org/funding/1670pon.asp>

9. NOAA SBIR Sub-Topics Include Development of Renewable Energy Sources

The National Oceanic and Atmospheric Administration (NOAA) issued its Small Business Innovation Research (SBIR) solicitation, which includes as a sub-topic "Development of Renewable Alternative Energy Sources," such as tidal/current technology and biofuels from microalgae or macroalgae. Phase I proposal budgets must not exceed \$95,000 and project duration must not exceed six months. If a small business concern has received one or more Phase II awards from any Federal agency in the prior five fiscal years, it may be eligible to apply for a NOAA SBIR Phase II award of up to \$300,000 to \$400,000, dependent on sub-topic. Approximately ten Phase I contracts are expected under this solicitation. The deadline for submitting proposals is January 14, 2010.

<https://www.fbo.gov/index?s=opportunity&mode=form&id=b9877e0b080e61f9c7aeca2832848206&tab=core&cvview=0&cck=1&au=&ck=>

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**Contract / Funding Awards**  
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10. Army Awards \$2.0 Million for SOFC System Integration and Testing

The U.S. Army awarded a \$2.0 million contract to Protonex Technology Corporation to build, test and deliver SOFC power systems. The project will focus on system integration and testing to develop a fully-integrated liquid fuel generator system.

<http://www.protonex.com/assets/pressrelease/eaaa7b30-ba16-43b2-b4db-0064d9ebde6c.pdf>

11. CCS Demonstration at Hydrogen-Production Facility Receives DOE Funding

Praxair will partner with several other companies on a project to demonstrate carbon capture and sequestration (CCS) of CO² emissions from an existing hydrogen-production facility at a BP Products oil refinery in Danbury, Connecticut. The project, which will receive \$1.7 million from DOE, is one of twelve industrial CCS projects selected to receive funding as part of the American Recovery and Reinvestment Act.

http://www.fossil.energy.gov/news/techlines/2009/09072-DOE_Announces_Industrial_CCS.html

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**State Activities**  
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12. East Tennessee Hydrogen Initiative Publishes Report on Hydrogen Production Methods

The East Tennessee Hydrogen Initiative (ETHI) published a report documenting research performed by the Center for Energy, Transportation and the Environment (CETE) at the University of Tennessee at Chattanooga. The research effort explored alternative fuel options for renewable transportation energy, selected hydrogen as the fuel of choice, and conducted a comparison of various methods for producing hydrogen. Based on results of the research, CETE has designed and implemented a system for generating, compressing, storing and dispensing hydrogen in support of the testing of hydrogen fueled transit vehicles.

<http://www.fta.dot.gov/documents/EastTennesseeHydrogenInitiativeChattanooga.pdf>

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**Legislative / Regulatory News**  
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13. California's Renewable Portfolio Standard Increased to 33 Percent by 2020

California Governor Arnold Schwarzenegger signed an Executive Order directing the California Air Resources Board (CARB) to adopt regulations that increase the state's Renewable Portfolio Standard to 33 percent by 2020. CARB must adopt the regulations by July 31, 2010. Gov. Schwarzenegger also signed an initiative to expedite renewable energy development on U.S. public lands in California managed by the Department of the Interior.

<http://gov.ca.gov/press-release/13273/>

http://www.doi.gov/news/09_News_Releases/101209.html

14. *Comments Sought on Draft Framework/Roadmap for Smart Grid Interoperability Standards*
The National Institute of Standards and Technology (NIST) seeks comments on the draft "NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0." NIST wants comments on the overall document and contents as well as comments on the 15 additional "Standards Identified for Implementation." Documents are available online. Comments must be received on or before November 9, 2009.

http://www.nist.gov/public_affairs/techbeat/tb2009_1006.htm#grid1

15. *Updates Published for Model Interconnection Procedures, Net Metering Rules*

The Interstate Renewable Energy Council (IREC) has published updates for its Model Interconnection Procedures and Model Net Metering Rules. IREC has participated in more than thirty state utility commission rulemakings regarding interconnection and net metering of distributed generation, and has put together these documents to note the best practices based on how the procedures have affected the development of the states' renewable energy markets.

http://irecusa.org/fileadmin/user_upload/ConnectDocs/IREC_IC_Model_October_2009.pdf

http://irecusa.org/fileadmin/user_upload/ConnectDocs/IREC_NM_Model_October_2009-1.pdf

16. *IREC Publishes 6th Edition of Its Connecting to the Grid Guide*

The Interstate Renewable Energy Council (IREC) has published the 6th edition of its Connecting to the Grid Guide, which provides information on a variety of topics related to grid-tied renewable energy sources. The new edition includes information on IREC's recently updated model procedures, alternative billing arrangements for net metering, energy storage and other emerging issues. The guide is designed for state regulators, other policymakers, utilities, industry representatives and consumers.

http://irecusa.org/fileadmin/user_upload/ConnectDocs/Connecting_to_the_Grid_Guide_6th_edition-1.pdf

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**Industry News**  
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17. *MTI MicroFuel Cells Reports 30% Improvement in Power Density*

MTI MicroFuel Cells Inc. reported it has achieved a 30% improvement in power density of its Mobion® fuel cell engine, demonstrating a power density of 84 mW/cm² while maintaining a fuel efficiency of 1800 Wh/kg. In 2008, MTI MicroFuel Cells reported achieving a power density of 62 mW/cm².

<http://www.mtimicrofuelcells.com/news/article.asp?id=367>

18. *Fuel Cell Hybrid Semi Truck Debuted in California*

California Governor Arnold Schwarzenegger introduced fuel cell hybrid TyranoT semi truck at the State Capitol building in Sacramento. The truck, which is 30% to 40% cheaper to operate than a diesel truck, is manufactured by Vision Industries Corporation.

http://www.visionmotorcorp.com/Tyrano_Introduced_by_Arnold_Schwarzenegger.htm

19. *Coca-Cola to Install 40 Hydrogen Fuel Cell Forklifts*

Coca-Cola announced it will install 40 fuel cell-powered forklifts at its Charlotte, North Carolina, production center. The GenDrive™ fuel cells, provided by Plug Power, will use hydrogen fuel. Coca-Cola selected fuel cells over batteries because compact hydrogen fueling stations can be conveniently located throughout the production center facility.

<http://www.plugpower.com/newsroom/pressreleases.aspx?action=details&newsid=299>

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**University Activities**  
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20. Rolls-Royce to Expand Fuel Cell Research Division at Stark State College of Technology
Rolls-Royce announced it will expand its Ohio fuel cell research operations by investing \$3 million in processing and testing equipment to consolidate its research and development activities at Stark State College of Technology in North Canton, Ohio. Rolls-Royce is developing utility-scale fuel cells at the site.

http://www.ohiomeansbusiness.com/news/press_releases_html.php?id=183

21. University Fuel Cell Roundup

(summaries contributed by Kathy Haq, Dir. of Outreach and Communications, National Fuel Cell Research Center, UC Irvine, khaq@nfcrc.uci.edu)

Research at MIT has uncovered new information about how nanoscale patterns on the surface of a material can produce significant changes in the way it interacts with liquids. The discovery could be significant in understanding interactions that affect a wide variety of biological processes in living cells, as well as many manufacturing or energy storage systems. The finding could affect many kinds of processes, the researchers say, from how a drug penetrates a cell membrane to how coatings adhere to surfaces, such as the catalysts coated onto electrodes in a fuel cell.

<http://web.mit.edu/newsoffice/2009/harnessing-nanopatterns.html>

On Sept. 24, International Patent Publication No. WO/2009/115319 was assigned to the Technical University of Denmark for an all ceramics solid oxide fuel cell invented by Peter Halvor Larsen of Denmark. An abstract filed with the World Intellectual Property Organization contains the following description: "The present invention provides an all ceramics solid oxide cell, comprising an anode layer, a cathode layer, and an electrolyte layer sandwiched between the anode layer and the cathode layer, wherein the electrolyte layer comprises doped zirconia and has a thickness of from 40 to 300 μm ; wherein the anode layer and the cathode layer both comprise doped ceria or both comprise doped zirconia; and wherein the multilayer structure formed of the anode layer, the electrolyte layer and the cathode layer is a symmetrical structure. The present invention further provides a method of producing said solid oxide cell."

<http://www.wipo.int/pctdb/en/wo.jsp?WO=2009115319>

On Oct. 13, U.S. Patent No. 7,601,183 was issued to the Technical University of Denmark for Peter Halvor Larsen's invention of a method for producing a reversible solid oxide fuel cell. An abstract filed with the U.S. Patent & Trademark Office contains the following description: "The present invention provides a method for producing a reversible solid oxide fuel cell, comprising the steps of: providing a metallic support layer; forming a cathode precursor layer on the metallic support layer; forming an electrolyte layer on the cathode precursor layer; sintering the obtained multilayer structure; impregnating the cathode precursor layer so as to form a cathode layer; and forming an anode layer on top of the electrolyte layer. Furthermore, a reversible SOFC is provided which is obtainable by said method. The method advantageously allows for a greater choice of anode materials, resulting in more freedom in cell design, depending on the desired application."

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetacgi%2FPTO%2Fsearch-adv.htm&r=1&f=G&l=50&d=PALL&S1=07601183&OS=07601183&RS=07601183>

For the second time in one week, Ohio State's Buckeye Bullet 2 team exceeded the international speed record it set in 2007. On Sept. 25, the Bullet set an average speed of 302.877 mph, which is pending certification by the Federation Internationale de l'Automobile before it can be called an official record. The hydrogen fuel cell powered land speed streamliner racer and its engineering student team made the record attempts in the Salt Flats in Utah. On Sept. 21, the Bullet reached an average 299.91 mph, far surpassing the certified record of 132.129 mph the vehicle set in 2007.

<http://www.osu.edu/news/newsitem2561>

Researchers at Brigham Young University claim to have developed a fuel cell that harvests electricity from glucose and other sugars known as carbohydrates using a common weed killer as a catalyst. Lead researcher and BYU chemistry professor Gerald Watt said in an article published in the August issue of the *Journal of the Electrochemical Society* that carbohydrates are very energy rich and that he and his colleagues sought a catalyst that would extract the electrons from the carbs and transfer them to an electrode.

<http://blogs.edmunds.com/greencaradvisor/2009/09/brigham-young-u-scientist-sugar--weed-killer--direct-carbohydrate-fuel-cell.html>

On Oct. 1, International Patent Publication No. WO/2009/119846 was assigned to the Japan Science and Technology Agency; the University of Tokyo; and inventors Kazuhito Hashimoto, Ryuhei Nakamura and Fumiyoshi Kai for a microbial fuel cell. An abstract filed with the World Intellectual Property Organization contains the following description: "Provided is a microbial fuel cell that can increase the electric current density without using a mediator. A microbial fuel cell (1) includes agglomerate (4) which has a three-dimensional structure formed by conductive fine particles (2) and microorganisms (3). The agglomerate (4) has a three-dimensional structure as a whole. The conductive fine particles (2) are dispersed in the interstices between Shewanellas (3), and the conductive fine particles (2) are connected to each other to hold Shewanellas (3). Therefore, more Shewanellas (3) can conduct electrons because the conductive fine particles (2) hold even the Shewanella (3a) on the surface of an electrode (103) and the Shewanella (3b) away from the surface of the electrode (103) in the vertical direction."

<http://www.wipo.int/pctdb/en/wo.jsp?WO=2009119846>

A pair of Case Western Reserve University researchers mixed metals commonly used to grow nanotubes and found that the composition of the catalyst can control the chirality – the way in which a lattice of carbon atoms is rolled into a tube – producing different structures that exhibit very different properties. In a letter published in the Sept. 20 online edition of *Nature Materials*, R. Mohan Sankaran, an assistant professor of chemical engineering at the Case School of Engineering, and Wei-Hung Chiang, who received his doctorate degree in chemical engineering in May, describe their findings. The finding could lead to a replacement for costly platinum in fuel cells.

<http://blog.case.edu/case-news/2009/10/05/naturematerialsnanotubes>

Researchers at Purdue University are developing a new type of rocket propellant made of a frozen mixture of water and "nanoscale aluminum" powder that is more environmentally friendly than conventional propellants and could be manufactured on the moon, Mars and other water-bearing bodies. The aluminum-ice, or ALICE, propellant might be used to launch rockets into orbit and for long-distance space missions and also to generate hydrogen for fuel cells, said Steven Son, an associate professor of mechanical engineering. Purdue is working with NASA, the Air Force Office of Scientific Research and Pennsylvania State University to develop ALICE.

<http://www.purdue.edu/UNS/x/2009b/091007SonRocket.html>

University of Calgary chemists Jeff Hurd and George Shimizu have discovered a new material that allows a PEM fuel cell to work at a higher temperature, up to 150 °C. A research paper by Shimizu, Hurd, Ramanathan Vaidyanathan and Venkataraman Thangadurai of the University of Calgary, and Christopher Ratcliffe and Igor Moudrakovski of the Steacie Institute for Molecular Sciences, National Research Council, has just been published in *Nature Chemistry* online. Shimizu filed a patent with the U.S. patent office last year.

<http://www.ucalgary.ca/news/october2009/fuelcell>

The Air Force Office of Scientific Research announced Oct. 22 that it will award approximately \$14.6 million in grants to 38 scientists and engineers who submitted winning research proposals through the Air Force's Young Investigator Research Program. One of the recipients is Mohamed Y. El-Naggar, an assistant professor of physics at the University of Southern California, Los Angeles, who will investigate biotic-abiotic nanoscale interactions in biological fuel cells.

<http://www.wpafb.af.mil/news/story.asp?id=123173414>

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**Administration**  
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Press releases and story ideas may be forwarded to Bernadette Geyer, editor, for consideration at [fuelcellconnection @ yahoo.com](mailto:fuelcellconnection@yahoo.com).

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**About Fuel Cell Connection**  
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The Sponsors

US Fuel Cell Council -- The US Fuel Cell Council is the business association for anyone seeking to foster the commercialization of fuel cells in the United States. Our membership includes producers of all types of fuel cells, as well as major suppliers and customers. The Council is member driven, with eight active Working Groups focusing on: Codes & Standards; Transportation; Power Generation; Portable Power; Stack Materials and Components; Sustainability; Government Affairs; and Education & Marketing. The Council provides its members with an opportunity to develop policies and directions for the fuel cell industry, and also gives every member the chance to benefit from one-on-one interaction with colleagues and opinion leaders important to the industry. Members also have access to exclusive data, studies, reports and analyses prepared by the Council, and access to the "Members Only" section of its web site. (<http://www.usfcc.com/>)

National Fuel Cell Research Center -- The mission of the NFCRC is to promote and support the genesis of a fuel cell industry by providing technological leadership within a vigorous program of research, development and demonstration. By serving as a locus for academic talent of the highest caliber and a non-profit site for the objective evaluation and improvement of industrial products, NFCRC's goal is to become a focal point for advancing fuel cell technology. By supporting industrial research and development, creating partnerships with State and Federal agencies, including the U.S. Department of Energy (DOE) and California Energy Commission (CEC), and overcoming key technical obstacles to fuel cell utilization, the NFCRC can become an invaluable technological incubator for the fuel cell industry. (<http://www.nfccrc.uci.edu/>)

National Energy Technology Laboratory -- The National Energy Technology Laboratory is federally owned and operated. Its mission is "We Solve National Energy and Environmental

Problems." NETL performs, procures, and partners in technical research, development, and demonstration to advance technology into the commercial marketplace, thereby benefiting the environment, contributing to U.S. employment, and advancing the position of U.S. industries in the global market. (<http://www.netl.doe.gov>)