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## **FUEL CELL CONNECTION - March 2008 Issue**

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**News on U.S. Government Fuel Cell Programs**  
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**1. Fuel Cell Demonstration Begins at National Guard Facilities in New Mexico**

The U.S. Army Construction Engineering Research Laboratory is monitoring a new demonstration of twenty fuel cell units at New Mexico National Guard facilities in Santa Fe and Rio Rancho. The GenCore® hydrogen fuel cells supplied by Plug Power will provide emergency backup power to the facilities' mission critical communications and computer systems.

[http://www.dvs.state.nm.us/pdfs/NMNG\\_021908.pdf](http://www.dvs.state.nm.us/pdfs/NMNG_021908.pdf)

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**2. BNL Scientists Research Catalysts for Efficient, Clean Hydrogen Production**

Scientists at the Brookhaven National Laboratory (BNL) and the Institute for Molecular Science in Japan are working on catalysts that mimic the natural process of photosynthesis, with the ultimate goal of finding catalysts that will be efficient at producing hydrogen. The research team is looking closely at a ruthenium complex with bound quinine molecules, a catalyst that appears promising for water oxidation. [http://www.bnl.gov/bnlweb/pubaf/pr/PR\\_display.asp?prID=08-21](http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=08-21)

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**3. ARL Project Demonstrates Fuel Cell Battery Hybrid Powered Unmanned Aircraft**

A small Puma unmanned aircraft flew more than nine hours powered by an onboard fuel cell battery hybrid energy storage system, a milestone for a U.S. Air Force Research Laboratory (ARL) project with AeroVironment. The hybrid energy storage system incorporates a Protonex Pulse™ UAV fuel Cell system. The flight was two hours longer than the previous Puma flight record, and more than three times longer than the duration of Puma's standard battery-only operation. [http://www.avinc.com/pr\\_landing.asp](http://www.avinc.com/pr_landing.asp)

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**4. NRC Publishes Report on FreedomCAR and Fuel Partnership**

The National Research Council (NRC) of the National Academies of Science published its annual report on the progress of the federally-supported FreedomCAR and Fuel Partnership. The report concludes that development of fuel cells and supporting hydrogen infrastructure would provide the most efficient and least polluting means to power personal transportation vehicles, but that significant improvements in durability and cost are needed to enable the mass production and sale of vehicles.

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12113>

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**5. GAO Reports on DOE Advanced Energy R&D Budget Trends and Challenges**

The U.S. Government Accountability Office (GAO) has published a report titled "Advanced Energy Technologies: Budget Trends and Challenges for DOE's Energy R&D Program." The report found that the U.S. Department of Energy (DOE) spent \$57.5 billion over the past 30 years for R&D on advanced energy technologies and that "fossil energy today provides 85 percent of the nation's energy compared to 93 percent in 1973." According to the report, "DOE's budget authority for renewable, fossil, and nuclear energy R&D dropped by 92 percent (in inflation-adjusted terms) between fiscal years 1978 and 1998 before bouncing back in part during the past 10 years." GAO notes that since "DOE's energy R&D funding alone will not be sufficient to deploy advanced energy technologies, coordinating energy R&D with other federal energy-related programs and policies will be important." <http://www.gao.gov/new.items/d08556t.pdf>

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**6. Presentations Available from National Academies Summit on America's Energy Future**

Presentations are now available and downloadable online from the National Academies Summit on America's Energy Future, which was held in March 2008. Presentations include "Prospects of a Hydrogen Economy," by Michael P. Ramage, Chair, National Research Council Committee on Alternatives and Strategies for Future Hydrogen Production and Use. Dr. Raymond L. Orbach, DOE Under Secretary for Science, details hydrogen research projects in his presentation on "Basic Science for America's Energy Future."

[http://www.trb.org/news/blurb\\_detail.asp?id=8882](http://www.trb.org/news/blurb_detail.asp?id=8882)

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**RFP/Solicitation News**  
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*7. Navy Seeks Proposals for Hydrogen Vehicle Fueling Station Pilot Projects*

The Naval Surface Warfare Center is seeking proposals for a Department of Defense (DOD) fuel cell Materiel Handling Equipment (MHE) pilot program at the Defense Depot in San Joaquin, California. The project will also advance knowledge and understanding of hydrogen-powered MHE, hydrogen fueling stations and the associated infrastructure. Approximately \$2-4 million is available for this program, excluding any proposed industry cost sharing. Proposals are due April 28, 2008. <http://www.fbo.gov/spg/DON/NAVSEA/N00164/N0016408RGS20/SynopsisR.html>

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*8. DOE Requests Applications for Hydrogen Storage Engineering Center of Excellence*

The Department of Energy has issued a Funding Opportunity Announcement for a multidisciplinary Hydrogen Storage Engineering Center of Excellence (CoE) team to research and develop onboard vehicular hydrogen storage systems and components that will allow for a >300-mile driving range. About \$40 million is expected to be available for up to 16 awards under this solicitation. Deadline for proposals is June 4, 2008. <https://e-center.doe.gov/iips/faopor.nsf/UNID/AAEB2AA3C24EB96C852573FC0064020F?OpenDocument>

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*9. NSF Issues SBIR Solicitation, Includes Chemical Technology and Electronics Topics*

The National Science Foundation (NSF) has issued a Small Business Innovation Research (SBIR) solicitation and will award Phase I grants in three major topic areas: Biotech and Chemical Technologies; Electronics, Components and Engineering Systems; and Software and Services. Budgets for proposed projects must not exceed \$100,000. A maximum of four proposals are expected to be accepted. Deadline for the first round of proposal submissions is June 10, 2008. A separate Small Business Technology Transfer (STTR) solicitation is expected to be released at a later date. <http://www.nsf.gov/eng/iip/sbir/>

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**Contract / Funding Awards**  
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*10. DOE Provides \$3.5 Million to Automotive X PRIZE Foundation*

DOE has awarded a grant of nearly \$3.5 million to the X PRIZE Foundation for the national education and outreach component of the Automotive X PRIZE (AXP) Education Program. The AXP, officially launched on March 20, 2008, will award more than \$10 million in privately funded prizes to "teams that can engineer clean, production-capable vehicles that exceed 100 miles per gallon, or its energy equivalent fuel efficiency, and win a cross-country stage race." The outreach project will be managed by DOE's National Energy Technology Laboratory.

<http://www.energy.gov/news/6094.htm>

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*11. DOE Authorizes Additional \$500,000 for MTI MicroFuel Cells Efforts*

DOE has authorized the release of an additional \$500,000 for its program with MTI MicroFuel Cells, for the development of manufacturing techniques and the optimization of the company's Mobion® fuel cell technology platform.

<http://www.mtimicrofuelcells.com/news/article.asp?id=316>

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*12. DOE Awards Additional Funding for Hydrogen Technology and Education Curriculum*

DOE has awarded an additional \$150,000 to partners on a project to further develop a Hydrogen Technology and Education Curriculum (HyTEC). The project partners are Lawrence Hall of Science at University of California--Berkeley, Schatz Energy Research Center at Humboldt State University, and AC Transit Authority. HyTEC is a two-week module targeted for high school chemistry and environmental science students. [http://www.schatzlab.org/v3n1\\_dig\\_sm.pdf](http://www.schatzlab.org/v3n1_dig_sm.pdf)

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*13. DOE Selects Venture Capital Firms to Participate in New Entrepreneur Program*

DOE has selected three venture capital firms to participate in an Entrepreneur in Residence (EIR) pilot program in order to help accelerate adoption of advanced renewable energy and energy efficient technologies. The program will place venture capital-sponsored and selected entrepreneurs in three of DOE's national laboratories – National Renewable Energy Laboratory, Sandia National Laboratory, and Oak Ridge National Laboratory – to identify promising technologies and to develop business cases for their commercialization.

<http://www.energy.gov/news/6017.htm>

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**Industry News**  
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*14. Online Fuel Cell Patent Database Launched*

The law firm Thompson Hine LLP has launched a fuel cell patent web site that features a database archive of U.S. patents and published patent applications that may be of interest to the fuel cell community.

[http://www.thompsonhine.com/Practices/Intellectual\\_Property/FuelCellPatents.php](http://www.thompsonhine.com/Practices/Intellectual_Property/FuelCellPatents.php)

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*15. UTC Fuel Cell System Achieves 10 Million Kilowatt-Hours of Operation*

A PureCell® Model 200 stationary fuel cell designed and manufactured by UTC Power has achieved 10 million kilowatt-hours of operation, including more than 52,000 operating hours with its original fuel cell stack. The system uses phosphoric acid fuel cell technology to provide the St. Agnes Hospital in Bocholt, Germany, with baseload electric power, heating in winter, air conditioning in summer, and domestic hot water.

[http://www.utcpower.com/fs/com/bin/fs\\_com\\_Page/0,11491,0240,00.html](http://www.utcpower.com/fs/com/bin/fs_com_Page/0,11491,0240,00.html)

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*16. Violet Fuel Cell Stick Announces High Power Density Achievement*

Violet Fuel Cell Sticks announced it has achieved a high, 15-kW/liter power density with its monolithic, seal-less Solid Oxide Fuel Cell (SOFC) Stick™. The company expects its technology to be adaptable to a wide variety of applications, including large-scale power generation, APUs, automotive and mobile power generation.

[http://www.businesswire.com/portal/site/home/?epi\\_menuItemID=989a6827590d7dda9cdf6023a0908a0c&epi\\_menuID=c791260db682611740b28e347a808a0c&epi\\_baseMenuID=384979e8cc48c441ef0130f5c6908a0c&ndmViewId=news\\_view&newsLang=en&div=973078938&newsId=20080307005765](http://www.businesswire.com/portal/site/home/?epi_menuItemID=989a6827590d7dda9cdf6023a0908a0c&epi_menuID=c791260db682611740b28e347a808a0c&epi_baseMenuID=384979e8cc48c441ef0130f5c6908a0c&ndmViewId=news_view&newsLang=en&div=973078938&newsId=20080307005765)

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**University Activities**  
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*17. GM Establishes Automotive Research Institute at Shanghai Jiao Tong University*

General Motors has established a US\$4 million Institute of Automotive Research on the campus of Shanghai Jiao Tong University (SJTU) in Shanghai. The GM-SJTU Institute of Automotive Research will focus on manufacturing, materials, propulsion systems, and other energy-efficient and environmentally friendly automotive technology.

<http://media.gm.com/servlet/GatewayServlet?target=http://image.emerald.gm.com/gmnews/viewpressreldetail.do?domain=796&docid=44144>

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*18. 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](mailto:khaq@nfcrc.uci.edu))

On Feb.26, 2008, Patent No. 7,334,406 was issued to the Regents of the University of Minnesota in St. Paul for a hybrid geothermal and fuel cell system. The device was invented by James P. Licari and Jim Walters, both of Rochester, Minn., and Hal H. Ottesen of Mazeppa, Minn. An abstract of the invention, available through the U.S. Patent Office, describes it as "a hybrid energy system [that] heats or cools a plant with a geothermal unit powered at least partly by a fuel cell, which may also power other devices. The thermal fluid for the geothermal unit also cools the fuel cell via a heat exchanger. A digital controller bypasses a variable portion of the thermal fluid around the heat exchanger to regulate the fuel cell temperature."

<http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetacgi%2FPTO%2Fsrchnum.htm&r=1&f=G&l=50&s1=7,334,406.PN.&OS=PN/7,334,406&RS=PN/7,334,406> .

Professor Dan Eliezer of Ben-Gurion University of the Negev in Israel is the lead researcher working with Moshe Stern of C.En (for "Clean Energy") on what Stern claims is "revolutionary" hydrogen storage and delivery technology that will enable automobile manufacturers to produce and sell cars that use hydrogen power. C.En's tank uses hydrogen gas enclosed in a thin but leakproof glass container. "We can build a 60-liter tank that can travel up to 600 kilometers and weighs no more than 50 kilograms," Stern said. He is coordinator of the project and chief investor. [29-Feb-2008, *Jerusalem Post*] The full text is available for a fee at

<http://pqasb.pqarchiver.com/jpost/access/1441168041.html?dids=1441168041:1441168041&FMT=ABS&FMTS=ABS:FT&date=Feb+29%2C+2008&author=DAVID+SHAMAH&pub=Jerusalem+Post&edition=&startpage=20&desc=H+2+Go>

Researchers at the University of Minnesota studying bacteria capable of generating electricity have discovered that riboflavin (commonly known as vitamin B-2) is responsible for much of the energy produced by these organisms. The bacteria, *Shewanella*, are commonly found in water and soil and are of interest because they can convert simple organic compounds (such as lactic acid) into electricity, according to Daniel Bond and Jeffrey Gralnick, of the university's BioTechnology Institute and department of microbiology. Scaled-up "microbial fuel cells" using similar bacteria could generate enough electricity to clean up wastewater or power remote sensors on the ocean floor. The research is published in the March 3 issue of the *Proceedings of the National Academy of Sciences*.

[http://www1.umn.edu/umnnews/news\\_details.php?release=080303\\_3794&page=UMNN](http://www1.umn.edu/umnnews/news_details.php?release=080303_3794&page=UMNN)

IP2Biz LLC of Atlanta and International Speciality Chemicals Ltd. of London announced March 12 that they had entered into a joint-development agreement for the purpose of bringing titanium

dioxide (TiO<sub>2</sub>)-based nanowires to market. The two companies will work together to develop manufacturing capabilities and identify additional applications for this unique, breakthrough material created at the University of Arkansas. Financial details of the agreement were not disclosed. When assembled into free-standing membranes, this two-dimensional "paper" provides solutions for a variety of applications including high-temperature chemical and water filtration, high-temperature non-woven textiles, drug delivery, fuel cells and solar cells among others. <http://www.ip2biz.com/Company/NewsRef/Releases/040812-TiO2jointagreement.asp>

Bruce Logan, the Kappe professor of environmental engineering at The Pennsylvania State University, is one of 12 scientists to receive a Global Research Partnership Investigator award from the King Abdullah University of Science and Technology (KAUST). Logan will receive up to \$10 million over the next five years to investigate microbial fuel cell technologies that convert waste into electricity or hydrogen and in the process, clean water. [13-Mar-2008]

<http://live.psu.edu/story/29389>

<http://www.kaust.edu.sa/news-releases/investigator-winners08.aspx>

Mantra Venture Group Ltd. has acquired a technology developed by Professor Colin Oloman of the University Of British Columbia that can be used to convert carbon dioxide gas emissions into products for use in several industrial applications, including fuel cells. Larry Kristof, president and chief executive officer of Mantra, said, "The technology is the first step in a planned closed-loop process to convert CO<sub>2</sub> emissions into liquid fuel for fuel cells." [18-Mar-2008]

<http://www.mantraenergy.com/2008-news/mantra-venture-group-ltd.-acquires-carbon-dioxide-reduction-process-developed-at-the-university.html>

The city of San Diego has joined with the University of California, San Diego's William J. von Liebig Center for Entrepreneurism, and Technology Advancement to accelerate the commercialization of environmentally friendly technologies from academia to the private sector. Clean technology encompasses advancements in solar power, wind power, hybrid vehicles, fuel cell technology, tidal and wave power, bio-diesel, green building materials and water treatment. [19-Mar-2008] <http://ucsdnews.ucsd.edu/newsrel/science/03-08HomeGrownCleanTech.asp>

A University of Wisconsin-Madison and University of Maryland research team has developed a new nanotechnology-driven chemical catalyst that paves the way for more efficient hydrogen fuel cell vehicles. Writing in the *Advance Online Publication of Nature Materials*, UW-Madison chemical and biological engineering Professor Manos Mavrikakis and UM chemistry and biochemistry Professor Bryan Eichhorn describe a new type of catalyst created by surrounding a nanoparticle of ruthenium (Ru) with one to two layers of platinum (Pt) atoms. The result is a robust room-temperature catalyst that dramatically improves a key hydrogen purification reaction and leaves more hydrogen available to make energy in the fuel cell. [19-Mar-2008]

<http://144.92.105.154/14928>

Researchers at Duke University's Pratt School of Engineering have developed a membrane that allows fuel cells to operate at low humidity and theoretically at higher temperatures. "The current gold standard membrane is a polymer that needs to be in a humid environment in order to function efficiently," said Mark Wiesner, a Duke civil engineering professor. "If the polymer membrane dries out, its efficiency drops. We developed a ceramic membrane made of iron nanoparticles that works at much lower humidities. And because it is a ceramic, it should also tolerate higher temperatures." [19-Mar-2008]

[http://news.duke.edu/2008/03/fuel\\_cell.html](http://news.duke.edu/2008/03/fuel_cell.html)

Michigan Technological University is renovating a 4,000-square-foot building to meet the growing needs of its alternative energy researchers. Scheduled for completion this summer, the remodeled building will support various researchers from Michigan Tech's Advanced Power Systems Research Center. Among the research included in the remodeled building is that of Jeffrey Allen, who will head a U.S. Department of Energy-funded project to investigate the effects of freezing temperatures on hydrogen fuel cells using an environmental chamber. [21-Mar-2008]



[http://www.admin.mtu.edu/urel/news/media\\_relations/674/](http://www.admin.mtu.edu/urel/news/media_relations/674/)

Purdue University is the site of the Hydrogen Symposium 2008, a two-day conference on hydrogen and fuel cells scheduled for April 24-25 at the university's Stewart Center.

<http://www.purdue.edu/dp/energy/2008hydrogen/>

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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.

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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.nfcrc.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>)