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## **FUEL CELL CONNECTION - February 2006 Issue**

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**News on U.S. Government Fuel Cell Programs**  
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1. White House Proposes \$289 Million for FY2007 Hydrogen Fuel Initiative

The Bush administration has proposed a total of \$289 million to fund the President's Hydrogen Fuel Initiative in FY2007, an increase of \$53 million over FY2006 funding. According to a White House fact sheet, the President's program has resulted in a more than 50% decrease in the cost of a hydrogen fuel cell over the past four years. The Department of Energy has posted breakdowns of funding for individual fuel cell programs within its department, which includes: \$195.8 million for Hydrogen Technology in the budget of the Office of Energy Efficiency and Renewable Energy; \$18.6 million for the Office of Nuclear Energy; \$23.6 million for the Office of Fossil Energy; and \$50.0 million for the Office of Science. An additional \$1.4 million is included in the budget of the Department of Transportation.

<http://www.whitehouse.gov/news/releases/2006/01/20060131-6.html>

<http://www.cfo.doe.gov/budget/07budget/Start.htm>

2. Sandia Researchers Examines PEMFC Durability, Performance

Researchers at Sandia National Laboratory are combining computational models with physical experimentation to examine water management in PEM fuel cells. The researchers are seeking a better understanding of how liquid water is produced, transported and removed efficiently in PEMFCs and how PEMFC performance degrades.

<http://www.sandia.gov/news-center/news-releases/2006/renew-energy-batt/fuelcell.html>

3. Fuel Cell APU Developed for Military Operations

Protonex Technology Corporation has developed a quiet, durable, fuel cell auxiliary power unit for use by the U.S. military as a refuelable power source. The system will provide 150 to 250 watts of power for electronic and communications equipment for extended missions.

<http://www.protonex.com/Quiet%20APU.pdf>

4. FutureGen Announces Intent to Prepare Environmental Impact Statement, Solicits Comments

The Department of Energy announced an Advance Notice of Intent to prepare an Environmental Impact Statement for the implementation of the FutureGen Project. Comments from the public, federal agencies, Native American Tribes, state and local governments and other organizations are requested by March 20, 2006.

http://www.fossil.energy.gov/programs/powersystems/futuregen/futuregen_anoi.pdf

5. President Bush Discusses Hydrogen Initiative as Part of Advanced Energy Initiative

President Bush spoke at the National Renewable Energy Laboratory about his Advanced Energy Initiative, including DOE funding of hydrogen and fuel cell technology research and development. The day before the president's visit to NREL, DOE transferred an additional \$5 million to restore 32 jobs at the lab for 8 researchers and 24 support staff who had recently been laid off due to a \$28-million budget shortfall. Several of the restored positions were in the area of hydrogen research.

<http://www.whitehouse.gov/news/releases/2006/02/20060221.html>

<http://www.energy.gov/news/3223.htm>

6. NREL Awards Licenses for Hydrogen Sensor Technology

The National Renewable Energy Laboratory has awarded licenses to Nuclear Filter Technology for the manufacture of Fiber Optic Hydrogen Sensors. NREL and Nuclear Filter Technology also

have a Cooperative Research and Development Agreement for the further development of the sensors, which will then be manufactured and integrated into safety sensors for products and facilities where hydrogen may be present.

http://www.nrel.gov/news/press/2006/0606_sensor_tech.html

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**RFP/Solicitation News**  
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7. Draft RFP Released for First FutureGen Power Plant Site

The FutureGen Industrial Alliance announced a site selection process for the first "zero emissions" coal plant, which will produce both electricity and hydrogen. A draft RFP has been released for comments. A final RFP is expected after March 7, 2006. Proposals will be due by May 2006.

http://www.fossil.energy.gov/news/techlines/2006/06007-FutureGen_Site_Selection_Process.html

8. Sources Sought for Joint Research Project on Hydrogen Production

Westinghouse Savannah River Company, the managing contractor of the Savannah River Site for the DOE, has issued a Sources Sought Notice for a joint research project to develop critical technology for the Hybrid Sulfur thermochemical cycle for production of hydrogen. Experimental work has begun on the sulfur dioxide depolarized electrolyzer. Industry or academic partners are sought to participate in cooperative research and development that would result in membranes or membrane-electrode-assemblies meeting specific requirements. Letters of interest are due no later than March 27, 2006.

<http://www.fbo.gov/spg/DOE/WSRC/SRS/Reference-Number-SR16TC21-js/SynopsisR.html>

9. DOD STTR Solicitation Pre-Released

The Department of Defense has pre-released its 2006 Small Business Technology Transfer Solicitation, which features one fuel cell topic within the Army topics. The "Optimal Design of Compact Fuel Cell Hybrid Power Systems" topic seeks to develop a systems-level computational model and software that enables optimal selection of power system components and design of a complete soldier-portable fuel cell power system. Up to \$850,000 in early-stage R&D funding will be available under this solicitation. Individual Phase I awards are typically \$60,000 to \$100,000 in size for a period of 6-9 months. Proposals are due April 14, 2006.

<http://www.acq.osd.mil/sadbu/sbir/solicitations/sttr06/index.htm>

10. Loan Guarantees and Grants Available for Renewable Energy, Energy Efficiency Projects

The Department of Agriculture has made available \$176.5 million in loan guarantees and almost \$11.4 million in grants to support investments in renewable energy and energy efficiency improvements by agricultural producers and small businesses. Eligible technologies include fuel cells utilizing renewable fuels such as biomass. Applications for grants are due May 12, 2006. Applications for guaranteed loans are due by July 3, 2006.

http://www.usda.gov/wps/portal/!ut/p/s.7.0.A/7.0.1OB/cmd/ad/ar/sa.retrievecontent/c/6.2.1.UH/ce/7.2.5JM/p/5.2.4TQ/d/1/th/J.2.9D/s.7.0.A/7.0.1OB?PC.7.2.5JM.contentid=2006%2F02%2F0051.xml&PC.7.2.5JM.navtype=RT&PC.7.2.5JM.parentnav=LATEST_RELEASES&PC.7.2.5JM.navid=NEWS_RELEASE#7.2.5JM

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## Contract / Funding Awards

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11. Hydrogenics Receives Contract for Hydrogen Station at Spanish Wind Farm

Hydrogenics Corporation has been awarded a contract for more than EUR 500,000 to deliver a hydrogen station to Gas Natural SDG, which will use a HySTAT™-A Hydrogen Station at the Sotavento Galicia wind farm in Spain. The wind farm will produce up to 60 Nm³/hr of hydrogen, which will be used to fuel an internal combustion engine generator to supply electricity to the electric grid.

http://www.hydrogenics.com/ir_newsdetail.asp?RELEASEID=186066

12. PA Governor Announces \$3.7 Million Investment in Alternative Fuel Technologies

A solid oxide fuel cell project will receive \$100,000 as one of the projects selected for funding by the Pennsylvania Department of Environmental Protection under its Alternative Fuel Incentive Grants program. The program was started to help reduce the state's dependence on imported oil, improve environmental quality and encourage the deployment of innovative energy technologies to spur economic development.

<http://www.ahs.dep.state.pa.us/newsreleases/default.asp?ID=3813&varQueryType=Detail>

13. UC-Irvine Receives EISG Award for Biohydrogen Project

The University of California-Irvine received a \$75,000 grant from the California Energy Commission Energy Innovations Small Grant Program for a project to examine the feasibility of producing biohydrogen at municipal wastewater facilities.

http://www.energy.ca.gov/contracts/smallgrant/2006-02-15_awards_05-01.html

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## State Activities

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14. NYPA and NYC Transit to Power Facility with Fuel Cell

The New York Power Authority and MTA New York City Transit are working together on a \$2 million project to power an expanded subway and bus maintenance facility in Corona, NY, with a 200-kW fuel cell fueled by natural gas. The heat produced by the fuel cell will be used for the facility's domestic hot water system.

<http://www.nypa.gov/press/2006/060208a.htm>

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## Industry Headlines

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15. Air Products Hydrogen Station Fuels Cars for 5-City Demonstration Program

Air Products' new hydrogen fueling station in Riverside, California, has begun fueling cars for a five-city demonstration program being implemented by South Coast Air Quality Management District.

<http://www.airproducts.com/PressRoom/CompanyNews/Archived/2006/01Feb06.htm>

16. Hydrogenics Delivers Fuel Cell to Bell Canada Telecom Site

Hydrogenics Corporation delivered and commissioned a hydrogen fuel cell backup power generator at a Bell Canada telecommunication site in Burlington, Ontario. The 8-kW HyPM® XR fuel cell uses hydrogen as its fuel.

http://www.hydrogenics.com/ir_newsdetail.asp?RELEASEID=187832

17. Millennium Cell and Gecko Energy to Collaborate on Fuel Cells for Military

Millennium Cell and Gecko Energy Technologies announced they have entered into a 3-year joint development program to collaborate on the development and commercialization of portable fuel cell systems for use in military, medical, industrial and consumer electronics applications.

<http://www.millenniumcell.com/fw/main/default.asp?DocID=92®id=817662>

18. Fuel Cell, Turbine Power Plant Achieves High Electrical Efficiency

FuelCell Energy announced its Direct FuelCell/Turbine® achieved 56% electrical efficiency in the sub-megawatt class for 800 continuous hours during initial testing. The system – which is based on a 250-kW fuel cell and a 60-kW microturbine – has been developed following an initial Vision 21 Program contract award from DOE in 2000.

http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=FCEL&script=410&item_id=821195&layout=23

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**University Activities**  
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19. 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)

VIASPACE Inc. of Pasadena, Calif., announced that its subsidiary, Direct Methanol Fuel Cell Corporation, has exercised an option and signed two license agreements with the California Institute of Technology and the University of Southern California for an extensive joint patent portfolio on direct organic fuel cell technology. Organic fuels include methanol, ethanol, formic acid, formaldehyde and others. Methanol is the most common fuel. Together, the two agreements grant DMFCC a worldwide license to 50 issued and 50 pending patents. These licenses should enable VIASPACE/DMFCC to offer patent protection to fuel cell manufacturers and original equipment manufacturers that partner with DMFCC. In consideration for these licenses, DMFCC has issued 1,056,324 shares in DMFCC to Caltech and 1,056,324 shares to USC, which together represent 12 percent of the total outstanding equity of DMFCC. In addition, DMFCC has agreed to pay royalties under the licenses to USC and Caltech, as well as to a third party. DMFCC has also agreed to pay certain future patent expenses associated with the prosecution and maintenance of patent rights under the licenses. [25-Jan-2006, *PR Newswire US*]

The University of Minnesota recently received a grant to build a facility to convert solar energy to hydrogen that will be stored in a tank and used to power fuel cells to generate electricity. The new facility will employ 72 solar panels given to the university several years ago by Xcel Energy. The panels are installed on top of the university's architecture building, Rapson Hall. [1-Feb-2006, *University Wire*]

Harvest Energy Technology, Inc., of Sun Valley, Calif., supplied one of its proprietary Steam Methane Reformer hydrogen generators to Air Products for integration into a hydrogen generation and fueling system being constructed by Air Products at Penn State University. The system will be commissioned this year. [7-Feb-2006, *PR Newswire US*]

A chemical engineering group at The University of Texas at Austin has developed a new membrane material that can separate hydrogen from carbon dioxide and other contaminant gases. In the Feb. 3, 2006, edition of *Science*, Benny Freeman, UT's Kenneth A. Kobe Professor in Chemical Engineering, details how his laboratory designed the membrane material and tested its ability with colleagues at the Research Triangle Institute in North Carolina. The new material could lower the costs of purifying hydrogen for hydrogen-fueled vehicles. It differs structurally and functionally from previous options, with a key advantage being its ability to permit hydrogen to remain compressed at high pressure. Freeman and graduate student Haiqing Lin designed the membrane material in Freeman's laboratory at the university's Center for Energy and Environmental Resources. [13-Feb-2006, *Space Daily*]

The Mitsubishi Chemical Corporation of Tokyo and the University of California, Santa Barbara, recently announced that they are extending their successful research and education alliance for a new term of four years. With the support of Mitsubishi Chemical — Japan's largest chemical company — UC Santa Barbara, in 2001, formed a new research unit called the Mitsubishi Chemical Center for Advanced Materials. In a very short time, the center established itself as an engine of innovation, responsible for a large number of research publications, new patents, and inventions. Under the terms of the new agreement, Mitsubishi Chemical will invest between \$8.5 million and \$10 million at UCSB over the next four years. The funds will support research as well as the administration of the Center. The total also includes a philanthropic contribution of \$800,000 to permanently endow new graduate fellowships in materials and chemical engineering. The Center's researchers are involved in creating new materials, devices, and advanced fabrication technologies for the specialty chemical and electronic materials marketplace. The Center's main areas of focus are materials for display technologies, solid-state lighting, fuel cells and batteries, information storage media, and polymers for automotive applications, among others. [14-Feb-2006, *AScribe Newswire*]

A team of researchers from the United Kingdom are working on a method that could make it easier to produce hydrogen from methane. The team involves researchers from the universities of Leeds and Bath, along with a team from Imperial College. Stripping the carbon away from methane to leave molecular hydrogen is a well-known process, known as reforming. There has been much research focused on removing hydrogen using selective membranes, but the team, led by Yulong Ding at Leeds, is taking a different tack: removing the carbon dioxide. "Hydrogen removal gives you a very pure hydrogen product, but it's very slow," explained Bath researcher Alexei Lapkin. "Removing the CO₂ shifts the whole equilibrium, because it also forces the CO to be converted into more CO₂. It gives you a much higher throughput, and although the hydrogen isn't 100 percent pure, it's much purer than a standard reformer." [16-Feb-2006, *The Engineer*]

The University of Alabama's Matthew Fitzgerald, a senior mechanical engineering major from Bay Minette, placed on one of the USA TODAY All-USA College Academic Teams for his work involving plasma propulsion and hydrogen fuel cells. Four times a year, USA TODAY honors outstanding students and educators with the All-USA Academic and Teacher Teams. The 20 students and educators selected for the All-USA First Teams are featured in the newspaper. The students — high school, two-year college and four-year college attendees — each receive \$2,500 cash awards. Each All-USA Teacher Team member receives \$500, with the balance of the \$2,500 award going to the school for use at the teacher's discretion. In the student programs, judges may select 40 more runners-up to the second and third teams. They are named in the paper and receive certificates of achievement. [18-Feb-2006, *Birmingham News* (Alabama) and USA TODAY Web site]

A researcher at Lawrence Berkeley National Laboratory has demonstrated a fuel cell measuring just 200 nanometers across that potentially can be integrated on-chip to supply power from a hydrogen reservoir for decades. "We are building nanoscale fuel cells from the bottom up instead from the top down, like the automobile makers," said Lawrence Berkeley researcher Kenneth Lux, who hit upon a way to build three-dimensional electrodes porous enough for nano fuel cells while experimenting with making metallic nanowires at the University of Wisconsin, Madison. By making a nanowire alloy of two metals, he found it was possible to remove the atoms of one metal in the alloy, leaving behind a densely porous 3-D structure that increased the surface area of the electrode by orders of magnitude. Three-dimensionality is key, he said. "Our goal is a nano fuel cell on a chip, but to do that you need 3-D, because the usual planar structures inside chips do not provide enough surface area," said Lux, who performed the work with University of Puerto Rico doctoral candidate Karien Rodriguez. "We estimated that you needed to increase the surface area of electrodes about 10,000 times to achieve enough power density." [20-Feb-2006, *Electronic Engineering Times*]

One of the most pressing technological challenges standing in the way of the widespread use of fuel cells in cars is the high cost of producing hydrogen pure enough to power the cells without poisoning their catalysts. A new reactor developed by a team led by Yi Hua Ma, professor of chemical engineering at Worcester Polytechnic Institute, may provide the solution. Developed with funding from Shell International Exploration & Production and Shell Hydrogen, the reactor uses a very thin layer of palladium, which acts as a filter. The filter enables only pure hydrogen derived from natural gas or renewable sources, such as corn, to pass through. Shell hopes to make the reactor the heart of a hydrogen refueling network for cars within a decade or so. [22-Feb-2006, *PR Newswire*]

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Press releases and story ideas may be forwarded to Bernadette Geyer, editor, for consideration at fuelcellconnection@comcast.net.

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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.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>)