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

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News on U.S. Government Fuel Cell Programs

1. *Biobased Fuel Cell Membrane Developed at Agricultural Research Service*

Scientists at the Agricultural Research Service have conducted preliminary studies that show conventional petroleum-based membranes in fuel cells could be replaced with biological products. The bio-based, non-petroleum membranes are made from naturally occurring products. <http://www.ars.usda.gov/is/pr/2006/060308.htm>

2. *BNL Researchers Study Reversible Hydrogen Storage*

Researchers at Brookhaven National Laboratory are studying the basic mechanisms underlying reversible hydrogen storage in materials such as sodium alanate. The researchers believe by studying how the titanium atoms facilitate the uptake of hydrogen they will have a better idea of how to search for viable materials for large-scale hydrogen storage. http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=06-25

3. *INL Demonstrates Nuclear Hydrogen Production for 1,000 Hours*

DOE's Idaho National Laboratory used a high-temperature electrolysis stack, utilizing nuclear energy, to produce hydrogen for 1,000 hours. The stack produced the equivalent of half of one person's average daily gasoline usage over a 24-hour period, amounting to 177 normal liters of hydrogen per hour. http://www.ornl.gov/info/news/pulse/pulse_v204_06.htm

4. *Jadoo Delivers Fuel Cell System to Replace Military Batteries*

Jadoo Power Systems has delivered the IFS24 military development platform to the U.S. Military's Special Operations Command as part of a contract to move away from the military batteries currently used by soldiers. The new system is expected to provide the required "runtime" in a package that is 30% of the weight of the current battery system. http://www.jadoodpower.com/pdfs/PR_jadoo_SOCOM2.pdf

5. *India First Country to Participate on FutureGen Steering Committee*

India is the first country selected to participate on the government steering committee for the FutureGen project, which seeks to develop a coal-based power plant that removes and sequesters CO₂ while producing electricity and hydrogen. The Indian government will contribute \$10 million to the initiative and Indian companies will be invited to participate in the private sector segment of the program. http://www.fossil.energy.gov/news/techlines/2006/06014-US_and_India_FutureGen_Agreement.html

6. *Annual Energy Outlook Projects Fuel Cell Use in 2030*

The Department of Energy's Annual Energy Outlook has been released, featuring projections on the usage of fuel cells for both stationary and transportation applications. The report details tax credits and other issues that could increase the usage of fuel cell and hydrogen technologies, projecting that advanced technologies will exceed 25 percent of light-duty vehicle sales by 2030.

<http://www.eia.doe.gov/oiaf/aeo/index.html>

7. Document Details Strategies for Transitioning to a Hydrogen Future

The National Renewable Energy Laboratory has published a document called "Transitioning to a Hydrogen Future: Learning from the Alternative Fuels Experience." The document is designed to "identify key concepts and lessons learned through the evaluation and deployment of alternative fuels," to apply to the President's Hydrogen Fuel Initiative.

<http://www.eere.energy.gov/afdc/pdfs/39423.pdf>

8. Karsner Sworn in as Assistant Secretary for Energy Efficiency and Renewable Energy

Alexander Karsner was sworn in as DOE Assistant Secretary for Energy Efficiency and Renewable Energy. He will also lead DOE's efforts to carry out the new Advanced Energy Initiative announced by President Bush in his 2006 State of the Union Address. Before joining DOE, Karsner served as managing director for Enercorp, which provides international project development, management and financing of renewable energy infrastructure.

http://www.eere.energy.gov/news/progress_alerts/progress_alert.asp?aid=150

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**RFP/Solicitation News**  
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9. ICAT Grants Available for Fuel Cell Technologies

The Innovative Clean Air Technologies (ICAT) program of the California Air Resources Board is accepting applications for grants to help commercialize technologies such as fuel cells, zero-emission vehicles, and low-VOC paints and coatings. Pre-proposals are required. Deadline for pre-proposals is March 31, 2006. Selected pre-proposals will be invited to submit full proposals.

<http://www.arb.ca.gov/research/icat/solicit.htm>

10. Renewable Hydrogen Projects Eligible for Native American Program Funding

Renewable hydrogen is one of the renewable sources eligible for funding under the U.S. Department of Health & Human Services, Administration for Native Americans Social and Economic Development Strategies Program. The solicitation is expected to have \$9 million in funding available for 50 to 75 individual awards. Responses are due April 4, 2006.

<http://www.acf.hhs.gov/grants/open/HHS-2006-ACF-ANA-NA-0003.html>

11. NYSERDA Seeks Proposals for Advanced Transportation Technologies

The New York State Energy Research and Development Authority has \$3 million in funding available under Advanced Transportation Technologies Program Opportunity Notice (PON) No. 1003, which will be dispersed in two rounds. The funding is to support development, demonstration and commercialization of innovative transportation products, systems, and services. Individual R&D projects are limited to a maximum of \$500,000. Bench scale or similar research efforts will be limited to a maximum \$150,000. Feasibility studies will be limited to \$50,000 in funding. Proposals are due for Round 1 on April 26, 2006. Round 2 proposals are due September 27, 2006. <http://www.nyserda.org/funding/funding.asp?i=2>

12. DOE Seeks Applicants to Analyze Effects of Transition to Hydrogen Economy

DOE has issued a solicitation for applicants to analyze the possible effects of a transition to a Hydrogen Economy. The analysis will study the effect of the transition on employment and industries in the United States for both emerging hydrogen technologies and for technologies that

will be displaced by the emerging technologies. One grant will be awarded for a total of \$750,000. Deadline for applications is May 2, 2006. <https://e-center.doe.gov/iips/faopor.nsf/UNID/7346515D0BD8B12685257139005D1394?OpenDocument>

13. NSF SBIR to Support Emerging Technologies, Advanced Materials Development

The National Science Foundation has issued its Small Business Innovative Research solicitation, with topics including Advanced Materials and Emerging Opportunity. The Advanced Materials topic includes such sub-topics as High Temperature Materials and Thin Film Technology. The Emerging Opportunity topic is designed to support technologies with a strategy for market entry within three years. Phase I awards are for a maximum of \$100,000 for a six-month project. Proposals are due June 13, 2006. <http://www.nsf.gov/eng/sbir/sbirspeccs.jsp>

14. Army Issues Presolicitation for UAV and Robotics Fuel Cells

The U.S. Army Aviation Applied Technology Directorate has issued a presolicitation for a program to develop lightweight fuel cell power systems for Unmanned Aerial Vehicle (UAV) and robotic applications. The estimated maximum value of the contract will be \$16 million. Deadline for responses will be May 8, 2006.

<http://www.fbo.gov/spg/USA/USAMC/DAAH10/W911W6-06-D-0012/SynopsisP.html>

15. Air Force Seeks Proposals for Efficient Battlefield Vehicle Technology

The U.S. Air Force has issued a Broad Agency Announcement for Advanced Tactical Vehicles for Battlefield Airman and Security Forces. Areas of interest include advanced energy storage capabilities as well as tactical electrical energy. Up to 25 awards are anticipated. The announcement is open until superseded.

<http://www.grants.gov/search/search.do?mode=VIEW&oppld=8006>

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**Contract / Funding Awards**  
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16. DOE Selects FuelCell Energy for Coal-Based Fuel Cell Program

The Department of Energy announced FuelCell Energy will lead a third project selected under its new Fuel Cell Coal-Based Systems program, which leverages knowledge gained through the Solid-State Energy Conversion Alliance (SECA) program. The other two projects selected are led by General Electric Hybrid Power Generation Systems and Siemens Westinghouse Power Corporation. The three projects will research, develop and demonstrate fuel cell technologies that can support power systems with capacities of 100 MW or more.

http://www.fossil.energy.gov/news/techlines/2006/06012-FuelCell_Energy_Project_Selection.html

17. Ohio Awards \$6 Million to Third Frontier Fuel Cell Projects

Ohio Governor Bob Taft announced more than \$6 million in grants awarded to seven Ohio companies and research collaborations through the Third Frontier Fuel Cell Program. Recipients include HydroGen Corporation, SOFCo-EFS Holdings, NexTech Materials, and Edison Materials Technology Center. <http://www.odod.state.oh.us/newsroom/releases/1424.asp>

18. University of New Mexico Receives Funding for Enzymatic Fuel Cell Research

The University of New Mexico (UNM) was selected by the Department of Defense as one of 20 universities to receive basic research grants through the Multidisciplinary University Research

Initiative (MURI). UNM will receive funding over a three-year period for its project entitled Fundamentals and Bioengineering of Enzymatic Fuel Cells.
<http://domenici.senate.gov/news/record.cfm?id=252119>

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**State Activities**  
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19. California Publishes Draft PIER Program Electricity Research Investment Plan
The California Energy Commission has published the draft of an Electricity Research Investment Plan for 2007-2011 for the state's Public Interest Energy Research Program. The Plan notes that testing protocols for fuel cells are being prepared in response to the lack of uniformly accepted procedures for testing the performance of distributed generation and CHP technologies.
<http://www.energy.ca.gov/2006publications/CEC-500-2006-016/CEC-500-2006-016-D.PDF>

20. HyRoad Demonstration Program Launched in Bay Area
A fleet of zero-emission fuel cell buses and cars operated by the Alameda-Contra Costa Transit District were formally dedicated in a ceremony launching the HyRoad demonstration program. An on-site Chevron hydrogen energy station fuels the vehicles.
<http://www.actransit.org/news/articledetail.wu?articleid=0571160f>

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**Industry Headlines**  
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21. Angstrom Power Launches Commercially Available Fuel Cell Flashlight
Angstrom Power has launched its A2 micro hydrogenT fuel cell flashlight, which runs on hydrogen fuel stored in the handle. The 1-Watt LED flashlight has a continuous run-time of more than 24 hours on a single charge of hydrogen. <http://www.angstrompower.com>

22. Plug Power Signs Agreements with Honda for Next Phase of Home Energy Station
Plug Power has signed two new agreements with Honda R&D Company to continue joint development of the Home Energy Station, which is a fuel cell system providing electricity and heat for homes or businesses while providing hydrogen for a fuel cell vehicle.
<http://www.plugpower.com>

23. Fuel Cell Bus at Winter Olympics Successfully Demonstrated
A fuel cell-powered bus featuring a UTC Power fuel cell system successfully carried passengers around Torino city center during the Winter Olympic games in February. The bus will continue operation until early summer.
http://www.utcpower.com/fs/com/bin/fs_com_PowerHomePage/0,5828,01,00.html

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**University Activities**  
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24. Former Member of Protium Disappears in Boating Accident

We are sad to report the disappearance of Geoff Wilkes in a boating accident in Rhode Island. Wilkes played in the Ponaganset High School band called Protium, the first fuel cell-powered band, which toured the United States and played regularly at the annual Fuel Cell Seminar. At the time of this writing, Wilkes and the other two friends he was with on the boat had not yet been found by rescue workers.

<http://www.turnto10.com/news/8141798/detail.html?rss=pro&psp=news>

25. 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)

Researchers at the Biodesign Institute at Arizona State University are attempting to develop catalysts that will make the electrolysis process a lot more efficient. In part, they are doing this by trying to mimic the process of photosynthesis. The researchers are armed with a \$1.5 million grant from the U.S. Department of Energy. "One of the big problems with hydrogen as a fuel is the lack of efficiency of making it," said Neal Woodbury, director of the Center for BioOptical Nanotechnology, a division of the Biodesign Institute. "We need to have mechanisms to make it more efficiently." If the right catalyst can be formed, it can be coated on the surface of electrodes placed in contact with water, producing hydrogen cheaply and efficiently, he said. [27-Feb-2006, *East Valley Tribune* (Mesa, Arizona)]

Yakov Kulik, a physics major studying fuel cell efficiency at the University of New South Wales, was one of two Australian undergraduates to be awarded inaugural \$15,000 scholarships funded by the Defence Science & Technology Organisation and the Australian Institute of Physics. [2-Mar-2006, *Australian Associated Press Pty. Ltd.*]

Chemists at UCLA and the University of Michigan have achieved hydrogen fuel concentrations of 7.5 percent — nearly three times as much as had been reported previously — but at a very low temperature (77 degrees Kelvin). The research, scheduled for publication this month in the *Journal of the American Chemical Society*, could lead to hydrogen fuel that powers not only cars, but laptop computers, cellular phones, digital cameras and other electronic devices as well. The research is led by Omar Yaghi, UCLA professor of chemistry. Co-authors of the research, which Yaghi conducted when he was on the faculty at the University of Michigan, are Adam Matzger, assistant professor of chemistry at Michigan, and Antek Wong-Foy, chemistry research associate at Michigan. [6-Mar-2006, *Ascribe Newswire*]

With financial help from Chevron, Humboldt State University's Schatz Energy Research Center is conducting a feasibility study to determine if a nearby landfill has what it takes to become a state-of-the-art hydrogen power park. The Center wants to take the landfill gas — formed by decomposing trash — and turn it into electricity, heat and hydrogen fuel. The concept began as an Evolution Energy Systems student project. The methane from the landfill would be captured and cleaned of contaminants like sulfur compounds and halides, then piped to a separate facility. There it would be used to power a molten carbonate fuel cell, which could run a generator. Excess hydrogen would be captured, purified, compressed and sold as a fuel for vehicles. Center Director Peter Lehman estimates that on 100 standard cubic feet of landfill gas per minute, 200 kW of electricity, 100 kg per day of compressed hydrogen, and 75 therms of heat per day could be produced. Based on a recent study, there appears to be enough gas to run such an operation for at least 20 years. The demonstration power park could cost as much as \$10 million. Lehman said the goal isn't to produce cheap power, but to pave the way for better hydrogen technology. [12-Mar-2006, *Eureka Times Standard* (California)]

Nanotechnologists at the University of Texas at Dallas have employed fuel cell technology in the development of artificial muscles that are 100 times stronger than natural muscles. Among other possibilities, these muscles could enable alcohol- and hydrogen-powered artificial limbs, "smart skins" and morphing structures for air and marine vehicles, autonomous robots having very long

mission capabilities and smart sensors that detect and self-actuate to change the environment. The breakthrough is described in the March 17 issue of *Science*. The development of these revolutionary muscles was motivated by a visit of Dr. John Main from the Defense Advanced Projects Agency to Dr. Ray H. Baughman, Robert A. Welch Professor of Chemistry and director of the university's NanoTech Institute. During the visit, Main described his vision of a future that could include such advancements as artificial muscles for autonomous humanoid robots that protect people from danger, artificial limbs that act like natural limbs and exoskeletons that provide super-human strength to firefighters, astronauts and soldiers — all of which are able to perform lengthy missions by using shots of alcohol as a highly energetic fuel. The new muscles simultaneously function as fuel cells and muscles, according to Baughman, corresponding author of the *Science* article. Patent applications for the artificial muscles are pending. [16-Mar-2006, *Ascribe Newswire*]

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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 @ comcast.net](mailto: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.nfrcr.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>