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## **FUEL CELL CONNECTION – April 2005 Issue**

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### **News on U.S. Government Fuel Cell Programs**

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1. Army Receives First Fuel Cell Military Truck from GM

General Motors delivered the first fuel cell-powered military truck, a modified Chevrolet Silverado, to the U.S. Army Research, Development and Engineering Command. The truck is equipped with two 94-kW fuel cell stacks, utilizing compressed hydrogen, and will have a range of 125 miles. The Army will evaluate the truck until July 2006 at Fort Belvoir, Virginia.

http://www4.army.mil/ocpa/print.php?story_id_key=7144

2. PNNL Researchers Find Faster Way to Release Hydrogen from Solid Compound

Researchers at Pacific Northwest National Laboratory have found a way to release hydrogen from a solid compound of ammonia borane almost 100 times faster than was previously possible. The researchers used a nanoscale material as "scaffolding" for the ammonia borane, which enabled a lower temperature reaction for release of the hydrogen.

<http://www.pnl.gov/news/2005/05-20.htm>

3. NETL, CMU Researchers Successfully Demonstrate Hydrogen Membrane

Collaborating researchers at the National Energy Technology Laboratory and Carnegie Mellon University have successfully demonstrated new hydrogen membrane material made of a palladium and copper alloy. The membrane allows pure hydrogen to pass through without contamination of the membrane by other gas impurities during the process of separating hydrogen from a mixed gas stream.

http://www.ornl.gov/info/news/pulse/pulse_v182_05.htm

4. DOE to Hold Pre-Solicitation Workshop for Fuel Cell Program

The Department of Energy will hold a Fuel Cell Pre-Solicitation Workshop on May 26, 2005, from 1:00-5:00 pm, to present and discuss potential topics of fuel cell research and development. Written comments and suggested topic areas will be collected until May 15, 2005. Ideas generated from this process will be taken into consideration for inclusion in the DOE's fuel cell solicitation scheduled to be released in August 2005.

http://www.eere.energy.gov/hydrogenandfuelcells/wkshp_fuelcell.html

5. National Science Bowl Includes Hydrogen Fuel Cell Model Car Races

This year's National Science Bowl, sponsored by the Department of Energy, will feature a hydrogen fuel cell model car race. Sixteen teams of students will design, build and race hydrogen fuel cell model cars, and winners will share \$9,000 in prizes for their schools.

http://trb.org/news/blurb_detail.asp?id=4937

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## Publications

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6. *Jane's Report Highlights Increased Portable Power Needs of Military*

Jane's Information Group conducted a study, commissioned by MTI MicroFuel Cells, detailing the increasing challenges faced by the U.S. Military trying to keep up with personal power demands of modern soldiers. The report notes current power sources are provided to meet the requirements of a typical 12-hour mission, but the Army aspires to meeting the requirements of a 24-hour mission by 2007-8 and a 72-hour mission by 2012.

<http://www.mtimicrofuelcells.com/news/article.asp?id=208>

7. *FEMP Focus Article Details Potential for Methane Fuel at Federal Facilities*

An article in the Winter/Spring 2005 issue of *FEMP Focus* details the potential for wastewater treatment plants (WWTPs) to produce high quality methane gas that can be substituted for natural gas in applications such as fuel cells, reciprocating engines and turbines, to provide power at federal facilities. More than 1,600 wastewater treatment plants and nearly 800 federal facilities are located within 15 miles of each other.

http://www.eere.energy.gov/femp/newsevents/fempfocus_article.cfm/news_id=8961

RFP/Solicitation News

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### 8. *Pennsylvania DEP Accepting Applications for Clean Energy Projects*

The Pennsylvania Energy Development Authority has recently unveiled new guidelines for proposed clean energy projects in the state. There is a total of \$10 million available in grants, loans, and loan guarantees for alternative energy projects, including fuel cells, landfill gas, and coal-mine methane. All proposals must be postmarked by May 13, 2005.

[http://www.dep.state.pa.us/dep/deputate/pollprev/PA\\_Energy/PAENERGY/PEDA\\_home.htm](http://www.dep.state.pa.us/dep/deputate/pollprev/PA_Energy/PAENERGY/PEDA_home.htm)

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### 9. *California Energy Commission Energy Innovations Small Grants Solicitation*

The California Energy Commission is accepting grant applications for their Energy Innovations Small Grants Program. These grants will be awarded to individuals, small businesses, non-profit organizations, and educational institutions for research and development in a variety of topic areas, including Environmentally Preferred Advanced Generation and renewable technologies hybridized with fossil fuel energy. The deadline for these applications is June 1, 2005.

<http://www.energy.ca.gov/research/innovations/index.html>

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### 10. *Climate Change Fuel Cell Program Issues Solicitation*

The Bonneville Power Administration, in coordination with the Department of Defense, has issued a solicitation for the DOD FY04 Climate Change Fuel Cell Program. A total of \$1.2 million is available through this program, which provides \$1000/kW to purchasers of fuel cell products. Solicitations for this project are due June 1, 2005.

[http://www.bpa.gov/Energy/N/projects/fuel\\_cell/dod\\_climate\\_change/](http://www.bpa.gov/Energy/N/projects/fuel_cell/dod_climate_change/)

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### 11. *California PIER Program Environmental Exploratory Grant Program*

The California Energy Commission is accepting applications for grants through its Public Interest Energy Research (PIER) Environmental Exploratory Grant Program. The program funds foundational research that can pave the way for more broad development and demonstrational work in support of PIER's subject areas, which include Environmentally Preferred Advanced

Generation and Buildings End-Use Efficiency. There is approximately \$750,000 available in grants, with a maximum \$75,000 awarded per grant. Deadline for applications is June 1, 2005. <http://www.energy.ca.gov/contracts/#PIER>

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*12. DOE/NETL Funding Available for Fuel Cell Coal-Based Systems*

The DOE National Energy Technology Laboratory seeks to develop a large (more than 100 MWe) fuel cell power system that produces power with coal. The ultimate goal of the program is a system with 50% efficiency (coal to AC power) and a cost less than \$400/kWe. The objectives of Phase I are to design and perform analysis of the baseline and proof-of-concept systems, which should include integrated coal gasification and CO2 separation processes. Proposals are due June 6, 2005. <http://www.fedgrants.gov/Applicants/DOE/PAM/HQ/DE-PS26-05NT42346/Grant.html>

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*13. US Army Seeks 10-kW Fuel Cell Auxiliary Power Unit*

The U.S. Army Tank Automotive Research Development and Engineering Center (TARDEC) issued a Broad Agency Announcement whose first topic is a 10-kW fuel cell auxiliary power unit, using JP-8 fuel. TARDEC anticipates awarding up to 3 contracts with combined total funding of approximately \$24 million. Proposals will be accepted May 26-June 9, 2005. <http://contracting.tacom.army.mil/research/fuelcell/fuelcell.htm>

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*14. USDA Announces Availability of \$22.8 Million for Renewable Energy*

The Department of Agriculture will make \$22.8 million available to support a wide range of technologies incorporating biomass and hydrogen as well as energy efficiency improvements by agricultural producers and rural small businesses. Applications must be postmarked no later than June 27, 2005. <http://www.usda.gov/wps/portal/!ut/p/s.7.0.A/7.0.1RD?printable=true&contentidonly=true&contentid=2005/03/0107.xml>

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Contract / Funding Awards
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*15. Team Selected for Colorado Fuel Cell Center*

Colorado's Office of Energy Management and Conservation (OEMC) selected a proposal for the establishment of the Colorado Fuel Cell Center. The winning proposal is from a team including the Colorado School of Mines, the Gas Technology Institute, the National Renewable Energy Laboratory, and Versa Power Systems. OEMC will provide \$2 million for the Center. <http://www.state.co.us/oemc/press/050406.pdf>

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State Activities
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*16. ND Legislation Creates Sales Tax Exemption on Hydrogen*

North Dakota Governor John Hoeven signed into law a comprehensive package of legislation that includes a sales tax exemption on hydrogen to power a fuel cell or internal combustion engine. <http://governor.state.nd.us/media/news-releases/2005/04/050422.html>

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17. LIPA Dedicates First Combined Fuel Cell, Solar Power System

Long Island Power Authority dedicated the first combined use of fuel cell and solar power systems on Long Island. The system, comprised of 15-kW solar power and 5-kW fuel cell power, is located at the Local 25 International Brotherhood of Electrical Workers headquarters in Hauppauge. <http://www.lipower.org/newscenter/pr/2005/mar29.pathfinder.html>

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**Industry Headlines**  
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18. Jadoo Unveils Fuel Cell Power System for Video Applications

Jadoo Power Systems unveiled its new NABII fuel cell power system for professional video applications at the 2005 National Association of Broadcasters Convention in Las Vegas. <http://www.jadoopower.com>

19. Ballard Delivers Fuel Cell Generator to Japanese Prime Minister's Residence

Ballard Power Systems delivered its first commercial 1-kW fuel cell power generator to the Japanese Prime Minister's new official residence. <http://www.ballard.com>

20. IdaTech Unveils Latest Portfolio of Fuel Cell Products

IdaTech unveiled a new 250-Watt portable power fuel cell system, which operates on a methanol-water fuel and weighs about 20 lbs., and a new commercially-available ElecraGen™5 hydrogen-fueled, 5-kWe backup power system. <http://www.idatech.com>

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**University Activities**  
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21. University of Illinois Researchers Design Membrane-less Fuel Cell

Researchers at the University of Illinois at Urbana-Champaign designed a fuel cell that can operate without a solid membrane separating the fuel and oxidant. <http://www.news.uiuc.edu/news/05/0322fuelcells.html>

22. Hydrogen Seminar Planned at San Diego Miramar College

On June 3, 2005, a Hydrogen Development & Safety Seminar will be held as a collaborative effort between the National Science Foundation and the Advanced Transportation Technology Initiative of the California Community Colleges Economic & Workforce Development Program. <http://www.codtrainingcenter.com/energytechnology.html>

23. 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)

John Deere e-Power Technologies has donated a fuel cell power module valued at \$150,000 to the University of North Dakota School of Engineering and Mines for use by students there who are crafting a fuel cell car. The car is being designed and built by

student members of the UND Society of Energy Alternatives to be raced in the 2005 North American Solar Challenge. The route starts in Austin, Texas, and goes through North Dakota to Calgary, Alberta. [23-Feb-2005, *The Associated Press*]

Industry representatives and academics from the United Kingdom are collaborating on a £2.1 million research project to investigate potential barriers to the introduction of fuel cells for vehicles and power generation.

The project, funded by the UK's Engineering and Physical Sciences Research Council, will examine the obstacles that must be overcome before fuel cells can be fully exploited, including key issues like durability and power density. The research will also investigate the potential of new fuels like ethanol and innovative materials that could allow cells to operate at a wider range of temperatures.

The endeavor includes four UK universities and is backed by DSTL, Rolls-Royce, Johnson Matthey and Ceres Power, a spin-off of Imperial College.

Professor Nigel Brandon, who leads the research at Imperial College, said the project is the first in the UK to bring together work on low-temperature fuel cells used in cars with the high-temperature fuel cells being developed for gas turbines. This means research efforts can be combined, he said, so for example electrode design improvements could enhance the performance of both high and low-temperature fuel cells. [11-Mar-2005, *The Engineer*]

Uppsala University in Sweden has set up multiple teams to work on a project aimed at using solar power to generate hydrogen from water by replicating the process of photosynthesis. The SOLAR-H project is funded by the European Union and is part of the EU's Sixth Framework research program, which is based at the university. There are four teams working on the hydrogen-production process: The first will study living cyanobacteria, whose genetics have been altered so that they produce hydrogen without absorbing it at the same time. The second will look at the biochemical mechanisms of natural photosynthesis, which will help the third team synthesize the molecule complexes necessary to replicate these processes. The fourth team will study the rapid and complex reactions of the process. [21-Mar-2005, *Process Engineering*]

A team of researchers at Northwestern University has developed a new high-temperature fuel cell that may increase "well-to-wheel" fuel cell efficiency, it was reported in April 1 issue of the journal *Science*. Although only demonstrated on a small scale, the cells could lead to cost-effective, clean and efficient electrical-power sources for applications ranging from aircraft to homes, scientists projected confidently.

The modified fuel cell allows excess fuel cell heat to drive the hydrocarbon-to-hydrogen reaction necessary to generate the hydrogen used to make electricity. In the past, carbon build up or "coking" on nickel anodes within fuel cells prevented scientists from taking advantage of the energy efficient practice of using fuel cell heat to "reform" hydrocarbons into hydrogen.

But in the new fuel cell, a Ruthenium and Cerium reformer layer covering the anode converts hydrocarbons to hydrogen without depositing carbon on the anode, said Scott Barnett, the Northwestern professor who led the research.

When placed over the anode, the new reforming layer produced hydrogen from a high purity hydrocarbon fuel similar to gasoline called "iso-octane." The fuel cells achieve power densities of 0.3 to 0.6 watts per square centimeter. [2-Apr-2005, *Xinhua General News Service*]

A team of engineers and scientists at Purdue University is working on the prototype for a giant, unmanned airship that will fly some 65,000 feet above Earth—above commercial aircraft but lower than spacecraft. If the team's work is successful, government agencies could contract with an aerospace firm to build the airships for use as communications relay stations and in stationary surveillance operations over international borders and large urban areas.

Building the helium-filled airship will require integrating a lot of existing technologies in ways that really push the envelope, said John Sullivan, an aeronautics professor who is co-leader of the project. The airship, which could be as much as 900 feet long, will need to have photovoltaic cells on its skin to convert sunlight to electricity. It also will need to carry fuel cells that can generate power when sunlight is unavailable.

To test some early ideas, the Purdue team has built one model that can fly at a few thousand feet. Graduate students and undergraduates are working on the project with faculty from a variety of Purdue departments. [2-Apr-2005, *Chicago Tribune*]

Researchers at Iowa State University are working to improve the process of turning Iowa prairie grass into a useable fuel in the form of hydrogen gas. Robert Brown, professor of mechanical engineering and director of the Center for Sustainable Environmental Technologies, said he and his team were awarded a \$1 million grant three years ago to help them with their research. "We did grass because there has been a lot of interest in switch grass," he said. "Our goal is to get a pure stream of hydrogen from biomass."

This process works because of "gasification," in which a solid material—in this case switch grass—is turned into hydrogen. Through this process, grass is converted from a solid material into a combustible gas, and contaminants are removed to increase the amount of hydrogen, said Jerod Smeenck, project manager and associate scientist at the center. [4-Apr-2005, *University Wire*]

A group of students working on fuel cells was one of three winning teams in this year's annual Little Bang contest sponsored by the University of California, Davis. Each group won \$15,000.

Winners of Little Bang were announced March 1 at a luncheon sponsored by the Sacramento Regional Technology Alliance and will move on to the Big Bang competition along with second-place finalists.

Little Bang was the brainchild of Andrew Hargadon, associate professor in the graduate school of management, and is a less intense competition, compared to Big Bang, for participants to "ease their way" into the field of business, according to Boegeskov Energy team member Matt Caldwell.

The team, led by Caldwell and Kenth Pedersen, is developing a catalyst-enhancing polymer that increases the efficiency and lowers the cost of fuel cells. [6-Apr-2005, *University Wire*]

For the first time in its history, Hyundai Motor Group is visiting prominent universities in the United States and Europe to recruit new talent. The group said it will use the new recruits to lead the development of hybrid and fuel-cell cars, next-generation powertrains, electronic transmissions and telematics systems.

The private conglomerate includes Korea's top two automakers, Hyundai Motor Co. and Kia Motors Corp., and has been hiring 100 university graduates abroad every year since 2002. The public relations-recruiting tour, scheduled April 21 to 29, includes 10 universities in the United States and five in Europe.

"It is to strengthen our R&D division in efforts to actively cope with the changes in the market and to gain advantage over other global firms," the group said in a statement. [9-Apr-2005, *The Korea Herald*]

Environmental engineers at Penn State University and a research scientist at Ion Power Inc. have developed a process that enables bacteria to coax four times as much hydrogen directly out of biomass than usually is generated by fermentation alone.

Hydrogen production by bacterial fermentation is currently limited by a factor called the fermentation barrier, in which bacteria, without a power boost, can convert carbohydrates only to a limited amount of hydrogen and a mixture of other, generally unusable fermentation end products such as acetic and butyric acids.

By giving the bacteria a small assist with a tiny amount of electricity—about 0.25 volts, a small fraction of the voltage needed to run a typical 6-volt cell phone—the researchers breached the fermentation barrier and converted acetic acid, one of the formerly unusable products, into carbon dioxide and hydrogen. [22-Apr-2005, *United Press International*]

Pacific Fuel Cell Corp. has acquired certain rights to a new carbon nanotube membrane electrode assembly for hydrogen and methanol fuel cells and has filed a provisional patent application in the name of its co-inventors.

"PFCE is planning to make this prototype available to selected commercial organizations for testing and potential joint ventures," said company president George Suzuki. He added, "Additional development will continue in PFCE's new laboratory at the University of California, Riverside Research Park, utilizing this and other proprietary technologies owned or licensed by the company."

Dr. Xin Wang, PFCE's director of research, said the new technology uses 75 percent less platinum while significantly exceeding the performance of current state-of-the-art MEA's for direct methanol fuel cells. [25-Apr-2005, *Business Wire*]

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**Administration**  
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Press releases and story ideas may be forwarded to Bernadette Geyer, editor, for consideration at bernie@usfcc.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.

[\(http://www.usfcc.com/\)](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.

[\(http://www.nfcrc.uci.edu/\)](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>