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FUEL CELL CONNECTION - August 2007 Issue

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**News on U.S. Government Fuel Cell Programs**  
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1. PNNL Researchers Develop Ammonia Borane Pellets for Hydrogen Storage

A new hydrogen storage medium is being developed by scientists at Pacific Northwest National Laboratory (PNNL). The research project, which is being conducted at DOE's Chemical Hydrogen Storage Center of Excellence at PNNL, involves solid ammonia borane (AB) compressed into small pellets to serve as a hydrogen storage material. Each milliliter of AB weighs about three-quarters of a gram and stores up to 1.8 liters of hydrogen.

<http://www.pnl.gov/news/release.asp?id=264>

2. ANL Researchers Create "Bendy" Hydrogen Sensors

Researchers at Argonne National Laboratory (ANL) have used single-walled carbon nanotubes (SWNTs) in order to create "bendy" hydrogen sensors for use in hydrogen-powered vehicles. The new "bendy" sensors have greater efficiency and lower cost than previously designed hydrogen sensors, which are rigid and use expensive palladium.

http://www.anl.gov/Media_Center/News/2007/news070731.html

3. Aerogels Could Be Used to Purify Hydrogen for Fuel Cells

Porous semiconducting aerogels – a material created by researchers from Argonne National Laboratory and colleagues at Northwestern and Michigan State universities – have the potential to purify hydrogen for use in fuel cells. The aerogels were able to remove more than 99.99 percent of mercury from a solution of mercury-contaminated water, and researchers believe the gels could also remove from hydrogen gas the impurities that could damage fuel cell catalysts.

http://www.anl.gov/Media_Center/News/2007/news070727.html

4. BNL Scientists Discuss Fuel Cell, Hydrogen Production Catalyst Findings

Researchers at Brookhaven National Laboratory (BNL) recently discussed findings important to both hydrogen generation and fuel cell systems. Researchers have found bio-inspired catalysts that could produce fuels like methanol or hydrogen directly from carbon dioxide or water using solar energy. Other researchers at the lab developed a new type of electrocatalyst – forming one thin layer of platinum on a ruthenium-oxide surface – that could lower the cost of fuel cell stacks. The new electrocatalyst has an oxidation-reduction reaction that is almost as fast as a pure platinum catalyst. http://www.bnl.gov/bnlweb/pubaf/pr/PR_display.asp?prID=07-86

5. NIST Developing Standards for Commercial Hydrogen Refueling

The National Institute of Standards and Technology (NIST) Weights and Measures Division (WMD) is leading an effort to develop weights and measures standards that will be required for commercial hydrogen refueling. NIST WMD is working on three separate standards: two international, and a third that will develop a U.S. hydrogen meter code. NIST is a non-regulatory federal agency within the U.S. Department of Commerce's Technology Administration.

<http://www.hydrogenandfuelcellsafety.info/2007/aug/nist.asp>

6. America COMPETES Act to Create ARPA-E

President Bush signed the "America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act" (America COMPETES Act), which includes a

provision to create the Advanced Research Projects Agency-Energy (ARPA-E). ARPA-E is modeled after the Defense Advanced Research Projects Agency (DARPA). The America COMPETES Act authorizes \$300 million for ARPA-E in fiscal year 2008.

<http://thomas.loc.gov/cgi-bin/bdquery/z?d110:h.r.02272:/>

7. National Labs to Meet with Fuel Cell Manufacturers on Deployment Opportunities

Facilities managers for the Department of Energy's National Laboratories will meet with fuel cell manufacturers to discuss opportunities for deploying commercially available fuel cells at the labs. "Matching National Laboratory Needs with Energy Efficient Fuel Cells" is sponsored by the Department of Energy and the US Fuel Cell Council and will be held September 20-21, 2007, at Argonne National Laboratory. http://www.eere.energy.gov/hydrogenandfuelcells/usfcc_meeting/

8. FTA Releases Report on Environmental Benefits of Advanced Fuels, Technologies

The U.S. Federal Transit Administration (FTA) released a new report, "Environmental Benefits of Alternative Fuels and Advanced Technology in Transit," which explores the potential reductions in pollutant emissions and fuel consumption of fuels such as hydrogen and technologies such as fuel cells in the national transit bus fleet. http://www.trb.org/news/blurb_detail.asp?id=8033

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**RFP/Solicitation News**  
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9. Fuel Cell Projects Eligible for NASA SBIR Solicitation

Fuel cell projects are eligible for funding under the new Small Business Innovation Research (SBIR) and Technology Transfer (STTR) solicitations from the National Aeronautics and Space Administration (NASA). NASA expects to fund approximately 250 SBIR and 30 STTR Phase I awards. The maximum value of each Phase I award is \$100,000. Deadline for proposals is September 6, 2007. <http://sbir.gsfc.nasa.gov/SBIR/sbirsttr2007/solicitation/index.html>

10. NASA Seeks Sources of High Pressure Water Electrolyzers

The National Aeronautics and Space Administration (NASA) Glenn Research Center has issued a Sources Sought Notice for a High Pressure Water Electrolyzer in the output range of 10 SLPM hydrogen and 5 SLPM oxygen. Responses to the Notice are due September 17, 2007. <http://www.fbo.gov/spg/NASA/GRC/OPDC20220/Electrolyser/SynopsisR.html>

11. PIER Grants Available for Innovative Energy Concepts

California's Energy Innovations Small Grant (EISG) Program, a component of the state's Public Interest Energy Research (PIER) Program, will fund projects in six program areas, including Environmentally Preferred Advanced Generation and Renewable Generation. Approximately \$2.6 million is available for EISG grants under this solicitation. Maximum individual project awards are \$95,000 for hardware projects requiring physical testing and \$50,000 for modeling projects. Deadline for proposals is September 27, 2007.

<http://www.energy.ca.gov/contracts/smallgrant/index.html>

12. PIER Program Issues Biopower Program Opportunity Notice

The California Energy Commission's Public Interest Energy Research (PIER) Renewables Program has announced a solicitation for Biopower Research, Development & Demonstration. Eligible projects will develop and demonstrate technologies to produce power using California forest biomass resources. Co-production of heat and other value-added products is encouraged.

Up to \$1 million total is available for funding through this solicitation for two or three projects. Proposals are due October 12, 2007. <http://www.energy.ca.gov/contracts/pier.html>

13. DOD Issues BAA for Hydrogen Vehicle and Fueling Pilot Projects

The U.S. Department of Defense has issued a Broad Agency Announcement (BAA) for Research and Development for Hydrogen-Fueled Material Handling Equipment and Hydrogen Vehicle Fueling Station Pilot Projects. Up to \$4 million is available for projects through this solicitation. More than one effort may be funded for individual topic areas. Deadline for proposals is October 26, 2007. <http://www.crane.navy.mil/acquisition/07r6982/07r6982.htm>

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**Contract / Funding Awards**  
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14. DOE Awards Continued Funding to MTI MicroFuel Cells

DOE has given \$500,000 funding to MTI MicroFuel Cells for continued efforts to develop mass manufacturing techniques and the optimization of MTI Micro's Mobion® fuel cell technology platform. MTI Micro aims to have Mobion® consumer products available for sale in 2008. <http://www.mtimicrofuelcells.com/news/article.asp?id=292>

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**State Activities**  
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15. Policy Analysis of California Low Carbon Fuel Standard Published

A new policy analysis of California's Low Carbon Fuel Standard (LCFS) says that "additional targeted policies may be required to assure the success" of some technologies, and that the standard "does not necessarily provide sufficient support for advanced vehicle technologies that will likely be required for the success of some vehicle-fuel combinations," including hydrogen fuel cell vehicles. The LCFS, commissioned in January 2007, was designed to reduce carbon emissions from fuels by 10 percent by 2020. The authors of the new policy analysis recommend that non-liquid fuel providers (including hydrogen and propane) be given the option to participate in the LCFS. http://www.energy.ca.gov/low_carbon_fuel_standard/index.html#uc

16. More States Raise Net Metering Limits, Expand Programs

Delaware has enacted legislation that increases the maximum capacity of net-metered energy systems and expands the program to include all utility customer classes. The legislation also extends the list of eligible technologies to include fuel cells powered by renewable fuels. Oregon also raised the system limit for net metering to 2 MW for nonresidential applications. Pennsylvania increased the maximum limit of a net-metered energy system from 1 MW to 3 MW for nonresidential systems. The Pennsylvania law also allows net-metering of a system greater than 3 MW, but not greater than 5 MW, if the system is available to operate in parallel with the grid during grid emergencies, or where a microgrid is in place for the purpose of maintaining critical infrastructure.

http://www.irecusa.org/uploads/media/August_2007_Interconnection_Newsletter.pdf

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**Industry Headlines**  
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17. Fuel Cell Race Car Sets Land Speed Record

Ford's Fusion Hydrogen 999, the world's first production vehicle-based fuel cell race car, set a land speed record of 207.297 miles per hour at the Bonneville Salt Flats in Utah. The vehicle joined the 200 MPH Club of Bonneville Speed Week, an annual event featuring hundreds of racing team participants. http://media.ford.com/article_display.cfm?article_id=26560

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**University Activities**  
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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)

Gerardine Botte, associate professor of chemical and biomolecular engineering in the Russ College of Engineering and Technology at Ohio University, has developed patent-pending ammonia catalytic electrolyzer technology that efficiently converts ammonia into hydrogen to produce inexpensive fuel. Botte and the university have signed an agreement to license her technology to American Hydrogen Corp., which has offices in Athens at the Ohio University Innovation Center. The license agreement grants American Hydrogen exclusive worldwide rights to commercialize the technology. <http://news.research.ohiou.edu/news/index.php?item=404>

Joseph M. DeSimone, a professor of chemistry and chemical engineering at the University of North Carolina in Chapel Hill and at North Carolina State University, told *Mechanical Engineering* magazine that he has found a way to add texture to a proton exchange membrane, more than tripling its conductivity.

<http://www.memagazine.org/contents/current/features/goodcond/goodcond.html>

Biological engineers at Oregon State University have designed a microbial fuel cell that is capable of generating about ten times more electricity than previously possible from an air cathode microbial fuel cell of the same size. This design breakthrough could allow microbial fuel cells to be used more widely as sources of sustainable energy, said Hong Liu, an assistant professor in the OSU Department of Biological and Ecological Engineering. The design improvements could eventually lead to a dramatic reduction in the cost of operating wastewater treatment plants in the United States and elsewhere.

<http://oregonstate.edu/dept/ncs/newsarch/2007/Aug07/fuelcell.html>

Careful pairing of bacteria can create a fuel cell that consumes cellulose and produces electricity, according to a team of Penn State researchers. The researchers -- who include John M. Regan, assistant professor of environmental engineering; Thomas E. Ward, research associate; and Zhiyong Ren, graduate student -- looked at *Clostridium cellulolyticum*, a bacterium that ferments cellulose, and *Geobacter sulfurreducens*, an electroactive bacterium. Both are anaerobic, living in places where no free oxygen exists. The bacterium fermenter produces acetate, ethanol and hydrogen. The electroactive bacteria consumed some of the acetate and ethanol. The researchers reported the results of their study in a recent online issue of *Environmental Science and Technology*. <http://live.psu.edu/story/25234>

Cows could one day help to meet the rise in demand for alternative energy sources, say Ohio State University researchers who used microbe-rich fluid from a cow to generate electricity in a small fuel cell. This new microbial fuel cell is a redesign of a larger model that the researchers created a few years ago. The new cell is a quarter of the size of the original model, yet can produce about three times the power, said Hamid Rismeni-Yazdi, lead author of a new study of

cellulose-based microbial fuel cells and a doctoral student in food, agricultural and biological engineering at Ohio State University. <http://researchnews.osu.edu/archive/mfccow.htm>

On Aug. 7, U.S. Patent No. 7,252,898 was issued to the Board of Trustees of the University of Illinois for fuel cell technology developed by Larry J. Markoski and Paul J.A. Kenis, both of Champaign, Ill., and Eric R. Choban of Urbana, Ill. "This invention relates to the field of induced dynamic conducting interfaces. More particularly, this invention relates to laminar flow induced dynamic conducting interfaces for use in micro-fluidic batteries, fuel cells, and photoelectric cells," according to the documentation on file. <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=7,252,898.PN.&OS=PN/7,252,898&RS=PN/7,252,898>

On Aug. 7, U.S. Patent No. 7,252,901 was issued to The Regents of the University of California for fuel cell technology developed by John F. Cooper of Oakland, Calif. "An aspect of the invention includes a process comprising: providing a high temperature molten salt electrolytic cell; providing a raw carbonaceous feed material; thermally decomposing said raw carbonaceous feed material to a carbon fuel; converting said carbon fuel to electric energy; wherein said conversion generates heat and said heat is used for said thermal decomposition," according to the documentation on file. <http://patft.uspto.gov/netacgi/nph-Parser?Sect1=PTO1&Sect2=HITOFF&d=PALL&p=1&u=%2Fnetachtml%2FPTO%2FSrchnum.htm&r=1&f=G&l=50&s1=7,252,901.PN.&OS=PN/7,252,901&RS=PN/7,252,901>

POSCO, the world's fourth largest steelmaker, is working with Pohang University of Science and Technology and the Research Institute of Industrial Science and Technology (RIST) in Korea to develop fuel cell power generators. POSCO and Korea Electric Power Corporation announced a new partnership to develop hydrogen fuel cell generators. The companies will collaborate to develop and produce fuel cell power generators, as well as work together to market the products. As part of the partnership, the steelmaker will also supply the KEPCO subsidiary Korea South East Power Co., Ltd. (KOSEP) with two fuel cell generators with 1.2 megawatts of capacity by 2008. Earlier this year the steelmaker also formed a strategic partnership with FuelCell Inc. as part of its program to develop related technologies. [21-Aug-2007, cheesuk@heraldm.com, *The Korea Herald*]

Lichang Wang, associate professor of chemistry and biochemistry in the College of Science at Southern Illinois University Carbondale, will receive a four-year, \$200,000 research grant from the National Science Foundation for her work in "nanostructured fuel cell catalysts with molecularly engineered size, shape and composition." Wang will collaborate with a team of researchers from the State University of New York at Binghamton working on catalysts that engineers can incorporate into the design of fuel cells for automobiles and other uses. Using sophisticated software, including some developed at SIUC, she will help the other researchers predict and "see" how different atoms will interact in an effort to help them build the most efficient and effective catalysts. <http://news.siu.edu/news/August07/082107tjc7068.jsp>

Ford researchers are working with Ohio State University student engineers on its Buckeye Bullet 2, a fuel cell-powered racer that competed for a world speed record in the unlimited class category. On Aug. 17, the Buckeye Bullet 2 Blog reported that the vehicle had reached its goal and had been clocked at 201.636 mph.
<http://buckeyebullet2.blogspot.com/2007/08/201636-mph.html>

Unidym, a majority owned subsidiary of Arrowhead Research Corporation, is joining Missouri State University's Roy Blunt Jordan Valley Innovation Center (JVIC) as a senior corporate affiliate, as is Foster-Miller, Inc. A formal agreement between the university and the two companies is still being finalized. Both companies plan to lease space at JVIC, which is located in downtown Springfield. Unidym is a nanotechnology company that utilizes carbon nanotubes to develop a wide range of high-performance, cost-effective electronic products such as thin film transistors for flexible electronic devices and fuel cells for portable devices.

<http://www.news.missouristate.edu/releases/40922.htm>

A fuel cell airship design by Nick Inoue and Jack Dunkley, students at John Cabot City Technology College in Great Britain, placed them among the eight regional winners of the inaugural PTC Worldwide Student Design Challenge. Inoue and Dunkley designed the airship using PTC's Pro/ENGINEER software. The winning designs were announced at the 18th Annual PTC/USER World Event 2007, held June 3-6 in Tampa, Fla.

http://www.ptc.com/appserver/wcms/standards/textsub.jsp?&im_dbkey=54984&icg_dbkey=21

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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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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/>)

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