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FUEL CELL CONNECTION - April 2008 Issue

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News on U.S. Government Fuel Cell Programs
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1. NIST Researchers Examine Materials for Hydrogen Storage
Researchers at the National Institute of Standards and Technology's (NIST) Center for Neutron Research (NCNR) have demonstrated a novel class of materials called metal-organic frameworks (MOFs), which are one of several classes of materials that can bind and release hydrogen. According to researchers, the MOFs don't require the high temperatures some other materials need to release the hydrogen, and the MOFs could be engineered so that refueling is as simple as current gasoline pumping.
http://www.nist.gov/public_affairs/techbeat/tb2008_0401.htm#hydrogen

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2. Fuel Cell Passes Testing by Army Operational Test Command
The U.S. Army's Operational Test Command has successfully completed testing of a 250-watt Alternate Power Source Fuel Cell from SFC Smart Fuel Cell AG for use in data-acquisition systems. The fuel cell provides up to 100 hours of power autonomously with one 7.4 gallon cartridge.
http://www.efoy.de/index.php?option=com_content&task=view&id=924&Itemid=177&lang=en

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3. DOE Announces Upcoming Loan Guarantee Solicitations
The U.S. Department of Energy (DOE) has announced plans for future loan guarantee solicitations for up to $38.5 billion to fund projects that use advanced technologies to reduce or sequester pollution. The first solicitation, planned for June 2008, is expected to provide up to $30.5 billion in funding for projects that focus on energy efficiency, renewable energy, electric transmission, or nuclear topics. The second solicitation, planned for late-summer 2008, is expected to provide up to $8 billion for projects that focus on advanced fossil energy technologies. http://www.lgprogram.energy.gov/press/041108.pdf

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4. DOE Issues Report on Go/No-Go Decisions for Hydrogen Storage Materials
DOE has published a report, "Material Go/No-Go Decisions for Hydrogen Storage Materials," which reviews the materials that have been considered to date for commercially viable hydrogen storage systems. Since 2005, 51 materials have been investigated by the Metal Hydride Center of Excellence, of which 27 show promise as viable hydrogen storage materials.
http://www1.eere.energy.gov/hydrogenandfuelcells/news_detail.html?news_id=11721

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5. ORNL Publishes Analyses of Transition to Hydrogen FCVs
The Oak Ridge National Laboratory (ORNL) has published a report titled "Analysis of the Transition to Hydrogen Fuel Cell Vehicles & the Potential Hydrogen Energy Infrastructure Requirements." The report indicates that, for the three policy cases analyzed, costs of transitioning to a hydrogen fuel cell vehicle (FCV) market would range from $10 to $45 billion

cumulatively over the 2012-2025 timeframe, with peak annual costs between $1 billion and $6 billion. The report also features a map indicating areas of projected hydrogen energy demand, as well as presenting various infrastructure deployment scenarios.
http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2008_30.pdf

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6. Report Explores Potential Changes Needed to Accommodate Hydrogen Vehicles
The U.S. Federal Motor Carrier Safety Administration has published a report titled "Changes to Consider in the Federal Motor Carrier Safety Regulations and North American Standard Inspection Procedures to Accommodate Hydrogen as an Alternative Fuel." The report focuses on commercial vehicles that use either gaseous or liquid hydrogen as fuel.
http://www.trb.org/news/blurb_detail.asp?id=8934

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7. Database of Transportation Research in Progress Surpasses 10,000 Projects
The Transportation Research Board announced that its Research in Progress database now contains information on more than 10,000 current or completed transportation research projects – including fuel cell and hydrogen projects – funded by the U.S. Department of Transportation or state departments of transportation. The Research in Progress database was started in 1949 as the Highway Research Review series.
http://www.trb.org/news/blurb_detail.asp?id=8899

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RFP/Solicitation News

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8. EPA SBIR Solicitation Topics Include Waste-to-Energy, Biofuels
The Environmental Protection Agency (EPA) has issued its 2008 Small Business Innovation Research (SBIR) Phase I funding announcement, which includes sub-topics such as "Ethanol, Biodiesel and Other Biofuels" and "Waste-to-Energy Systems." The government anticipates awarding up to 25 Phase I contracts of up to $70,000 each under this solicitation. The closing date for this solicitation is May 21, 2008. http://es.epa.gov/ncer/rfa/2008/2008_sbir_phase1.html

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9. BAA Released for R&D of Novel Materials for Solid Hydrogen Storage
The Naval Surface Warfare Center (NSWC), Crane Division, and the Defense Logistics Agency (DLA) have issued a Broad Agency Announcement (BAA) for R&D to identify novel materials and processes that can provide potential breakthroughs in hydrogen storage on board military vehicles. NSWC and DLA are coordinating their efforts with the DOE and the National Hydrogen Storage Project. The total amount of funding for this BAA is $1.5 million, with individual awards expected to be between $500,000 and $1.5 million. Questions will be considered until May 21, 2008. The deadline for responses to the BAA is May 23, 2008.
http://www.crane.navy.mil/acquisition/Synop/08RGS29.htm

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10. CCEF Project 150 Issues RFP for Renewable and Advanced Energy Technologies
The Connecticut Clean Energy Fund (CCEF) has issued a Request for Proposals (RFP) for Class I Renewable Development Projects, including fuel cell projects. Project 150 aims at increasing clean energy supply in Connecticut by at least 150 megawatts of installed capacity using Class I renewable energy sources with contract durations between 10 and 20 years. Eligible energy sources include fuel cells, hydrogen production and hydrogen conversion technologies, and landfill gas. CCEF will award at least $50,000 to each project selected. An information session is scheduled for May 7, 2008, in Cromwell, Connecticut. Proposals are due May 30, 2008.
http://www.ctcleanenergy.com/commercial/project150.php

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11. California PIER EISG Program Accepting Proposals
California's Public Interest Energy Research (PIER) Energy Innovations Small Grant (EISG) Program is now accepting proposals under an Electricity Program solicitation. Maximum funding per project is $95,000 for hardware projects requiring physical testing and $50,000 for modeling projects. Approximately $2.6 million per year is allocated to grants through the EISG program. Projects must target one of the six PIER program areas, which include renewable generation and building end-use efficiency. Pre-proposal abstracts are optional and are being accepted through May 2, 2008. The deadline for grant applications is June 10, 2008.
http://www.energy.ca.gov/contracts/smallgrant/index.html

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12. DOD 2008.2 SBIR Solicitation Includes Fuel Cell, Hydrogen Topics
The U.S. Department of Defense (DOD) has issued its 2008.2 Small Business Innovation Research (SBIR) solicitation, which includes several fuel cell and hydrogen technology topics. Phase I awards are typically $70,000 to $100,000 in size over a period of six to nine months. Potential proposers may speak directly with Topic Authors to ask technical questions until May 18, 2008. DOD will accept proposals between May 19 and June 18, 2008.
http://www.acq.osd.mil/osbp/sbir/solicitations/sbir082/index.htm

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13. Pennsylvania Announces Alternative Fuel, Energy Grant Opportunities
The Pennsylvania Department of Environmental Protection announced that applications are now available for grants to help the state achieve energy independence and grow its economy while helping consumers and businesses to develop and use advanced, clean energy sources. Up to $12.8 million will be available from the Pennsylvania Energy Development Authority for innovative, advanced energy projects, energy efficiency, renewable power, and for advanced energy businesses interested in locating to the state. Approximately $10 million is available through the state's Alternative Fuels Incentive Grants program for investing in companies that produce and market homegrown biofuels, for businesses to purchase alternative fuel fleet vehicles, and for consumers who purchase hybrid vehicles. Approximately $5 million will be available through the Energy Harvest grant program which promotes awareness and builds markets for cleaner or renewable energy technologies. The deadline for applications for all of the above grant programs is June 20, 2008.
http://www.depweb.state.pa.us/news/cwp/view.asp?Q=536273&A=3

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Contract / Funding Awards
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14. Advanced Technology Institute Program Awards Fuel Cell UGV Funding to Protonex
The Advanced Technology Institute's Next Generation Manufacturing Technology Initiative has awarded a $537,249 contract to Protonex Technology Corporation for a project to integrate a Pulse UGV fuel cell power system into a TALON robotic Unmanned Ground Vehicle (UGV) from Foster-Miller, Inc. Protonex also announced receipt of an additional $1.62 million from the U.S. Naval Research Laboratory to continue development of high power fuel cell systems for small unmanned aerial vehicles.
http://www.protonex.com/4-1-08_ATI-NGMTI_FINAL.pdf

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15. Ohio Third Frontier Program Awards $8.9 Million for Fuel Cell Projects

The Ohio Third Frontier Commission's Fuel Cell Program has awarded $8.9 million to twelve projects focused on fuel cell development, including demonstrations of fuel cell powered lift trucks, market readiness demonstrations, and validations of stationary fuel cell systems.
http://www.ohiochannel.org/your_state/third_frontier_project/press_release.cfm?release_id=94553

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16. Ohio Third Frontier Announces $12 Million for Advanced Energy Grants
Ohio's Third Frontier Commission announced $12 million for advanced energy grants to 17 companies for the development and growth of the advanced energy industry in the state. Two fuel cell projects were among those receiving grants through this announcement.
http://www.ohiochannel.org/your_state/third_frontier_project/press_release.cfm?release_id=94552

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Regulatory News

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17. Significant Increase Proposed for Passenger Vehicle, Light Truck Fuel Efficiency
U.S. Department of Transportation (DOT) Secretary Mary E. Peters announced a proposed 25 percent increase over five years for the fuel efficiency standards of passenger vehicles and light trucks. For passenger cars, the proposal would increase the fuel efficiency standard from 27.5 miles per gallon to 35.7 miles per gallon by 2015. For light trucks, the proposal calls for increases from 23.5 miles per gallon in 2010 to 28.6 miles per gallon in 2015. According to DOT, the proposal will save nearly 55 billion gallons of fuel and result in a reduction of carbon dioxide emissions of approximately 521 million metric tons. DOT says the plan will also save drivers over $100 billion in fuel costs over the lifetime of the vehicles covered by the rule.
http://www.dot.gov/affairs/dot5608.htm

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State News

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18. California Reduces ZEV Requirements
The California Air Resources Board has scaled back its requirements for the sale of zero-emissions vehicles (ZEVs) throughout the state by allowing new credits for the sale of plug-in hybrid electric vehicles and vehicles with hydrogen-fueled internal combustion engines. The new approach is being called "Enhanced, Advanced-Technology, Partial ZEVs" and would require only 7,500 ZEVs from automakers for model years 2012-2014. A similar option for 2015-2017 would reduce the number of ZEVs required to 25,000.
http://www.arb.ca.gov/msprog/zevprog/zevreview/summary.pdf
http://www.arb.ca.gov/msprog/zevprog/factsheets/2008zevfacts.pdf

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19. Pennsylvania Unveils Alternative Energy Portfolio Standards Web Site
The Pennsylvania Public Utility Commission has created the Alternative Energy Portfolio Standards (AEPS) Program web site to help implement and enforce requirements in the AEPS Act of 2004, which requires a certain percentage of all electric energy sold in the state be derived from alternative energy sources. Among its services, the web site provides assistance in the management of Alternative Energy Credits from customer-owned generation sources, and facilitates the trade of the credits through a regional bulletin board.
http://www.depweb.state.pa.us/news/cwp/view.asp?Q=535727&A=3

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20. California Publishes PIER Program 2007 Annual Report
The California Energy Commission has published the 2007 Annual Report on the state's Public Interest Energy Research (PIER) Program, including details on fuel cell and hydrogen technology projects. The program uses funds collected from investor-owned electric utilities to invest in public interest energy-related research, development and demonstration.
http://www.energy.ca.gov/2008publications/CEC-500-2008-026/CEC-500-2008-026-CMF.PDF

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Industry News

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21. Boeing Demonstrates Manned Fuel Cell Powered Airplane
Boeing has successfully flown a manned airplane powered by hydrogen fuel cells. The two-seat Dimona motor-glider was used as the airframe and modified to include a PEM fuel cell/lithium-ion battery hybrid system to power an electric motor coupled with a conventional propeller. The demonstrations included a cruising speed of 62 miles per hour for approximately 20 minutes on power solely generated by the fuel cells.
http://www.boeing.com/news/releases/2008/q2/080403a_nr.html

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22. Study Concludes FCVs are Best Pathway to Energy, Environmental Security
A new study released by Dr. C.E. Thomas concludes that hydrogen powered fuel cell vehicles are "the only option that can achieve the goal of reducing greenhouse gases by 60% or more below 1990 levels in the transportation sector." According to Thomas' calculations, transitioning to a hydrogen infrastructure would cost far less than maintaining and expanding the current gasoline infrastructure, and the benefits would far exceed the costs.
http://www.fuelcells.org/thomasstudy.pdf

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University Activities

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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)

Researchers at Duke's Pratt School of Engineering have developed a membrane that allows fuel cells to operate at low humidity and theoretically at higher temperatures, the university announced March 19. The researchers reported their findings online in the *Journal of Membrane Science*. "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 and senior author of the paper. "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."
http://news.duke.edu/2008/03/fuel_cell.html

Materials scientists at Rice University have discovered that tiny carbon capsules called buckyballs are so strong they can hold volumes of hydrogen nearly as dense as those at the center of Jupiter, the university announced March 20. The research appears on the March 2008 cover of the American Chemical Society's journal *Nano Letters* and has been featured in *Popular*

Mechanics. "Based on our calculations, it appears that some buckyballs are capable of holding volumes of hydrogen so dense as to be almost metallic," said lead researcher Boris Yakobson, professor of mechanical engineering and materials science at Rice. "It appears they can hold about 8 percent of their weight in hydrogen at room temperature, which is considerably better than the federal target of 6 percent." The Department of Energy has devoted more than $1 billion to developing technologies for hydrogen-powered automobiles, including technologies to cost-effectively store hydrogen for use in cars.
http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=10750&SnID=643547152
http://www.popularmechanics.com/science/research/4256976.html?series=19

A team from Missouri University of Science & Technology won the Hydrogen Education Foundation's 2007-2008 Hydrogen Student Design Contest. For this year's contest, teams of students from around the world were challenged to use a budget of $3 million to design the most effective airport hydrogen system to address the three main challenges for airports: noise, air pollution and groundwater contamination. The winning team's design included an on-site hydrogen fueling station, a primary fuel cell system to provide 200 kW of power to the airport, back-up power supply to protect the airport's computer systems, portable fuel cell power for tools and communications, a hydrogen forklift and baggage tug for use on the tarmac, as well as two hydrogen vehicles designed to increase public attention: a hydrogen ICE shuttle bus to transport passengers from the airport to downtown, as well as a hydrogen fuel cell scooter for use at the airport. http://www.hydrogencontest.org/winnersPressRelease.html
http://news.mst.edu/news/2008/hydrogen-design-airport.html

A research team led by Drexel University chemical engineering professor Yossef Elabd is exploring ways to increase the power output of direct methanol fuel cells, the university announced March 31. Elabd and Drexel graduate student Daniel Hallinan Jr. are evaluating Nafion® absorption of methanol to determine how the chemicals react with one another. They are using time-resolved Fourier transform infrared attenuated total reflectance spectroscopy to determine the diffusion and sorption of both methanol and water in Nafion and have discovered new insights into this process. According to the researchers, this is the first time both multi-component diffusion and sorption were measured in Nafion in the presence of a concentration gradient. From this study, Elabd and Hallinan concluded that the sorption of methanol into the Nafion, rather than the rate of methanol diffusion through Nafion, has the most significant impact on methanol crossover. This should be taken into consideration when developing Nafion alternatives for methanol fuel cells, according to the researchers. Their findings were published in the Nov. 22, 2007, issue of *Journal of Physical Chemistry*.
http://www.drexel.edu/news/headlines/chemical-engineer-discovers-way-of-increasing-battery-life-with-environmentally-friendly-fuel cells.aspx

A three-wheeled fuel cell vehicle designed by a student team from Penn State achieved 1,668.3 mpg (709.1 kilometers per liter) in the 2008 Shell Eco-marathon™ Americas, held over a four-day period beginning April 10 at the California Speedway in Fontana, Calif. The competition attracted 32 teams from four high schools and 23 universities from Canada, Mexico and the U.S. The entries included 25 vehicles powered by combustion engines, four by fuel cell/hydrogen technology, one by diesel fuel, one by LPG (liquid petroleum gas) and two by solar power. In addition to Penn State HFV's "Blood, Sweat & Gears," other vehicles featuring fuel cell/hydrogen technology included Lamar University's "1602," developed by team Full Throttle; and "Infusion I" and "HICE," developed by teams LAAE A and LAAE C from Los Altos High School in Hacienda Heights, Calif. http://www.shell.com/home/Framework?siteId=us-en&FC2=/us-en/html/iwgen/leftnavs/zzz_lhn7_4_0.html&FC3=/us-en/html/iwgen/news_and_library/press_releases/2008/sem2008_results_041208.html

A team of chemists at Brown University in Providence, R.I., claims to have created uniform platinum nanocubes, a breakthrough that could make hydrogen fuel cells more efficient and less costly. In an April 10 press release, the university says a team led by chemistry Professor Shouheng Sun has mastered a dilemma for dealing with platinum, a precious metal coveted for

its ability to boost a chemical reaction in fuel cells. The team shows that shaping platinum into a cube greatly enhances its efficiency in a phase of the fuel cell's operation known as oxygen reduction reaction. Sun's results have been published online in the journal *Angewandte Chemie*. The paper was selected as a Very Important Paper, reserved for less than 5 percent of manuscripts submitted to the peer-reviewed journal.
http://news.brown.edu/pressreleases/2008/04/platinum-nanocubes

SymPowerco Corporation announced that Carleton University in Canada's capital city of Ottawa, Ontario, will be the company's primary development partner in its Flowing Electrolyte Direct Methanol Fuel Cell program. SymPowerco will partner with Carleton's Mechanical and Aerospace Engineering Department. The principal investigator will be Feridun Hamdullahpur, provost and academic vice president. http://biz.yahoo.com/iw/080408/0384600.html

The Appalachian State University Energy Center, located in Boone, N.C., will co-host the Fourth International Hydrail Conference June 9 in Valencia, Spain. The conference, also hosted by NTDA Energia, will showcase projects applying hydrogen and fuel cell technology to railways and examine scenarios for integrating these technologies into existing transport systems. In its fourth year, the conference will help provide a vision for the implementation of hydrogen-powered railways and a medium- to long-term strategic plan for the global deployment of this technology. For more information about attending the conference, or to learn more about hydrogen trains, visit http://www.hydrail.org . http://www.news.appstate.edu/2008/04/14/hydrail-technology/

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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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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/)

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