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

### 1. Researchers Find Hydrogen-Rich Alloys that Solidify at Lower Pressures

Researchers at the Stanford Institute for Materials and Energy Science (SIMES), who have been studying hydrogen-rich alloys composed of hydrogen and silane together, found that the alloys solidified at much lower pressures than would be required for hydrogen alone, with the alloy forming a solid containing more than 99 percent hydrogen. The work is providing insight into how metallic hydrogen behaves. SIMES is a joint institute of the U.S. Department of Energy's (DOE) SLAC National Accelerator Laboratory and Stanford University.

<http://www.ornl.gov/info/news/pulse/no295/story2.shtml>

### 2. Researchers Increase Electrical Conductivity of Semiconductor Nanorod Crystals

Researchers at Lawrence Berkeley National Laboratory have reported a technique that increases the electrical conductivity of nanorod crystals of the semiconductor cadmium-selenide by 100,000 times. The key to the increase is fabricating gold electrical contacts on the ends of cadmium-selenide rods via direct solution phase-growth. Researchers believe this is an important discovery since electrical conductance in semiconductor nanocrystals is important for both solar electricity and solar fuel technologies, such as splitting water to generate hydrogen.

<http://newscenter.lbl.gov/press-releases/2009/09/08/enhancing-nanocrystal-electrical-conductance/>

### 3. EPA GreenChill Program Certifies Fuel Cell-Powered Grocery Store

A Whole Foods Market in Dedham, Massachusetts, has received the Environmental Protection Agency's (EPA) GreenChill certification for its environmentally friendly design, construction and operations. The store features a 400-kW fuel cell from UTC Power, which generates nearly 90 percent of its power needs and all of its hot water needs onsite. The GreenChill certification program promotes advanced technologies, strategies and practices that reduce refrigerant charges and emissions of greenhouse gases.

<http://www.epa.gov/greenchill/>

### 4. DOE Announces First H-Prize Competition for Hydrogen Storage Materials

DOE announced the initial H-Prize Competition for Breakthrough Advances in Materials for Hydrogen Storage. The top prize for the competition is \$1 million. The primary focus of this initial competition is for demonstrating advancements in developing an on-board hydrogen storage material for light-duty vehicles. The H-Prize Competition is authorized by the Energy Independence and Security Act of 2007. February 15, 2010, is the deadline for registration and eligibility documentation.

<http://www.hydrogenprize.org/>

## RFP/Solicitation News

### 5. DARPA Accepting Proposals to Convert Seawater to Liquid Fuels

The Defense Sciences Office of the Defense Advanced Research Projects Agency (DARPA) seeks proposals for projects to convert seawater to liquid fuels. Projects should emphasize unique opportunities for novel catalyst development. According to the solicitation "Ideas based entirely on pre-existing processes and technologies and incremental advances of current technologies should not be submitted." Funding levels for the solicitation have not been specified. Deadline for proposals is October 5, 2009.

[https://www.fbo.gov/index?s=opportunity&mode=form&id=8a7bf54d69b9e4aceb4237ce25ba64e0&tab=core&\\_cview=0](https://www.fbo.gov/index?s=opportunity&mode=form&id=8a7bf54d69b9e4aceb4237ce25ba64e0&tab=core&_cview=0)

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**6. *Proposals Sought for Measuring the Active Surface Area of Non-Platinum Catalysts***

NineSigma issued a Request for Proposals (RFP) for Measuring the Active Surface Area of Non-Platinum Catalysts. "Measurement technologies for the combination of a platinum or its alloy catalyst with an acidic electrolyte are not under consideration." The response due date is October 5, 2009.

[https://www.myninesigma.com/sites/public/\\_layouts/RFPs/NineSigma\\_RFP\\_65370.pdf](https://www.myninesigma.com/sites/public/_layouts/RFPs/NineSigma_RFP_65370.pdf)

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**7. *LLNL Announces Business Opportunity to License MEMS Fuel Cells***

Lawrence Livermore National Laboratory (LLNL) is offering the opportunity to license the technology to make and sell micro-electrical-mechanical systems (MEMS) fuel cell technology. MEMS fuel cells operate at a low temperature (less than 400 degrees Celsius), with a high power density, and capable of operating on liquid fuels such as methanol. The deadline for responses to this opportunity is October 12, 2009.

[https://www.fbo.gov/index?s=opportunity&mode=form&id=6a181251c1e55f777221b2504bf95d2d&tab=core&\\_cview=0](https://www.fbo.gov/index?s=opportunity&mode=form&id=6a181251c1e55f777221b2504bf95d2d&tab=core&_cview=0)

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**8. *CEC Issues PIER EISG Electricity Program Grant Solicitation***

The California Energy Commission (CEC) has issued a solicitation for grants under its Public Interest Energy Research Energy Innovations Small Grant (PIER EISG) program. R&D areas of interest include Environmentally Preferred Advanced Generation and Renewable Generation. Approximately \$2.6 million is available for EISG grants each year. Maximum per-project funding levels are \$95,000 for hardware projects requiring physical testing and \$50,000 for modeling projects. Deadline for applications is October 27, 2009.

[http://www.energy.ca.gov/contracts/smallgrant/09-02\\_electricity/index.html](http://www.energy.ca.gov/contracts/smallgrant/09-02_electricity/index.html)

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**9. *DOT Volpe Center to Issue FY10.1 SBIR Solicitation on October 1***

The U.S. Department of Transportation (DOT) Volpe Center announced it will open its FY10.1 Small Business Innovation Research (SBIR) solicitation on October 1, 2009, with a closing date of November 16, 2009. This notice is posted to give potential applicants advance notice of the solicitation.

<http://www.volpe.dot.gov/sbir/>

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**10. *NSF FY-2010 STTR Solicitation Seeks Materials for Energy Generation and Storage***

"Materials for Energy Generation and Storage" is one of the subtopics of the FY-2010 Small Business Technology Transfer (STTR) solicitation issued by the National Science Foundation (NSF). The STTR has one topic, Multi-Functional Materials, with five subtopics. The maximum funding level per Phase I project is \$150,000. NSF anticipates making 35 STTR Phase I awards. Deadline for proposals is November 17, 2009.

[http://www.nsf.gov/pubs/2009/nsf09605/nsf09605.htm?govDel=USNSF\\_25](http://www.nsf.gov/pubs/2009/nsf09605/nsf09605.htm?govDel=USNSF_25)

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**11. *DOE SBIR/STTR Solicitation Includes Hydrogen, Fuel Cell Topic***

DOE's Office of Science has issued its Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) solicitation, which includes four topics of interest under its "Hydrogen, Fuel Cells, and Infrastructure Technologies Program." Phase I grants of a maximum \$100,000 per project will be awarded. Approximately \$36 million is expected to be available for new Phase I awards under this solicitation. Deadline for responses is November 20, 2009.

<http://sbir.er.doe.gov/sbir/>

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**12. *NSF FY-2010 SBIR Solicitation to Support Advanced Materials and Manufacturing***

The National Science Foundation (NSF) has issued its FY-2010 Small Business Innovation Research (SBIR) solicitation, which includes the topic "Nanotechnology, Advanced Materials and Manufacturing."

NSF expects to have \$45 million total for projects under this solicitation, with maximum funding of \$150,000 per Phase I project. Proposal deadline is December 3, 2009.

<http://www.nsf.gov/pubs/2009/nsf09609/nsf09609.htm>

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*13. Annual P3 Awards Opens for Student Design Team Applications*

The Environmental Protection Agency National Center for Environmental Research is accepting applications for its 7<sup>th</sup> Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet. Research Areas for this funding opportunity include "Energy," "Materials and Chemicals," and "Built Environment." Teams will research, develop and design solutions to real world challenges involving the overall sustainability of human society. Approximately \$850,000 is available for all awards. Per project funding of up to \$10,000 is available for each Phase I grant. Upon successful completion of a Phase I project, grant recipients will be able to apply for Phase II funding of up to \$75,000 for two additional years. The solicitation closes on January 5, 2010.

[http://www.epa.gov/ncer/rfa/2010/2010\\_p3.html](http://www.epa.gov/ncer/rfa/2010/2010_p3.html)

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**Contract / Funding Awards**  
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*14. \$100 Million in ARRA Transit Funding Includes Hydrogen, Fuel Cell Projects*

The U.S. Department of Transportation (DOT) announced that \$100 million in funding from the American Recovery and Reinvestment Act (ARRA) has been awarded to 43 transit agencies for projects to advance environmental technologies. Projects include "green" hydrogen production at AC Transit in California (\$6.4 million); and stationary fuel cells for the Connecticut Department of Transportation's bus maintenance and storage facilities (\$7 million).

[http://www.fta.dot.gov/news/news\\_events\\_10555.html](http://www.fta.dot.gov/news/news_events_10555.html)

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*15. ARRA Funding Results in Purchase of Fuel Cells for Lift Truck Fleets*

A \$6.1 million award from DOE to GENCO, using funding from the American Recovery and Reinvestment Act (ARRA), has resulted in GENCO purchasing 136 GenDrive™ fuel cell power units from Plug Power. The fuel cell units will be provided to Wegmans at its distribution facilities for conversion of lift truck fleets in their produce and grocery buildings.

<http://www.b2i.us/View.asp?b=604&ID=69553&l=204573>

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*16. Univ. of Texas Receives Funding for Hydrogen Generation Research*

Researchers at the University of Texas at Austin received grants totaling \$2.5 million from the National Science Foundation and DOE for research on new materials for using sunlight to split water to generate hydrogen. The researchers will examine novel metal oxides that can act as semiconductors.

[http://www.utexas.edu/news/2009/09/16/water\\_hydrogen\\_fuel/](http://www.utexas.edu/news/2009/09/16/water_hydrogen_fuel/)

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*17. PEDAs Awards \$1 Million Grant to Wegmans for Fuel Cell Handling Equipment*

The Pennsylvania Energy Development Authority (PEDA) has awarded a \$1 million grant to Wegmans Food Markets to support installation of a hydrogen fueling infrastructure – including an outdoor hydrogen storage tank and indoor fueling dispensers -- for fuel cell-powered pallet jacks and reach trucks at the company's Retail Service Center in Pottsville, Pennsylvania. Wegmans will purchase 50 Crown pallet trucks and 9 Crown stand-up forklifts that will be powered by Plug Power's GenDrive™ fuel cell systems.

<http://www.wegmans.com/webapp/wcs/stores/servlet/PressReleaseDetailView?storeId=10052&catalogId=10002&langId=-1&productId=675114>

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*18. Navy Awards Fuel Cell Bread Board System Contract to Protonex*

The Department of the Navy Office of Naval Research has awarded a \$598,813 contract to Protonex Technology Corporation for development of a fuel cell bread board system for small unmanned aerial vehicles (UAVs).

<https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=4690d329e5587b423fb6bc3f3942c004>

[http://www.protonex.com/\\_assets/pressrelease/5cfb47f6-3877-41af-8717-3190388b65aa.pdf](http://www.protonex.com/_assets/pressrelease/5cfb47f6-3877-41af-8717-3190388b65aa.pdf)

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*19. Air Force Awards Contract to Modify UAV for Fuel Cell-Based Propulsion System*

The U.S. Air Force awarded a \$405,449 contract to McDonnell Douglas Corporation for a project to modify a Scan Eagle Compressed Carriage (SECC) unmanned aerial vehicle (UAV) for a fuel cell-based propulsion system.

<https://www.fbo.gov/index?s=opportunity&mode=form&tab=core&id=bc960313c17610e6223cda9ce9a4e16>

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*20. Powertech Contracted by Shell Hydrogen for High Capacity Fueling Station in California*

Shell Hydrogen has awarded a contract to Powertech for a new high capacity hydrogen fueling station in Newport Beach, California. It will be the first high pressure (700 bar) public-use hydrogen fueling station in California and will be capable of fueling four hydrogen fuel cell vehicles simultaneously.

<http://powertechlabs.com/cfm/index.cfm?It=106&Id=73>

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**Legislative / Regulatory News**  
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*21. DOT and EPA Announce New Program to Address Climate Change and Energy Security*

The U.S. Department of Transportation (DOT) and the Environmental Protection Agency (EPA) proposed a rule to establish an interagency program to reduce greenhouse gases and limit dependence on foreign oil. The program, which covers model years 2012 through 2016, would enable auto manufacturers to build a single light-duty national fleet that satisfies all federal requirements as well as the standards of California and other states. Instead of three standards – DOE, EPA and a state standard – the new interagency program would allow clearer rules for all automakers. Public hearings on the proposal will be held around the country in October. There will be a 60-day comment period that begins with the publication of the proposal in the Federal Register. Details on the proposal and how to submit comments can be found at the following web sites: <http://www.dot.gov/affairs/2009/dot14109.htm>

<http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99aefa80569eea57529cdba046a0/>

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**Industry News**  
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*22. Mercedes-Benz to Launch First Series-Produced Fuel Cell Car*

Mercedes-Benz will launch its first series-produced fuel cell car, the B Class F-CELL, in late-2009, with the first of around 200 vehicles to be delivered to customers in Europe and the United States in early-2010. The car uses gaseous hydrogen fuel for a range of about 400 km (approx. 248 mi.) and a peak performance of 136 horsepower.

<http://www.daimler.com/dccom/0-5-7145-1-1232162-1-0-0-0-0-0-11979-0-0-0-0-0-0-0.html>

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*23. GM Announces Fuel Cell Advancements, 2015 Commercialization Potential*

General Motors announced that its 2<sup>nd</sup> generation hydrogen fuel cell system is half the size, 220 pounds lighter and uses less than half the precious metal of the current generation fuel cell in use in the Chevrolet Equinox fuel cell electric vehicle. The automaker says the system could be commercialized in the 2015 time frame. General Motors also announced that its fleet of Chevrolet Equinox fuel cell electric vehicles passed the one million mile mark. The company estimates that about 5,000 people have driven the cars in short test drives, with more than 80,000 people volunteering to drive them as part of Project Driveway, which started in November 2007.

<http://media.gm.com/servlet/GatewayServlet?target=http://image.emerald.gm.com/gmnews/viewpressreleetail.do?domain=2&docid=56786>

## 24. University Fuel Cell Roundup

"Neither the average person nor even a top-notch scientist who works with fuel cells would think that acoustics could help, but it has already been demonstrated that the application of acoustic stimulation in a fuel cell can increase its efficiency," Jack Seiner, director of the Jamie L. Whitten National Center for Physical Acoustics at the University of Mississippi and a former National Aeronautics and Space Administration scientist, states in a university press release.

On Aug. 25, U.S. Patent No. 7,578,992 was issued to Nahid Mohajeri of Rockledge, Fla.; Ali Tabatabaie-Raissi of Melbourne, Fla.; and Gary Bokerman of Rapid City, Mich., for a thermolytic method of generating hydrogen. The patent was assigned to the University of Central Florida Research Foundation, Inc. in Orlando. An abstract filed with the U.S. Patent & Trademark Office contains the following description: "A method of generating hydrogen includes the steps of providing an amine borane (AB) complex, at least one hydrogen generation catalyst, and a solvent, and mixing these components. Hydrogen is generated. The hydrogen produced is high purity hydrogen suitable for PEM fuel cells. A hydrolytic in-situ hydrogen generator includes a first compartment that contains an amine borane (AB) complex, a second container including at least one hydrogen generation catalyst, wherein the first or second compartment includes water or other hydroxyl group containing solvent. A connecting network permits mixing contents in the first compartment with contents in the second compartment, wherein high purity hydrogen is generated upon mixing. At least one flow controller is provided for controlling a flow rate of the catalyst or AB complex."

Murdoch University in Western Australia publicly launched its new Centre for Research into Energy for Sustainable Transport (CREST) in August. Researchers there are studying biofuel processing modeling, new energy products such as biofuel derived from microalgae, battery chemistry, and fuel cells and hydrogen energy.

Gerardine Botte, an associate professor of chemical and biomolecular engineering in the Russ College of Engineering and Technology at Ohio University, has developed fuel cell technology that allows hydrogen to be produced on demand using an “ammonia electrolytic cell.” Compared to water electrolysis, ammonia electrolysis consumes 95 percent less energy and produces more hydrogen.

Mantra Venture Group Ltd. has signed a worldwide exclusive licensing agreement for a Mixed Reactant Fuel Cell (MRFC) technology designed by Professor Emeritus Colin Oloman in the Clean Energy Research Center at the University of British Columbia, Canada. Unlike typical fuel cells that require a proton exchange membrane to separate the fuel from the oxidant within the cell, MRFC is based on an innovative technology that mixes the fuel with the oxidant and eliminates the need for the expensive yet fragile membrane. Under the direction of Prof. Oloman, Mantra's technical staff is currently undertaking feasibility studies on the MRFC technology using formate as the fuel.

<http://www.mantraenergy.com/press-releases/mantra-venture-group-acquires-worldwide-exclusive-license-for-mixed-reactant-fuel-cell-technology.html>



Xingbo Liu, assistant professor of mechanical and aerospace engineering in the West Virginia University College of Engineering and Mineral Resources, was awarded the 2010 Early Career Faculty Fellow Award from the Minerals, Metals and Materials Society. In 2008 and 2009, Liu was named the College's Outstanding Researcher. Recently, Liu lead a team that developed a new electroplating method that makes connecting multiple solid oxide fuel cells more efficient.

<http://wvutoday.wvu.edu/n/2009/09/06/xingbo-liu>

On Sept. 11, International Patent Publication No. WO/2009/110631 was assigned to Japanese inventors Yuichiro Haramoto, Kohei Shiramizu and Masashi Oota for "proton transport material and raw materials to manufacture the same; ion exchanger membrane electrode assembly and fuel cell that use the proton transport material." The patent was assigned to the University of Yamanashi and Toppan Printing Co. An abstract filed with the World Intellectual Property Organization contains the following description:

"Provided are: a proton transport material, suitable for electrolyte membranes of fuel cells and the like, which improves the mechanical properties of a sulfonic acid-type liquid crystal polymer material, and can be kept as a membrane in a solid state while maintaining the molecular arrangement of the liquid crystal state; an ion exchanger, a membrane electrode assembly (MEA), and a fuel cell that use the proton transport material; and the raw materials for manufacturing the proton transport material. The proton transport material has a molecular structure wherein the sulfonic acid-type liquid crystal polymer material is cross-linked with a part other than a sulfonic acid group using a cross-linking agent that has two or more functional groups."

[http://www.wipo.int/pctdb/en/fetch.jsp?LANG=ENG&DBSELECT=PCT&SERVER\\_TYPE=19-10&SORT=41285115-KEY&TYPE\\_FIELD=256&IDB=0&IDOC=1784406&C=10&ELEMENT\\_SET=B&RESULT=1&TOTAL=1&SART=1&DISP=25&FORM=SEP-0/HITNUM.B-ENG.DP.MC.AN.PA.ABSUM-ENG&SEARCH\\_IA=JP2009054376&QUERY=%28FP%2fWO%2f2009%2f110631%29+](http://www.wipo.int/pctdb/en/fetch.jsp?LANG=ENG&DBSELECT=PCT&SERVER_TYPE=19-10&SORT=41285115-KEY&TYPE_FIELD=256&IDB=0&IDOC=1784406&C=10&ELEMENT_SET=B&RESULT=1&TOTAL=1&SART=1&DISP=25&FORM=SEP-0/HITNUM.B-ENG.DP.MC.AN.PA.ABSUM-ENG&SEARCH_IA=JP2009054376&QUERY=%28FP%2fWO%2f2009%2f110631%29+)

Yong Wang, an internationally known researcher in the area of energy and renewable fuels, joins the Washington State University faculty as the first Voiland Distinguished Professor. Wang's work spans from fundamental to applied research in clean energy conversion, including fundamental studies of structure and function relationships of transition metal oxide and bimetallic catalysts, development of novel catalytic materials, and innovative work in reaction engineering to improve the conversion of biomass and hydrocarbons to fuels and chemicals. He also developed novel and durable materials for fuel cell applications.

<http://wsunews.wsu.edu/pages/publications.asp?Action=Detail&PublicationID=15669>

Chemical engineering students at the University of Rhode Island spent the summer building a microbial fuel cell that uses bacteria and the waste stream from the production of biodiesel to generate renewable energy. Students Sarah Hanselman of Bangor, Maine, and Patricia Coutts of Hyde Park, N.Y., collaborated with Professor Stanley Barnett, their advisor.

<http://www.uri.edu/news/releases/index.php?id=5014>

Anette M. Karlsson has been named chairperson of the University of Delaware's Department of Mechanical Engineering. Karlsson's research interests fall primarily in the areas of thermomechanical properties and response of advanced and traditional materials. Her current research includes composite structures, polymer fuel cells, thermal barrier systems, ultralight structures, and instrumented indentation.

<http://www.udel.edu/udaily/2010/sep/karlsson091609.html>

Dane Morgan, a materials science and engineering assistant professor at the University of Wisconsin-Madison, and Ph.D. student Edward "Ted" Holby have developed a computational model that could optimize an important component of fuel cells. Essentially, they investigate how particle size relates to the overall stability of a material, and their model has shown that increasing the particle size of a fuel cell catalyst decreases degradation and therefore increases the useful lifetime of a fuel cell.

<http://www.news.wisc.edu/releases/15511>

Thomas Zawodzinski, an expert and innovator in fuel cell and related energy storage science and technology, has been named the fifth University of Tennessee-Oak Ridge National Laboratory Governor's Chair. Zawodzinski focuses on ways to make fuel cells more durable over the long term, how to ensure that they function properly at higher temperatures and ways to improve the basic mechanics of the

chemical reactions at the heart of how fuel cells can be used to generate electricity and batteries store electrical energy.

<http://www.utk.edu/tntoday/2009/09/18/zawodzinski-named-ut-ornl-governors-chair/>

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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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