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

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News on U.S. Government Fuel Cell Programs
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*1. NREL Allies with Chevron on Biofuels, Hydrogen R&D*

DOE's National Renewable Energy Laboratory and Chevron Technology Ventures signed a five-year agreement to research and develop new production technologies for biofuels and hydrogen. Collaboration will focus on making the fuels more economical, sustainable and commercially viable. [http://www.ornl.gov/info/news/pulse/pulse\\_v222\\_06.htm](http://www.ornl.gov/info/news/pulse/pulse_v222_06.htm)

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*2. Proceedings of 7<sup>th</sup> Annual SECA Workshop and Peer Review Posted Online*

Proceedings and presentations from the 7<sup>th</sup> Annual Workshop and Peer Review of the Solid-State Energy Conversion Alliance (SECA) are now available online. The SECA program's goal is to develop cost-competitive solid oxide fuel cells for a variety of energy applications. Presentation topics include reports from SECA Industry Teams as well as overviews of Core Program projects. The Workshop was held September 12-14, 2006.

<http://www.netl.doe.gov/publications/proceedings/06/seca/index.htm>

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*3. DOE and Fuel Cells 2000 Launch Searchable Database of Activities*

The Department of Energy and Fuel Cells 2000 have launched a free, online, searchable database of fuel cell and hydrogen activities in the United States. The database lists fuel cell and hydrogen related policies, as well as demonstrations and installations that are either currently underway, or which have already ended. Fuel Cells 2000, which is an activity of the non-profit Breakthrough Technologies Institute, lists information on planned demonstrations and installations in a separate section of its web site.

[http://www1.eere.energy.gov/news/progress\\_alerts/progress\\_alert.asp?aid=201](http://www1.eere.energy.gov/news/progress_alerts/progress_alert.asp?aid=201)  
<http://www.fuelcells.org/dbs/index.php>

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RFP/Solicitation News
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*4. NSF 2007 SBIR/STTR Seeks New Energy Sources for Portable Devices*

The National Science Foundation has issued its 2007 Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) solicitation, which includes "New energy sources for portable and mobile devices" and "Systems for harvesting alternate energy sources" under its Electronics (EL) topic. SBIR Phase I projects will receive up to \$100,000 and STTR Phase I projects will receive up to \$150,000. Total anticipated funding for SBIR projects is \$12.5 million and for STTR is \$3.75 million. Deadline for proposal submission is December 4, 2006.

<http://www.nsf.gov/pubs/2006/nsf06598/nsf06598.html>

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*5. Navy Issues BAA for Hydrogen Vehicle Fueling Station Pilot Projects*

The U.S. Navy has issued a Broad Agency Announcement for a Hydrogen Fuel Cell Material Handling Equipment pilot program. Successful proposals will include installation, maintenance and training associated with all equipment and hydrogen infrastructure. Approximately \$10 million is available under this announcement. Individual awards are expected to be between \$750,000 and \$1,500,000. Deadline for proposals is December 13, 2006.

<http://www.fbo.gov/spg/DON/NAVSEA/N00164/N0016407R6685/SynopsisR.html>

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#### *6. DOD SBIR Includes Fuel Cell Topics*

The Department of Defense (DOD) has issued a pre-solicitation notice for its 2007.1 Small Business Innovation Research (SBIR) solicitation, which includes topics such as high-temperature membranes for PEM fuel cells (Air Force) and modular high power fuel cell system design (Navy). Phase I awards are \$70,000 to \$100,000 for testing of the scientific, technical and commercial merit of a concept. DOD will begin accepting proposals on December 6, 2006, and the solicitation will close on January 10, 2007.

<http://www.dodsbir.net/solicitation/sbir071/default.htm>

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#### *7. PIER-NG Announces Grants for Biogas and Hybrid Renewables*

The California Energy Commission's Public Interest Energy Research – Natural Gas (PIER-NG) program announced a grant solicitation for research, development and demonstration of biogas and hybrid renewable technologies to replace or reduce natural gas applications in the state. Total funding available for the solicitation is \$1.0 million for an anticipated two or three projects. A pre-proposal workshop will be held in Sacramento on December 18, 2006, but potential applicants who cannot attend in person may participate through the Commission's online meeting service. The deadline for submitting proposals is February 6, 2007.

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

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Contract / Funding Awards

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#### *8. DOE Awards \$100 Million in Fuel Cell R&D Funding*

DOE awarded \$100 million in funding to 25 hydrogen research and development projects that further the goals of the President's Hydrogen Fuel Initiative. Project topics include membranes, water transport within the fuel cell stack, advanced cathode catalysts, bipolar plates and innovative stack design. <http://www.energy.gov/news/4401.htm>

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#### *9. Proton Energy Systems Receives Contract for Follow-On Research Project*

The University of Nevada Las Vegas Research Foundation (UNLVRF) has awarded a \$2.3 million contract to Proton Energy Systems for continuation of research on advanced PEM electrolysis technology. Proton will focus on improvements to its hydrogen generation systems, such as increased cell stack efficiency and reduced costs.

[http://www.protonenergy.com/company/news.html?news\\_id=17746&year=2006&month=11](http://www.protonenergy.com/company/news.html?news_id=17746&year=2006&month=11)

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#### *10. Army Awards Contract for Fuel Cell Airport Tow Tractor*

The U.S. Army's Tank Automotive Research, Development and Engineering Center (TARDEC) awarded a \$1.8 million contract to Energy Conversion Devices for the development and demonstration of a hydrogen-powered airport tow tractor and to further develop the company's hydride fuel cell technology.

[http://www.ovonic.com/ne\\_e cd\\_ovonics\\_press\\_releases\\_more.cfm?pressrelease\\_id=381](http://www.ovonic.com/ne_e cd_ovonics_press_releases_more.cfm?pressrelease_id=381)

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#### *11. NorTech Awards Funding for Fuel Cell Prototyping*

NorTech, an Ohio-based economic development organization, has awarded \$150,000 to the Wright Fuel Cell Group to build portable fuel cells created with Ohio-made products and utilizing an Ohio workforce. The project is one of six selected to receive funding from NorTech's Technology Leaders' Group. <http://www.nortech.org/News/NewsDetail.aspx?NewsID=97>

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State Activities
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*12. Pennsylvania Announces \$90 Million Strategy to Support Clean Energy*

Pennsylvania has introduced a \$90 million strategy to leverage public and private capital for renewable energy, pooling the resources of the state's clean energy grant programs. As part of the strategy, a \$40 million Keystone Green Fund was created to provide private equity and debt investments, venture capital placement and project financing.

<http://www.patreasury.org/KeystoneGreen.htm>

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*13. California Boasts First Large-Scale Retail Hydrogen Facility*

California's SunLine Transit Agency celebrated the successful installation and commercial operation of the country's first large-scale hydrogen facility, which makes the fuel available for third-party refueling purposes. The facility features an Adéo hydrogen fuel generator. SunLine will be demonstrating fuel cell buses to evaluate performance in a hot desert climate, in addition to testing the life expectancy of an existing line of fuel cell buses.

<http://www.sunline.org/home/index.asp?page=16&recordid=597&returnurl=index%2Easp%3Fpage%3D16>

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*14. CEC to Consider Adopting Revisions to Renewable Program Guidebooks*

The California Energy Commission (CEC) will meet on December 13, 2006, to consider adopting revisions to two of its Renewable Energy Program guidebooks: the Emerging Renewables Program Guidebook and the Overall Program Guidebook. Revisions to be considered include maintaining the current rebate level for fuel cells at \$3.00/watt, as well as the addition and possible eligibility of fuel cells that meet the California Air Resources Board 2007 emission profile. If the revisions are adopted, they would go into effect January 1, 2007.

<http://www.energy.ca.gov/renewables/02-REN-1038/documents/index.html>

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Industry Headlines
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*15. Ford Unveils Fuel Cell-Powered Explorer at LA Auto Show*

Ford unveiled a six-passenger fuel cell-powered Explorer that can travel 350 miles on a single fill-up of hydrogen fuel. The vehicle features a 60-kW fuel cell combined with a 50-kW hybrid battery, and stores 10 kg of hydrogen in a center-mounted storage tank that occupies the space formerly used for the 6-speed automatic transmission in current Explorer models.

[http://media.ford.com/products/press\\_article\\_display.cfm?article\\_id=24884&vehicle\\_id=1442&make\\_id=92&CFID=7018339&CFTOKEN=2def605d74422da6-824982E4-1185-6933-5D54BD176A25499A&jsessionId=58303668fc91\\$F7\\$95\\$8](http://media.ford.com/products/press_article_display.cfm?article_id=24884&vehicle_id=1442&make_id=92&CFID=7018339&CFTOKEN=2def605d74422da6-824982E4-1185-6933-5D54BD176A25499A&jsessionId=58303668fc91$F7$95$8)

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*16. Fuel Cell System to Recover Energy from Natural Gas Pipeline Operations*

FuelCell Energy and Enbridge Inc. are initiating production of the first multi-megawatt hybrid fuel cell power plant that will generate energy while recovering energy normally lost during natural gas pipeline operations. The system generates 2.2 megawatts of electricity and is expected to be available in late-2007. [http://www.corporate-](http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=FCEL&script=410&item_id=927923&layout=23)

[ir.net/ireye/ir\\_site.zhtml?ticker=FCEL&script=410&item\\_id=927923&layout=23](http://www.corporate-ir.net/ireye/ir_site.zhtml?ticker=FCEL&script=410&item_id=927923&layout=23)

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*17. Fuel Cell Membrane Advance Increases Power Density, Water Diffusion*

PolyFuel announced its new, ultra-thin membrane produces 200 milliwatts of peak power per square centimeter, an increase of 60 milliwatts per square centimeter over the company's previous membrane. The new membrane also allows more than twice the amount of water to diffuse through it than previous membranes.

[http://www.polyfuel.com/pressroom/press\\_pr\\_110706.html](http://www.polyfuel.com/pressroom/press_pr_110706.html)

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*18. USFCC Developing Fuel Cell Guidance Document, Releases List of Available Products*

With the approval of portable fuel cells for transport in airline passenger cabins beginning in January 2007, the US Fuel Cell Council (USFCC) has begun development of a fuel cell Air Guidance Document for airport security screeners. The USFCC has issued a call to fuel cell developers around the world to supply information on products that will become available in 2007. In other news, the USFCC has unveiled a comprehensive list of fuel cell products available for purchase.

<http://www.usfcc.com/Nov8-EM-AirGuidanceDocPressRelease-06-205.pdf>

<http://www.usfcc.com/Nov13-EM-AvailableProductsPressRelease-06-206.pdf>

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*19. ReliOn Fuel Cells Complete NEBS Level 3 Compliance Testing*

ReliOn has announced its T-1000™ and T-2000™ rack mounted fuel cells have completed Network Equipment Building Systems (NEBS) Level 3 compliance testing, which qualifies equipment for use under extreme environmental conditions at telecommunication sites.

<http://www.relion-inc.com/news.asp#19>

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University Activities
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*20. 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](mailto:khaq@nfcrc.uci.edu))

The Biogas Energy Project, a new research and technology demonstration facility, opened at the University of California, Davis (UC Davis) on Oct. 24. The facility will process eight tons of leftovers weekly (and later as much as eight tons daily) from premier restaurants in San Francisco and Oakland. The Biogas Energy Project is the first large-scale demonstration in the United States of a new technology developed in the past eight years by Ruihong Zhang, a UC Davis professor of biological and agricultural engineering. The technology, called an "anaerobic phased solids digester," has been licensed from the university and adapted for commercial use by Onsite Power Systems Inc. Zhang's system differs from other anaerobic digesters in three key ways: (1) It processes a wider variety of wastes; (2) it works faster; and (3) it produces both hydrogen and methane, which can be used to produce electricity and heat, or to propel cars, trucks and buses. [24-Oct-2006, *UC Davis News and Information*]

A research team from the Tokyo University of Science and the Japan Science and Technology Agency has managed to use gallium nitride (GaN) crystals to extract hydrogen from water, which might lead to the development of more efficient processes of extracting hydrogen for use in fuel cells. A GaN wafer is connected with platinum using a wire, and immersed in water. Light is applied, and current flows through the water which causes electrolysis, producing hydrogen. The efficiency of converting light energy to hydrogen energy using this method is 0.5 percent. However, efficiency was improved 1.3 times by introducing the narrower band gap material such

as InGaN. According to Professor Kazuhiro Ohkawa of the Tokyo University of Science applied physics department, this can be raised to more than 20 percent. [1-Nov-2006, [paultan.org](#)]

A research team from the University of Minnesota says it has invented a "reactive flash volatilization process" that converts soy oil and sugar into hydrogen and carbon monoxide. The mixture — called synthesis gas, or syngas — is used to make chemicals and fuels, including gasoline, and the new process is said to work up to 100 times faster than current technology. In addition, the scientists say their new technology requires no fossil fuels and works in reactors at least 10 times smaller than current models. "It's a way to take cheap, worthless biomass and turn it into useful fuels and chemicals," said team leader Lanny Schmidt, a professor of chemical engineering and materials science. Schmidt and his colleagues — graduate students James Salge, Brady Dreyer and Paul Dauenhauer — have produced a pound of synthesis gas in just one day using their small-scale reactor. Schmidt gained national attention in February 2004, when a team he headed invented a similar technology to produce hydrogen from ethanol. The work is detailed in the current issue of the journal *Science*. [2-Nov-2006, *UPI*]

University of Nottingham scientists have made a breakthrough that may advance the development of the next generation of hydrogen-powered vehicles. In research published in the journal *Angewandte Chemie* and featured in *Nature* and *Chemistry World*, the research team studied materials that have a porous, sponge-like structure in which hydrogen can be stored, and they found that bigger pores don't necessarily store the most hydrogen fuel. Professor Martin Schroder and colleagues Professor Neil Champness and Dr. Peter Hubberstey from the university's School of Chemistry, along with Dr. Gavin Walker from the School of Mechanical, Materials and Manufacturing Engineering, have been investigating so-called metal organic frameworks (MOFs) —molecular scaffolding filled with tiny cylindrical pores into which hydrogen gas can be forced. The Nottingham study has quantified the amount of hydrogen that can be put into three MOFs made of identical material, but with different pore sizes. Surprisingly, the study showed that the middle-sized pores could hold the highest density of hydrogen. "In a very small tube, the hydrogen gas molecules all see the wall and interact with it. But in a larger tube, the molecules see less of the wall and more of each other: that interaction is weaker so they don't pack together as closely," said Schroder. The researchers conclude that there is an optimum pore size for any given material. [6-Nov-2006, *Aberdeen Press and Journal*]

Researchers from California have achieved a new record for absorbing hydrogen using nanoporous polymers. Frantisek Svec of Lawrence Berkeley National Laboratory and Jean Fréchet of the University of California, Berkeley revealed the feat at the International Congress of Nanotechnology held Oct. 30-Nov. 2 in San Francisco. Svec and Fréchet created the nanoporous polymers by heating and chemically treating styrene, an abundant hydrocarbon used to manufacture some plastics. The resulting material has an abundance of pores, each less than 2 nanometers in diameter. Hydrogen atoms naturally stick to the polymer, when cooled to around 77 Kelvin (-196° C), by forming surface bonds. This allows them to pack tightly inside the material's pores. The material then releases the hydrogen when the temperature is raised or the pressure is reduced. The research team found that at roughly 40 times atmospheric pressure, the nanoporous polymers contained 3.8 percent hydrogen. And, at atmospheric pressure, they contained 1.5 percent hydrogen. While this falls short of the 6 percent target established by the U.S. Department of Energy, it is the best achieved so far for such a material, and the team is working on improving the technique. [7-Nov-2006, *NewScientist.com* news service]

The Marie Curie Research Training Network's Complex Solid State Reactions for Energy Efficient Hydrogen Storage (COSY) was launched on Nov. 1. The network, which receives €2.5 million in funding from the European Union, was established to develop new types of reactive light-metal hydride composites that can be used for more effective hydrogen storage. During the project's four-year duration, GKSS-Forschungszentrum Geesthacht will coordinate the collaboration between the 13 participating research institutes from seven European countries. Participating institutions and key contacts include: from Spain (the [Instituto de Ciencia de Materiales de Sevilla](#) — Professor Asunción Maria Fernández Camacho and the [Universitat Autònoma de Barcelona](#)



— Professor Maria Dolors Baró Mariné); from Italy (the [Universita di Torino](#) — Professor Marcello Baricco); from France ([European Synchrotron Facility, Grenoble](#) — Dr. Gavin Vaughan, the [Institut National Polytechnique, Grenoble](#) — Professor Alain Reza Yavari, and the [Laboratoire de Réactivité et de Chimie des Solides LRCS, Amiens](#) — Dr. Aline Rougier); from the United Kingdom ([University of Oxford](#) — Dr. John Sykes); from Switzerland ([EMPA, Dübendorf](#), Professor Andreas Züttel); from The Netherlands ([Vrije Universiteit, Amsterdam](#) — Dr. Bernard Dam and the [Universiteit Twente](#) — Dr. Geert H.L.A. Brocks); and from Germany ([Leibniz-Institute for Solid State and Materials Research Dresden](#) — Dr. Oliver Gutfleisch, the [Forschungszentrum Karlsruhe](#) — Dr. Wiebke Lohstroh), and [GKSS Forschungszentrum Geesthacht](#) — Professor Rüdiger Bormann). One of the main tasks of COSY is the education of early-stage researchers in the field of hydrogen storage materials. COSY provides training and research experience for researchers by giving them the opportunity to spend between three months to three years in another country as part of an international high-quality research experience. [8-Nov-2006, *Azom.com*]

The Energy Research Engagement Showcase, scheduled for Nov. 29-30 at The Inn at Virginia Tech and Skelton Conference Centers in Blacksburg, offers business and community leaders the opportunity to learn about more than 300 energy-related activities at universities in Virginia. Sponsored by Virginia Tech's Office of Economic Development and the Deans' Task Force for Energy Security and Sustainability, the showcase will foster commercialization of research from Virginia universities in the energy and energy-related environmental fields, enhance public-private partnerships that will make Virginia a leader in energy security and sustainability, stimulate economic development, and facilitate the adoption of profitable energy solutions. The showcase is part of Virginia Tech's "Energy Ideas" initiative, a year-long series of events designed to increase dialogue within the university and acquaint the public with Virginia Tech's efforts related energy innovations. To learn more and register, visit <http://www.research.vt.edu/energy>. [10-Nov-2006, *PR Newswire US*]

The Alaska Energy Technology Development Laboratory at the University of Alaska Fairbanks recently announced a successful field test of a prototype propane fuel cell. The cell, manufactured by Massachusetts-based Acumentrics and installed at the Kenai Fjords National Park's Exit Glacier Nature Center near Seward, ran for more than 1,100 hours straight and did so with no measurable degradation in its efficiency. "From a technical point of view, it is an important milestone we have achieved here," said Dennis Witmer, director of AETDL. "It is one step closer to these kinds of fuel cells becoming devices that can be useful in remote locations." The fuel cell was part of the original design for the nature center. It was first installed and used in the summer of 2004. Since then, a team of researchers and technicians has been fine-tuning the cell's performance. In August, Park Service officials fired it up again and it ran until the end of the season. In addition to generating electricity, the fuel cell provided heat to the nature center during its test run from mid-August to late September. [15-Nov-2006, *Space Daily*]

Scientists at Keele University in Staffordshire, England, have been exploring the possibility of using biogas to fuel solid oxide fuel cells. Mark Ormerod, professor of clean technology at Keele, is leading the research and believes the fuel cells have huge potential. His team's work is being supported by the university's new research institute for the environment, physical sciences and applied mathematics. [17-Nov-2006, *The Sentinel* (Stoke)]

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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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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/>)

*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>)