

Spin-Off Technology Receives Patent

When an NETL-RUA-led team developed a new catalyst for conversion of hydrocarbon fuels to synthesis gas, it led to the creation of the lab's first start-up company. Pyrochem Catalyst Corporation was established with the help of Pittsburgh's [Innovation Works](#) and obtained an exclusive license to the catalyst and a related NETL technology. The catalyst development team, which includes David Berry, Dushyant Shekhawat, Daniel Haynes (all NETL), Mark Smith (URS), and Jerry Spivey (LSU), recently received US Patent 8,133,463 on the pyrochlore-type catalyst.

A key potential benefit of this catalyst could be to enable the use of solid oxide fuel cells (SOFCs) to replace heavy truck idling. Professional truck drivers are mandated to rest for 10 hours after every 11 hours of driving. However, a power source is needed during these rest periods to provide heating, ventilation, and air conditioning to the cabin where they sleep and to power other electrical devices. Currently the 2.2 million diesel trucks that haul goods across the U.S. produce an estimated 11 million tons of carbon dioxide, 200,000 tons of nitric oxide, and 5,000 tons of particulate matter annually while idling, wasting more than 1 billion gallons of fuel. Auxiliary power

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E News is your monthly source for the latest information about NETL-RUA's research, activities and other important news. If you have information that you would like to feature in future newsletters, send that information to paul.deffenbaugh@contr.netl.doe.gov or jane.engel@contr.netl.doe.gov

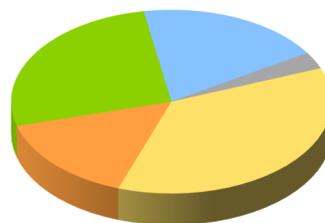
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NETL-RUA METRICS SNAPSHOT

RESEARCH PERSONNEL

PRODUCTS		
	FY2011	FY2012
Publications	194	43
Patents	11	2
Licenses	9	4
Students Graduated	20 PhD	9 PhD
	8 MS	6 MS



Total = 540

- Graduate Students - 102
- Undergraduate Students - 16
- University Researchers - 196
- URS Researchers - 83
- NETL Researchers - 143

** Products data is updated quarterly

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>> **PATENT**, *Continued from Page 1*

units that incorporate SOFCs would allow drivers to obtain power from a reliable source while eliminating significant pollutant discharge, and could open the door for use of similar units in large-scale power plants.

SOFCs are high-efficiency electrochemical devices that use hydrogen and oxygen to produce electricity. The hydrogen can be produced by converting fuels into synthesis gas, or *syngas*, a mixture of hydrogen and carbon monoxide, in a process called reforming. Syngas is currently generated from simple hydrocarbon fuels such as methane with the use of a catalyst. However, the sulfur and aromatic species in heavier, more complex fuels such as diesel pose a challenge because these components deactivate (or *poison*) conventional catalysts. Therefore, the development of an economical catalyst that can reform diesel and coal-based fuels into hydrogen-rich syngas is critical for this application.

A catalyst is prepared with the desired formulation (Figure 1) and is coated onto a monolithic structure (Figure 2). This represents a commercially usable product for reforming applications. Once prepared, the structure is loaded into the reactor (Figure 3), commonly designated as the Fuel Processing Unit (FPU), located at NETL in Morgantown, West Virginia, where a number of reforming demonstrations have been conducted proving the commercial viability of the catalyst. The catalyst system has been used to reform a variety of fuels using different reforming modes. Numerous test runs have been performed using diesel and biodiesel, and the syngas stream was fed directly into an operating SOFC for production of electricity.

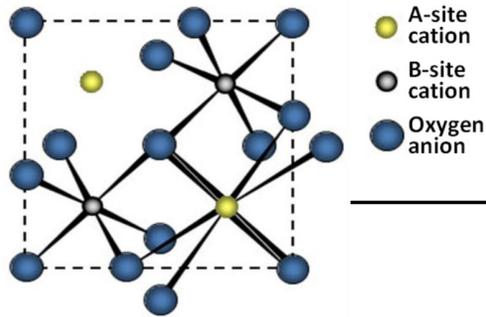


Figure 1

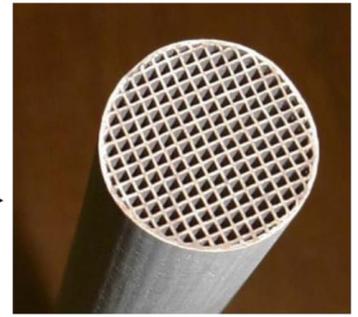


Figure 2

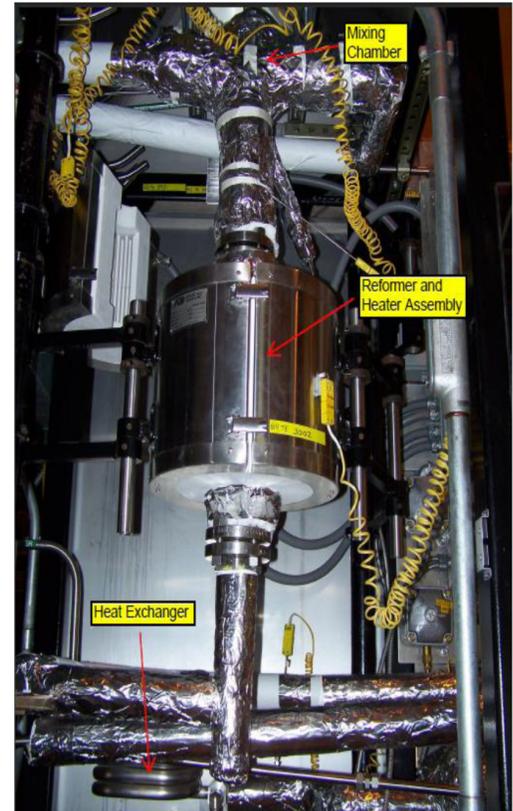


Figure 3

Upcoming Events

October 7 – 11, 2012	Materials Science & Technology 2012 Conference & Exhibition David L. Lawrence Convention Center Pittsburgh, PA
October 15 – 18, 2012	2012 Pittsburgh Coal Conference David L. Lawrence Convention Center Pittsburgh, PA
October 28 – November 2, 2012	2012 AIChE Annual Meeting, Cleaner Energy, Stronger Economy, Better Living David L. Lawrence Convention Center Pittsburgh, PA
November 28 – 29, 2012	NETL-RUA Fall Meeting: Energy & Innovation Conference (see sidebar on page 3) Southpointe Hilton Garden Inn Canonsburg, PA

Look for more information on these events in upcoming issues of the newsletter

Business Development News

NETL-RUA Fall Meeting: Energy & Innovation Conference

In partnership with [Catalyst Connection](#), the NETL-RUA is drawing business leaders, scientists, venture capitalists, and environmentalists from the region to its Fall Meeting to provide a forum to accelerate technology development and assist in commercializing new technologies and products by connecting technology needs with solutions.

The Energy & Innovation Conference, to be held at the Southpointe Hilton Garden Inn in Canonsburg, Pennsylvania on November 28-29, 2012, provides a unique opportunity for stakeholders from various disciplines to meet, network, and discuss the various approaches and strategies needed for moving technological innovations into the commercial arena.

The two-day event will showcase benefits of the collaborative research programs; provide informative sessions for industry on ways it can partner with the NETL-RUA; and offer technical tracks in the areas of Shale Gas, Process Control Systems, Energy & Water, and Materials.

Sessions will include brief technical overviews by NETL-RUA researchers as well as panel sessions focused on manufacturing needs and issues.

This is an exciting time for those of us involved in energy research. It's a time of innovation, a time of collaboration. It's a time of real opportunity in this region, and the NETL-RUA is poised to leverage these opportunities.

NETL-RUA Wins Prestigious Ceramic Industry Award

A team of NETL-RUA researchers comprising members from NETL, URS, and Carnegie Mellon University (CMU) earned the American Ceramic Society's prestigious 2012 [Richard and Patricia Spriggs Phase Equilibria Award](#).

The team, led by Jinichiro Nakano (URS), Kyei-Sing Kwong and James Bennett (NETL), was recognized for the article "Phase Equilibria in Synthetic Coal – Petcoke Slags (Al₂O₃-CaO-FeO-SiO₂-V₂O₃) under Simulated Gasification Conditions." The publication appears in *Energy and Fuels* 2011, 25, 3298-3306. Other team members included Thomas Lam, formerly a Ph.D. student working at NETL, CMU post-doctoral researchers Laura Fernandez and Piyamane Komolwit, and CMU Professor [Sridhar Seetharaman](#).

The award will be presented at the [Materials Science and Technology \(MS&T\) Conference and Exhibition 2012](#) to be held October 7-11 at the David L. Lawrence Convention Center in Pittsburgh, Pennsylvania.

The [American Ceramic Society](#) is a nonprofit organization dedicated to the ceramic community. It focuses on scientific research emerging technologies, and applications involving ceramic materials. The society presents this award annually to the author or authors of a published work that makes a valuable contribution to the field of phase-stability relationships in ceramic-based systems.



Kyei-Sing Kwong, James Bennet, and Jinichiro Nakano



Technology Spotlight

Unique Magnetic Survey Locates Oil and Gas Wells

Recently, members of the NETL-RUA Unconventional Resources team, Richard Hammack and Garret Veloski, contracted Fugro Airborne Surveys to perform an aeromagnetic survey over an area of Washington County, Pennsylvania, where past oil and gas production had occurred and where future Marcellus Shale gas production is expected.

A manned helicopter, utilizing the proprietary MIDAS™ System was flown over the area which was extensively drilled for shallow wells during the early to mid-1900s. The purpose of the survey was to locate wells that don't currently appear on any survey maps. Hammack and Veloski had already successfully used aeromagnetic surveys for locating abandoned oil wells at the Salt Creek Oil Field and the Department of Energy's Rocky Mountain Oilfield Testing Center near Casper, Wyoming.

The Midas™ System has been proven an excellent tool for rapidly locating existing and abandoned wells and for improving the effectiveness of soil and gas surveys in its current application. It also offers significant improvements in data quality and resolution over conventional single sensor magnetic systems.



NETL's Garret Veloski discusses survey with the pilot.



Survey in progress.

Morgantown High School Shines in the National Science Bowl

Congratulations to West Virginia Science Bowl (WVSB) Regional winners Morgantown High School on their outstanding performance at the National Science Bowl Competition held April 26-30, 2012 in Washington, DC.

Morgantown High School advanced through the double elimination final tournament to claim fourth place at this prestigious national event, defeating top teams from across the nation in the process.

This truly outstanding performance is the best finish of the West Virginia State Qualifier in the 21 years of the WVSB, and we congratulate the team members of Morgantown High School on the victory that resulted from their discipline and dedication.

In line with the NETL-RUA educational mission, all five members of the team plan to pursue educations in science or engineering.



Morgantown High School team