

# The Fossil Report

Oak Ridge National Laboratory Fossil Energy Program

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Energy Technology for the Future...and for the World

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the goal of releasing mercury from coal by the same process.

High-sulfur coals also contain high levels of mercury, and it is thought that the mercury trapped in coal is likely to be in the form of mercury-sulfur compounds. Bioleaching of the coal will, it is anticipated, remove mercury along with sulfur.

*For more information on this work, contact [Thomas Klasson](#), Oak Ridge National Laboratory.*

*Research sponsored by the [DOE Office of Fossil Energy, National Energy Technology Laboratory](#).*

## New Work Investigates Removal Of Mercury From Coal

Researchers at Oak Ridge National Laboratory, under the direction of Thomas Klasson, are investigating the biological modification of coal to remove mercury from coal prior to thermal processing.



*Thomas Klasson and Betty Evans examine a gas chromatogram showing PCB removal by anaerobic and aerobic bacteria.*

It is estimated that the power-generation industry emits up to 50 tons of mercury per year, and this level of emissions has serious implications for accumulation of mercury in the food chain.

Given the serious health and environmental consequences of mercury released from coal during burning or reforming, this work has far-reaching importance to the continued use of this country's most abundant resource.

Drawing on past experience with the use of sulfur-oxidizing bacteria to remove sulfur and iron from coal through a process known as bioleaching, this work has

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**UNITED WE STAND**

## Farewell to a Friend

The Fossil Energy Program and the scientific community as a whole lost a good friend this past summer when Gene Hoffman passed away suddenly at his home.

Gene was the DOE Oak Ridge Operations Manager responsible for the Oak Ridge National Laboratory Fossil Energy Materials Program for nearly twenty years—from 1979 until his retirement in 1996.

His counsel and ideas were instrumental to a wide variety of successful ventures undertaken by the Program over that period of time. Much of the success and effectiveness in interfacing with DOE and others in the scientific community was due in large part to Gene's broad knowledge of fossil energy materials technologies.

Gene was a member of the Metallurgy Division of Oak Ridge National Laboratory from 1951 until 1963. He then spent nine years in the space power division of the General Electric Company before moving to the Atomic Energy Commission in Gaithersburg, MD in 1972. After seven years with the AEC, Gene joined DOE Oak Ridge Operations in 1979 and spent the remainder of his career there, retiring in 1996.

Gene continued to be active in retirement, one of his causes being the cleaning up of stockpiles of depleted uranium. His persistence was rewarded with funding provided by DOE and Congress for remediation and disposal activities.

He also was involved with local government in his work to enact changes in local laws to prevent cell phone



*Gene Hoffman*

towers from encroaching on local neighborhoods.

Gene is survived by his wife of 50 years, Beverly, two daughters, three sons, his mother, a sister, 14 grandchildren, and 3 great-grandsons.

Gene will be sorely missed by all of us who came to know him, not only as a competent scientist and insightful administrator, but also as a loyal and good friend.

## Master Index Coming Soon to Web Site

In the near future, the [newsletter index](#) on the Fossil Energy Program Web site will be replaced by a hyperlinked list of topics.

The new index will enable easy access to articles of interest in the full collection of newsletters, without the necessity of reading through the list of article titles.

## Gas Turbine Conference Coming in February

DOE's Offices of Fossil Energy and Energy Efficiency and Renewable Energy have joined with the International Gas Turbine Institute and eight other organizations to host a conference entitled *Gas Turbines for a National Energy Infrastructure*. The Conference will be held on February 26-27 in Arlington, Virginia.

For more information contact [Kim Yavorsky, National Energy Technology Laboratory](#).

## DOE Honors Ellingson and Sun For Gas Turbine Research

William Ellingson and Jiangang Sun, Argonne National Laboratory, were among a highly-select group of recipients of a 2001 Research Partnership Award from the U.S. Department of Energy.

The Research Partnership Award, given as part of the 2001 Research and Development Awards and presented by DOE's Office of Power Technologies, recognizes outstanding research partnerships between the Department of Energy's national laboratories, private companies, and universities that have resulted in technology advances with national energy significance.

Ellingson and Sun won the award for their work on non-destructive evaluation development for stationary gas turbine ceramic components.

Bill Ellingson has been a participant on the DOE Fossil Energy Advanced Research Materials Program for nearly 25 years, focusing on the development of non-destructive evaluation methods for structural ceramics and ceramic coatings.



*Bill Ellingson*

## NDE Used to Assess Thermal Barrier Coatings

Argonne National Laboratory is developing a novel, nondestructive evaluation method, based on the backscattering characteristics of polarized laser light, for the assessment of the condition of thermal barrier coatings for hot section components for gas turbine engines.

The method is totally non-contact and can scan a 1-inch-square region in less than 15 minutes. Argonne has received three patents on this technology.

This NDE method relies on the fact that current thermal barrier coatings are optically translucent at the wave lengths of the laser light being used. The laser light penetrates the TBC and then back-scatters off internal interfaces. The back-scattered light is sensed by a high-sensitivity optical detector and output to a computer that also controls the motion of the object under study.

For more information on this work, contact [Bill Ellingson](#), [Argonne National Laboratory](#).

Research sponsored by the [DOE Office of Fossil Energy](#), [National Energy Technology Laboratory](#), [Advanced Research Materials Program](#).

## Stan David Receives Yoshiaki Arata Award

ORNL Metals and Ceramics Division's Stan David was recently awarded the Yoshiaki Arata Award by the International Institute of Welding.

The Arata Award is given to a person "who has realized outstanding achievements in fundamental research in welding science and technology and its allied areas," and whose research contributes greatly to the progress of welding engineering and related fields.

Stan has been involved with the Fossil Energy Program over a long period of time, bringing to the Program his extensive knowledge of joining methods, particularly as they apply to the newer materials used in advanced fossil energy systems.

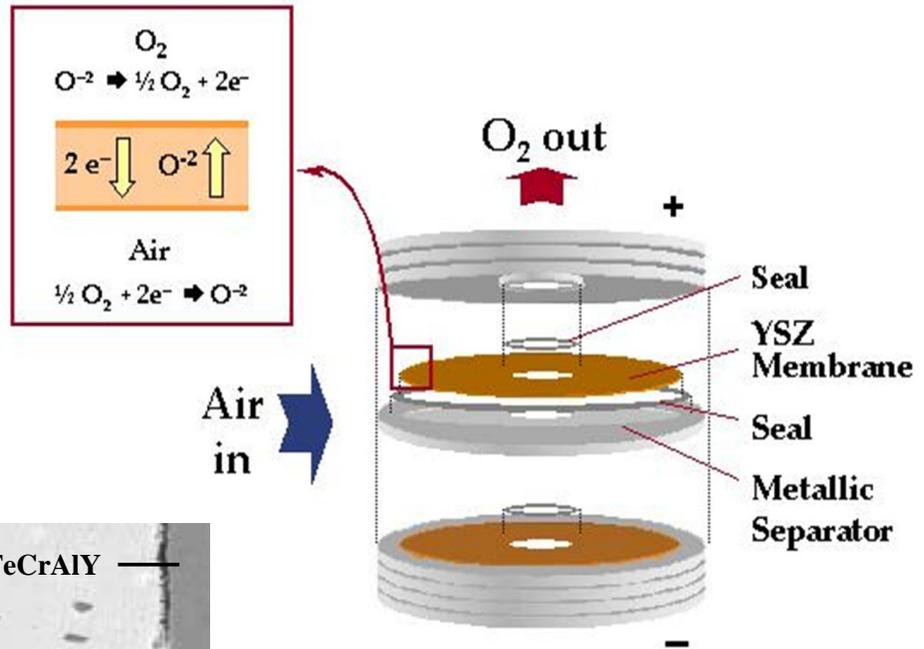


*Stan David*

## PNNL Develops Hermetic Seal for High-Temperature Electrochemical Application

Researchers at Pacific Northwest National Laboratory have developed a new, low-cost method of hermetically sealing ceramic and metallic components used in high-temperature electrochemical devices.

The technique, referred to as reactive air brazing, utilizes a novel copper oxide-silver single phase liquid as the basis for joining electrochemically active ceramics such as yttria-stabilized zirconia

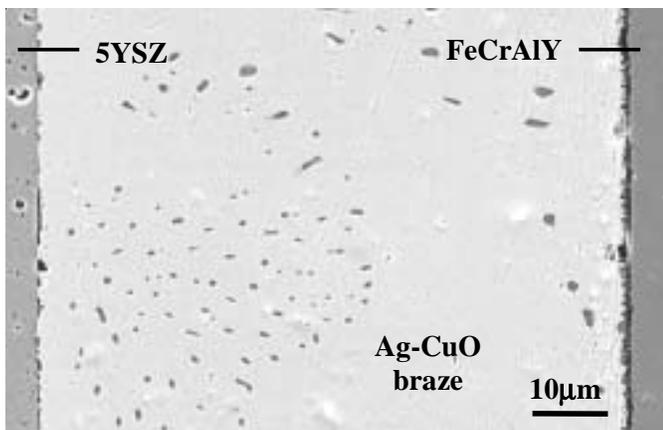


*A schematic drawing of a planar oxygen generator. atmospheres.*

An additional advantage of the RAB technique is that the sealing process is conducted in air, which minimizes the capital expenses and operating costs associated with the joining operation.

For more information on this research, contact [Scott Weil, Pacific Northwest National Laboratory](#).

This work is supported by the [DOE Office of Fossil Energy, National Energy Technology Laboratory](#).



*Cross-sectional SEM micrograph of an as-brazed bilayer/FeCrAlY joint.*

and lanthanum strontium cobalt ferrite to oxidation resistant metals such as FeCrAlY.

Materials of this type are commonly employed in the oxygen generators used in syngas production, solid oxide fuel cells, and solid-state sensors.

Unlike the previous sealing techniques, based primarily on high temperature glasses, the RAB joints exhibit excellent thermal cycling performance and long-term stability in both high-temperature oxidizing and reducing

### Continuing Resolutions Continuing

The President has signed a fifth Continuing Resolution, allowing programs with unsigned authorization bills to continue at FY 2002 levels through January 11.

No further appropriations actions are expected until the 108<sup>th</sup> Congress convenes in January 2003.