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One person's garbage is another's power

The Marine Sciences Laboratory in Sequim, Wash., has turned to the garbage dump to power its operations. One hundred percent of MSL's electrical energy needs now are supplied by methane gas from a sanitary waste landfill—or "green power." Green power refers to environmentally preferred power, generated by resources regarded as having certain environmental benefits—such as wind, solar and geothermal.

Landfill gas-to-energy plants are recognized by the Environmental Protection Agency as the only renewable source of power that actually removes pollution from the air. DOE has set a goal for each of its sites to purchase 3 percent green power by 2005 and 7.5 percent by 2010. Pacific Northwest National Laboratory's purchase of green power at MSL, coupled with its purchase of wind and small hydro generated power for its operations in Richland, Wash., represents 15 percent of its total energy usage being generated by renewable sources. For more information see PNNL's Web site at **http://www.pnl.gov/news/2003/03-48.htm**.

PNNL and NASA team on fuel cell research

Pacific Northwest National Laboratory and the NASA Glenn Research Center will collaborate in solving one of the toughest technical challenges in developing advanced solid oxide fuel cells. The two research organizations have signed a Space Act Agreement to team on the development of sealing technologies for the stacks of solid oxide fuel cells.

Solid oxide fuel cell (SOFC) stacks consist of a group of thin ceramic cells separated by gas seals between which electricity is generated through a combustion-less electrochemical process. The gas separation seals used between the individual cells prevent fuels and oxidants from intermixing. Robust seal materials and engineered architectures are essential to ensure the long-term stable operation of SOFCs.

The collaborators will develop composite materials and designs that will improve the strength and fracture toughness of composite glass and glass-ceramic-based seals. These seals must stand up to the extreme pressure, temperature and other environmental conditions that occur during extended operations. For more information see PNNL's Web site at **http://www.pnl.gov/news/2003/03-46.htm**.

New director selected for PNNL's Center for Global Security

Carol Kessler, an international expert in nuclear energy and nonproliferation, is the new director of the Pacific Northwest Center for Global Security, which is part of Pacific Northwest National Laboratory. The Center's mission is to provide a forum for the study of security issues, including not only traditional issues of nonproliferation, but also the impact of environmental, economic, energy and health conditions on global security. Kessler's primary responsibility is to further strengthen the Center's partnerships and programs with regional universities and nongovernmental organizations and to expand contacts with federal agencies. She will be located in Seattle.

"We must look beyond the traditional nonproliferation and verification mechanisms used to deal with proliferation to ascertain the root cause of why a country begins to buy, sell or develop weapons of mass destruction," said Kessler. Visit the Center's Web site at **http://pnwcgs.pnl.gov//** for more.

Radiation overdoses may be prevented with new technology

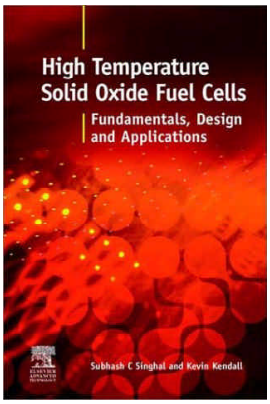
Receiving the correct dose is crucial for cancer patients undergoing radiation therapy. Too little radiation might not kill the cancer cells, too much can result in excess tissue damage, painful burns, long-term health problems and, in the worst cases, death.

Researchers at Pacific Northwest National Laboratory have patented a device that can help prevent patients from receiving the wrong dose of radiation. "Currently, the focus is on pre-planning the radiation treatment, meaning that doctors calculate the dose mathematically — either by hand or by computer programs," said co-developer Mary Bliss, a chief scientist at PNNL. "Frequently, there is no measurement of the actual dose during radiation treatment."

An incorrect dose can be caused by human error, improper calibration of the radiation-generating machine or equipment failure. Bliss and Richard Craig, a PNNL physicist, have developed a sensor constructed from glass fibers that provides real-time radiation detection, which can be immediately calculated into a dose reading. For more information see PNNL's Web site at **http://www.pnl.gov/news/2003/03-42.htm**.

Scintillating glass optical fibers are the first viable medium for large-area, solid-state, thermal neutron sensors that have applications in national security, medicine and materials research. Here, ultraviolet-induced fluorescence mimics scintillation.

PNNL researcher publishes book on solid oxide fuel cells



Subhash Singhal, a Battelle Fellow at Pacific Northwest National Laboratory, co-edited the first book devoted solely to solid oxide fuel cells published in more than eight years.

The book, *High Temperature Solid Oxide Fuel Cells: Fundamentals, Design and Applications*, provides comprehensive, up-to-date information on the operating principle, materials, cell and stack designs and fabrication processes, cell and stack performance, and applications of SOFCs. It was released in December by Elsevier and co-edited by Kevin Kendall of the University of Birmingham, United Kingdom.

"There are a lot of other publications out there about fuel cells," said Singhal, "but this is the only one currently in print about solid oxide fuels." The book includes individual chapters written by internationally renowned authors in their respective fields. It is intended for use by researchers, engineers and other people working in the technical field of SOFCs.

To purchase the book from Elsevier see **http://www.elsevier.com/inca/publications/store/6/2/2/9/8/9/index.htt**. For information on PNNL's fuel cell research, see **http://www.pnl.gov/energy/fuelcells/fuelcell.stm** and **http://www.pnl.gov/energy/fuelcells/images/pnnl03.htm**.

For more information about these items or about Pacific Northwest National Laboratory, contact:

Ginny Sliman, Editor
Phone: 509-375-4372
Fax: 509-375-6550
E-mail: virginia.sliman@pnl.gov

Pacific Northwest National Laboratory
P.O. Box 999, K1-39, Richland, WA 99352
Toll-free: 1-888-375-PNNL
Web address: http://www.pnl.gov

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