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DOE Pulse
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Livermore to collaborate in new shale oil technologies

DOE's Lawrence Livermore National Laboratory and American Shale Oil, LLC, a subsidiary of IDT Corporation, have entered into a technical cooperation agreement to develop carbon sequestration technologies for in ground shale oil production processes. Specifically, LLNL will partner with AMSO to study how to use depleted underground oil shale retorts to permanently store carbon dioxide generated during the oil shale extraction process. AMSO will provide technical expertise and oil shale core samples from its federal lease site. A retort, in this case, is a refractory chamber, generally cylindrically shaped, within which oil shale is heated as part of a smelting or manufacturing process. Livermore Lab's Susan Carroll is the principal investigator for the project.

[Anne Stark, 925.422.9799, stark8@llnl.gov]

Trio of dwellings provide efficiency testbed

Three houses under construction in East Tennessee will become a model for the nation when it comes to determining energy efficiency. The first house is a typical Energy Star "builder house" with an energy efficiency score of 85 Home Energy Rating System, or HERS. The second unit, called a retrofit house, includes energy-efficient upgrades to the building envelope and mechanical equipment. This house has a HERS rating of 64 (the lower the better). The third unit is a high-performance house with a package of technologies that help push the predicted HERS rating to 30. This house will provide about 55 percent energy savings compared to the builder unit. DOE's Oak Ridge National Laboratory is partnering with builders, suppliers and a utility on the project.

[Ron Walli, 865.576.0226, wallira@ornl.gov]

Improved coating process for solid oxide fuel cell

Researchers at DOE's National Energy Technology Laboratory and West Virginia University have collaborated on the development of manganese-cobalt coatings for solid oxide fuel cell (SOFC) interconnects using an environmentally-friendly electroplating process. Recent results during on-cell testing showed considerable improvement of SOFC degradation with this coating method relative to uncoated interconnects. When compared with other coating methods, electroplating offers significant advantages in ease of operation and cost. The research results have been published in two peer-reviewed journals, and one patent disclosure of the process has been filed.

[Linda Morton, 304.285.4543, Linda.morton@netl.doe.gov]

Shedding light on how much sunshine hits the ground

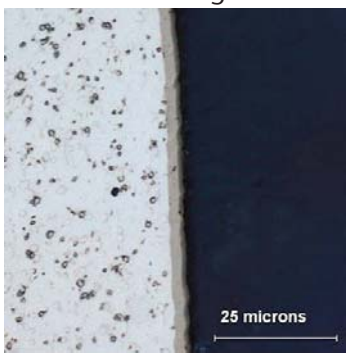
A team of DOE's National Renewable Energy Laboratory and industry engineers has launched a new ground-based instrument network to measure the sunlight hitting the southwestern United States. The first solar station has been installed in Arizona, with several more planned in nearby states.
The stations are part of NREL's Solar Resource and Meteorological Assessment Project. The inaugural station was installed with Iberdrola Renewables, a division of the Spanish energy giant. The improved data will be incorporated into computer models to help determine the most efficient locations for utility-scale solar energy conversion projects such as concentrated solar power plants.

[Joe Verrengia, 303.275.3891, Joe_verrengia@nrel.gov]

DOE Pulse highlights work being done at the Department of Energy's national laboratories. DOE's laboratories house world-class facilities where more than 30,000 scientists and engineers perform cutting-edge research spanning DOE's science, energy, national security and environmental quality missions. ***DOE Pulse*** (www.ornl.gov/news/pulse/) is distributed every two weeks. For more information, please contact Jeff Sherwood (jeff.sherwood@hq.doe.gov, 202-586-5806).

Low-friction nanoscale coating boosts industrial energy efficiency

Friction is the bane of any machine. But if you could manufacture machine parts that had tough, "slippery" surfaces, there'd be less friction, requiring less input energy and the machine would last longer. Researchers at DOE's Ames Laboratory are collaborating with other research labs, universities, and industrial partners to develop just such a nanocoating from an aluminum-magnesium-boride alloy.



BAM coating

Bruce Cook, an Ames Laboratory scientist and co-principal investigator on the four-year, $3 million Office of Energy Efficiency and Renewable Energy-funded project, says that applying such a coating to the blades of a pump rotor that would reduce friction and increase wear resistance could have a significant effect in boosting the efficiency of pumps, which are used in all kinds of industrial and commercial applications. Government calculations show that a modest increase in pump efficiency resulting from use of these nanocoatings could reduce U.S. industrial energy usage by 31 trillion BTUs annually by 2030, or a savings of $179 million a year.

The boron-aluminum-magnesium ceramic alloy was discovered by Cook and fellow Ames Laboratory researcher Alan Russell about eight years ago. Nicknamed BAM, the material exhibited exceptional hardness, and an even lower coefficient of friction than Teflon®.

Cook is working with Eaton Corporation, a leading manufacturer of fluid power equipment, and with Greenleaf Corporation, a leading industrial cutting tool maker, to put a longer lasting coating on cutting tools.

To test the coatings, the project team includes Peter J. Blau and Jun Qu at one of the nation's leading friction and wear research facilities at DOE's Oak Ridge National Laboratory, or ORNL, in Tennessee. Initial tests show a decrease in friction relative to an uncoated surface of at least an order of magnitude with the $AlMgB_{14}$-based coating. In preliminary tests, the coating also appears to outperform other coatings such as diamond-like carbon and TiB_2.

Submitted by DOE's Ames Laboratory

Ph.D. candidate continues to learn at Jefferson Lab


Marija Raskovic

As a high school student in the former Yugoslavia, Marija Raskovic dreamed of becoming an architect. But by the time she graduated in 1992, her country was undergoing rapid political and economic changes.

"My parents couldn't afford to send me on to architecture school," she recalled, "so I sat down and thought 'What am I good at?'"

She decided to study physical chemistry at the University of Belgrade, an institution she chose because of its excellent reputation in the field. After receiving her bachelor's degree, she was hired on as a teaching assistant while working toward her master's.

The economic situation in Serbia had been difficult during this period and hadn't changed by the time she defended her master's thesis in plasma science; so she decided to come to the United States to attend Old Dominion University for her Ph.D.

A student in the newly established ODU Center for Accelerator Science, Raskovic is pursuing a project at DOE's Jefferson Lab that is investigating plasma etching for surface preparation on superconducting radiofrequency cavities.

"Since accelerator performance depends directly on the physical and chemical characteristics of the superconducting radiofrequency cavity surface, the preparation of the cavity walls has been one of the major challenges in SRF accelerator technology. Constant research and development efforts are devoted to developing surface preparation processes that will decrease roughness without introducing impurities, like hydrogen or oxygen, into the niobium surface," she explains.

Raskovic 's project, which spans plasma, atomic and accelerator physics, is the first of its kind at ODU and is supported by the Department of Energy through a grant to the university.

Raskovic enjoys ballroom dancing with her husband, and, in what little spare time she has, she is also an avid crafter.

"I like to see something made by my own hands. It's a good stress reliever."

Submitted by DOE's Jefferson Lab