LLNL's Susana Reyes

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DOE Pulse

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New sorbent material enhances actinide removal

Savannah River National Laboratory researchers, working with personnel from Sandia National Laboratories, have developed a new titanium-based sorbent material, similar in composition to monosodium titantate (MST), which exhibits significantly improved performance for the removal of strontium and actinides (such as plutonium and neptunium) from strongly alkaline and high ionic strength solutions. MST is the baseline material for the removal of Sr-90 and alpha-emitting radionuclides from alkaline waste solutions generated during the processing of irradiated nuclear materials at the Savannah River Site. The plutonium removal efficiency of MST is a dominant factor limiting the operational capacity in two pretreatment facilities, the Actinide Removal Process and the Salt Waste Processing Facility, scheduled to open at SRS in the next few years.

[David Hobbs, 803/725-2854 david.hobbs@srnl.doe.gov]

How strange is the proton?

A new calculation by an international team of theoretical physicists from the University of Adelaide, DOE's Jefferson Lab and the University of Edinburgh predicts that strange quarks boiling up inside the proton display an unanticipated level of symmetry before they simmer back out of existence. The prediction is a consequence of a new, precise calculation of the extent to which the distribution of charge within the proton is carried by strange quarks. Namely, strange quarks contribute less than 1% of the total charge radius of the proton; consequently, strange and anti-strange quarks must distribute themselves rather evenly throughout the proton.

[Kandice Carter, 757/269-7263, kcarter@jlab.org]

Device provides continuous real-time wind turbine data

With increasing interest in alternative energy sources, the Wind Energy Technology group at DOE's Sandia National Laboratories has developed a device that can provide information necessary to understand how well a wind-driven generator is performing. The Accurate Time Linked data Acquisition System (ATLAS II) is capable of sampling a large number of signals to characterize the inflow, operational state, and structural response of a wind turbine. Sandia will begin a project with Texas Tech in August, monitoring a test site near the university campus in Lubbock, and will use the ATLAS II in three planned experiments to monitor blade designs at the Department of Agriculture research station in Bushland, Texas.

[Howard Kercheval, 505/844-7842, hckerch@sandia.gov]

Finding computer data hiding in plain sight

Criminals and terrorists are hiding data within innocent-looking digital images thanks to a number of software programs now on the market. The emerging science of detecting such files—steganalysis—is getting a boost from the Midwest Forensics Resource Center at DOE's Ames Laboratory and a pair of Iowa State University researchers. Steganographic techniques allow users to embed a secret file, or payload, by shifting the color values just slightly to account for the "bits" of data being hidden. The payload files can be almost anything from illegal financial transactions to sleeper cell communications or child pornography. Ames' software performs a quick statistical analysis of the suspect images and flags those that appear to have other data embedded within them.

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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).

Solar technology applied to oil and gas production

The oil industry has a long history of using solar power for the control of oil and gas wells and pipelines, remote telemetry units, lighting and communications. But, DOE's National Renewable Energy Laboratory and the Rocky Mountain Oilfield Testing Center (RMOTC) are taking the use of solar one step further. The two DOE laboratories are conducting experiments using a two-kilowatt photovoltaic (PV) array for the production and delivery of oil.

NREL and RMOTC began talking three years ago about using solar energy at its site in near Casper, Wyoming. Originally established by DOE as a testing alternative for the petroleum industry, RMOTC now offers a wide range of services to industries with testing and evaluation needs.

A solar-direct shipping pump system was selected for testing. The PV array provides electricity to a shipping pump which transfers the pumped oil from an intermediate collection point to a central collection point. When the sun shines, the oil is transferred.

Solar-powered pump station in Wyoming

"Moving oil from shipping tank to shipping tank is a necessary part of a large oil operation and energy is required, so why shouldn't it be solar?" NREL's Byron Stafford said.

The system is designed to ship 30 barrels of oil every day and several different system configurations have been tested. Working in an oil production environment brought its own set of challenges for equipment selection. The motor and pump equipment had to be inverter-rated, explosion proof and compatible with the fluid being shipped. In addition, the motor had to be compatible with commercially available solar-direct motor controllers.

"We're very pleased with the project," Stafford said. "In June, we shipped 286 barrels of product using solar only and the existing grid-connected pump, which is kept as backup, didn't start at all that month."

Future project plans include powering a stripper well at RMOTC with a PV system similar to those used for solar powered water pumps.

Submitted by DOE's National Renewable Energy Laboratory

Susana Reyes: Time for nuclear

Susana Reyes

In an era of global warming, Susana Reyes thinks it's time to go nuclear. On or off the job, Reyes, a nuclear engineer at DOE's Lawrence Livermore National Laboratory, promotes the application of nuclear science and technology and encourages young students to seek careers in nuclear science related fields.

"Soaring oil prices, pollution issues and short supplies all point to why we need alternative methods of energy. The time for nuclear energy has arrived," Reyes says, "but, we need to educate the public and reassure them of the safety aspect."

A native of Spain and a seven-year Lab employee, Reyes received her Ph.D. in industrial engineering from the University of Madrid. She came to LLNL to complete her doctoral research and then accepted a full time position working in the Physics and Advanced Technologies Directorate's Fusion Energy Program.

Reyes' main interest lies in fusion energy. She is currently involved in the ITER project, a joint international research and development project that aims to demonstrate the scientific and technical feasibility of fusion power.

Construction of ITER will soon start at the CEA (French atomic energy commission) site in Cadarache, France. In collaboration with UCLA, and other domestic institutions, she is working research and development activities to design fusion blanket modules to be tested in ITER.

Outside of her daily work activities, Reyes serves as the current chair of the Northern California Section of the American Nuclear Society, a non-profit international, scientific and educational organization committed to supporting nuclear science and technology. She is also active with the Berkeley Edge Program, which encourages underrepresented minority students who are eligible for Ph.D. programs to apply to UC Berkeley.

A resident of San Francisco, Reyes enjoys the city, exercising, doing yoga or volunteering with "Project Sunshine"– a nonprofit organization founded by some of her San Francisco colleagues that assists terminally ill and disabled children in the Bay Area.

Submitted by DOE's Lawrence Livermore National Laboratory