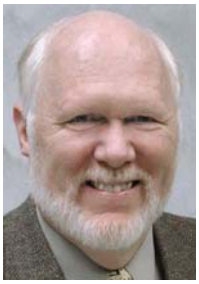


NETL's Woodruff

Page 2

Research Highlights . . .

DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

Number 151 February 8, 2004

Two new elements, 113 and 115

Scientists at DOE'S Lawrence Livermore National Laboratory, in collaboration with researchers from the Joint Institute for Nuclear Research (JINR) in Russia, have discovered the two newest super-heavy elements, element 113 and element 115. In experiments conducted at the JINR U400 cyclotron last summer, the scientists observed atomic decay patterns, or chains, that confirm the existence of element 115 and element 113. In these decay chains, element 113 is produced via the alpha decay of element 115. The experiments produced four atoms each of the two elements through the fusion reaction of calcium-48 nuclei impinging on an amercium-243 target. The results were published in the Feb. 2, 2004, issue of *Physical Review C.*

[Anne Stark, 925-422-9799; stark8@llnl.gov]

JASPER shot hits bulls-eye

On January 13, nuclear weapons researchers at DOE's Lawrence Livermore National Laboratory fired the fourth successful plutonium shot at JASPER (Joint Actinide Shock Physics Experimental Research), a nearly 100-foot, two-stage gas gun at the Nevada Test Site. Inside the gun's first stage, hot gases from a burning propellant drive a heavy piston down a pump tube, compressing the gas. That gas builds up to extremely high pressures, breaks a valve and enters the narrower barrel of the second stage, propelling the projectile—which is housed in the barrel—towards the target. JASPER can fire small projectiles at up to five miles per second,or more than 24 times the speed of sound. Results from the shot help scientists understand how shocked plutonium behaves at extreme temperatures and pressures.

[David Schwoegler, 925/422-6900; newsguy@llnl.gov]

NREL partners on 'New American Home'

Researchers from DOE's National Renewable Energy Laboratory collaborated with government and industry partners on the New American Home displayed at the International Builders Show in January. The home was designed to reach a Home Energy Rating System score of 90, a score well above the minimum Energy Star rating requirement of 86 and a significant step toward DOE's long-term goal of reducing overall residential energy use by 70 percent. The home integrates several high-performance energy systems, including exterior walls built of insulated concrete forms, windows that limit solar heat gain and a roof system built with structural insulated panels.

[Sarah Barba, 303/275-3023; sarah_barba@nrel.gov]

Tough earthly microbes may mirror Martian cousins

Techniques to find microbial life in the depths of our planet may be useful for determining whether there is life on Mars. That's the idea behind a NASA project that taps the expertise of researchers at DOE's Oak Ridge National Laboratory and the nearby University of Tennessee. The scientists, part of the 18-member team from eight research institutions, have found evidence of microbial life from South African gold mine samples, which were up to 100 million years old at depths up to three kilometers. Because of the extreme conditions and the complexity involved in such an endeavor, researchers must develop new methods, such as how to identify specific genes critical to survival of microbes .

[Ron Walli, 865/576-0226; wallira@ornl.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).

New Los Alamos facility strengthens DOE's radioisotope team

Scientists at DOE's Los Alamos National Laboratory in New Mexico recently commissioned the nation's newest radioisotope production facility. In doing so, Los Alamos strengthened the ranks of the other DOE radioisotope production facilities at Brookhaven National Laboratory, Idaho National Engineering and Environmental Laboratory, and Oak Ridge National Laboratory.

Radioisotopes are produced by bombarding elemental materials with neutrons or protons and then chemically extracting the resulting isotopes. Some radioisotopes are produced in accelerators where subatomic, positively charged protons are accelerated and used to irradiate target materials. Radioisotopes requiring a neutron source are made in reactors because neutrons have no electric charge and cannot be accelerated using magnetic fields.

Chemistry division employee Louie Salazar operates the hot cell manipulators in the new Isotope Production Facility at the Los Alamos Neutron Science Center.

Los Alamos was an early pioneer in the production of radioisotopes, but had shut down its target source activities, but not its isotope chemistry capability, nearly a decade ago and had since relied on accelerators at Brookhaven and in Russia and South Africa for irradiated target materials.

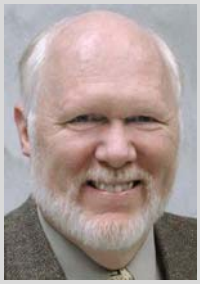
Located at the Los Alamos Neutron Science Center (LANSCE), the $23 million state-of-the-art Los Alamos Isotope Production Facility houses the equipment needed to direct a portion of LANSCE's proton beam from the existing accelerator at the 100 million electron volt range to a target station designed exclusively for the production of isotopes.

The new facility, built over the last five years without a single lost construction workday, will greatly enhance the security of the supply of rare and short-lived medical isotopes in the United States. The facility will be able to produce more than 30 different types of isotopes and, unlike the old facility, has the flexibility to insert and retrieve targets while the accelerator beam continues to operate.

LANSCE delivered its first proton beam to the facility on December 23, 2003 and the facility is expected to be in full production later this year.

Submitted by DOE's Los Alamos National Laboratory

Steve Woodruff: from laser optics to opera



Woodruff

TV advertisements often show an opera singer reaching a note that shatters a glass. While Steven Woodruff never used his singing voice to duplicate that feat, he has been instrumental in developing novel applications for lasers, including cutting glassware.

Steve has led a team of researchers from DOE's National Energy Technology Laboratory and West Virginia University in developing a carbon dioxide laser that cuts waste from glassware while leaving a finished, smooth edge. The process lowers costs, saves time, and improves worker safety by eliminating the manual steps of breaking off the waste and polishing the glassware.

Steve has spent the past 20 years singing with the WVU Choral Union in appearances with Wheeling, Charleston, and Washington, D.C., symphonies performing choral works such as "Beethoven's Ninth," the "Messiah," and Verdi's "Requiem." He also played an uncle in "Madam Butterfly" with the Pittsburgh Opera.

"The last time I did Beethoven's Ninth, I could finally do it by memory," Steve recounted.

Steve has concluded the glass-cutting project for now but wants to pursue two related projects in the future: developing a new cutting head for glass and demonstrating the CO2 laser on wood. He said the laser could cut a 2 by 4 to within 10/1000th of an inch using 25 horsepower rather than the 200 horsepower of a conventional mill saw motor, thereby saving energy, reducing worker risk, cutting costs, and eliminating sawdust landfilling.

Steve has spent much of his recent time developing other laser applications, such as a laser-spark ignition system to improve reciprocating engine performance and a miniature slab laser with a new optical configuration for sensor development. NETL plans to pursue a patent on the former application and is filing a patent application for the latter.

Submitted by DOE's National Energy Technology Laboratory