news & trends

Reform of DOE National Lab management proposed


(Credit: DOE)

Moniz

The Department of Energy's network of 17 national laboratories and five related facilities has been responsible for a multitude of innovations in materials science and other fields since World War II. Now Washington think tanks, Congressional leaders, and the new Secretary of Energy are looking at how possible reforms to the structure and management of the labs could bring them into the 21st century and facilitate transfer of lab-developed technologies to industry to boost the US economy.

A joint report from three ideologically disparate think tanks—the Information Technology and Innovation Foundation, the Heritage Foundation, and the Center for American Progress—got the reform ball rolling in June. Ernest Moniz, a nuclear physicist who became energy secretary in May, drafted a letter in response to a query from the US House of Representatives' Energy Subcommittee expressing his willingness to consider reforms, and the subcommittee recently held a hearing on the possible reform.

The report, entitled *Turning the Page: Reimagining the National Labs in the 21st Century Innovation Economy*, makes several recommendations on how the lab network could be improved to address changing scientific and technological challenges and promote closer ties to industry to move technologies from the basic research to the industrial implementation phase.

The national laboratories manage more than $10 billion of scientific and national security activities, according to the report, which says, "… As the nature of technology and the needs of the nation have evolved, the lab management and stewardship model has failed to keep pace. This report proposes a series of pragmatic nonpartisan policy reforms needed to ensure the labs remain effective and continue to deliver national benefits to the taxpayers.

"The working group's policy reforms described herein have three main goals: Increasing the effectiveness of each dollar spent on research to get the greatest benefit to taxpayers; ensuring that labs are well positioned to leverage private-sector investment in serving the national interest; and making lab research more nimble, relevant, and accessible to public and private interests."

More timely and efficient transfer of lab-developed technologies to the market is one of the key drivers of the reform movement. The report also suggests allowing labs to charge the market rate, rather than cost recovery, for services; merging the existing Offices of Science, Energy Efficiency and Renewable Energy, Fossil Energy, and Nuclear into a new Office of Science and Technology, which would coordinate all research functions; eliminating top-down overhead accounting rules; expanding DOE's Agreements for Commercializing Technology program; creating a high-level task force that would be aimed at giving the labs greater authority to manage themselves; and developing better technology-transfer metrics. ■

New Brazilian glass research center

New funding from the São Paulo State Research Foundation (FAPESP) recently established the Center for Glass Research, Technology, and Education in Vitreous Materials (CeRTEV) an 11-year, approximately $22 million (USD) collaborative effort involving 14 faculty at two universities located in São Carlos plus two more faculty who are education and outreach specialists. CeRTEV will be led by Edgar Zanotto, professor at the Federal University of São Carlos and the ACerS GOMD 2012 Morey Award lecturer.

Zanotto

The funding agency, FAPESP, awarded 17 new research centers for support for 11 years each after conducting a two-year competition that began with a field of 90 proposals. Funding for CeRTEV will be about $2 million per year for five years, after which the FAPESP will evaluate the program before authorizing funding for the next six years.

"We had this strategy of getting 14 researchers from two universities which were based in the same town. The whole strategy was to facilitate interaction throughout the 11 years," Zanotto says. Seven professors each from the Federal University of São Carlos and the University of São Paulo–São Carlos campus are collaborating. The two campuses are only four kilometers apart, and the center will bring together an interdisciplinary team that includes experts in vitreous materials like Zanotto, but also physicists and chemists who specialize in characterization techniques, such as nuclear magnetic resonance, Raman spectroscopy, and extended X-ray absorption fine structure spectroscopy.

Like the other 16 new centers, CeRTEV focuses on research to support Brazilian industries and education and outreach. The research component will

involve a systematic search for new glass and glass-ceramic compositions with specified properties, such as bioactivity, biocompatibility, high mechanical strength, or desired electrical properties.

"The main idea of the research part is to develop the genome of different glasses, from the recognized structure to special thermal treatments, which may or may not crystallize these materials, and then to develop microstructures to achieve certain properties for applications," Zanotto says.

The group targeted five application areas for initial development: bioactive materials, dental materials, armor, optical materials, and catalysts for certain processes. However, Zanotto says, "We are not really attached to these five areas. We are going to start with these five areas, but we may add some more during the next few years."

The education and outreach component of the project lends itself naturally to international exchanges. Zanotto envisions international exchanges similar to the IMI-NFG program at Lehigh University and Pennsylvania State University as a critical outreach activity. However, he also expects CeRTEV to expand beyond traditional approaches to education to build more outreach channels.

"We have to go further than the traditional education we do at the university," he says, "for example, through websites, online courses, special short courses for undergrads, post grads, and also high schools."

Considering the size of the award in terms of funding as well as time, CeRTEV is likely one of the largest and longest timeframe research efforts dedicated to glass science. Its impact will unfold over time, but it is likely to have a dominant influence on glass research globally for more than a decade. ■

USGS, DOE ramp up search for domestic RE sources

When it comes to mining rare-earth minerals, there is no "low-hanging" fruit. Their name, "rare earths," belies the truth—they are not so much rare as they are difficult to get at.

According to a United States Geological Survey fact sheet from 2002, "abundant" REs, such as lanthanum and cerium, are as plentiful in the Earth's crust as industrial metals such as chromium, nickel, copper, zinc, molybdenum, tin, tungsten, and lead. The fact sheet notes that the two least abundant of the RE elements—thulium and lutetium—are almost 200 times more common than gold. (Strictly speaking, REs comprise the 15 elements in the lanthanide series of the periodic table. However, scandium and yttrium are generally included in the RE category because they tend to be found in the same deposits and have some similar chemical properties.)

The problem is that REs tend not to concentrate in easy-to-mine deposits. The vast majority of RE ores come from China, but political and economic factors, combined with escalating demand, have led to supply and cost instability. Non-Chinese sources include a large deposit of neodymium discovered in Brazil in 2012, and, in the United States, Molycorp reactivated its Mountain Pass mining and ore processing operation.

In an effort to expand sources of REs, USGS and the US Department of Energy have made RE recovery and recycling research priorities. They are devoting increasing research resources to the search for alternatives to RE components based on non-RE compositions. And, in a new twist, USGS is investigating the possibility of recovering REs from the mine tailings from abandoned gold, silver, and copper mines.

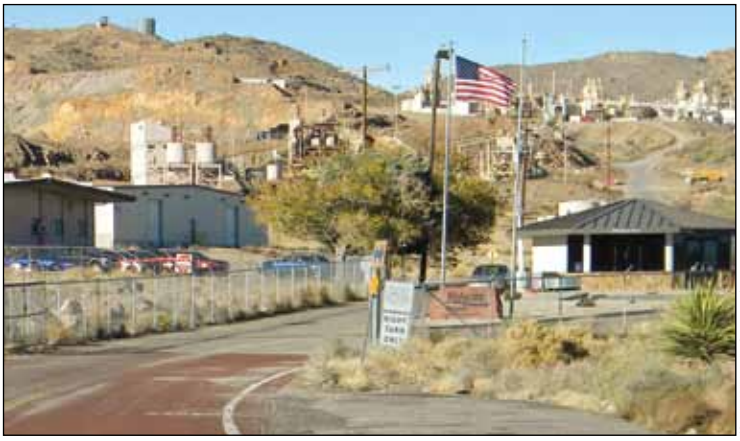
The USGS Central Mineral and Environmental Resources Science Center (Denver, Colo.) is working with scientists at the University of Nevada–Reno and the Colorado School of Mines to evaluate abandoned mine tailings. The USGS team uses laser ablation combined with plasma mass spectrometry to analyze rock chemistries.

The laser ablation approach determines rock chemistry directly and avoids time-consuming or acid-based extraction methods.

However, even if mine tailings prove to have significant RE content, that still leaves the problem of extracting the metals—and extraction and refining are key to the economic viability of any process, whether from ore, like Molycorp's Mountain Pass, or recycling.

Meanwhile, RE deposits have been discovered in the Bokan Mountain region of Alaska where uranium used to be mined. The discovery is significant because of the unusual abundance of heavier REs, which are not only harder to find but more useful for technology. USGS geologists hope their studies of the geology of Bokan Mountain will teach them what to look for when hunting for other potential RE deposits.

Besides finding more naturally occurring RE sources, DOE's newly established Critical Materials Institute in



(Credit: Wikimedia Commons)

The economic viability of Molycorp's recently reopened Mountain Pass facility will depend on finding new and more efficient ways to extract and refine REs.