NREL's Kazmerski makes a brighter future. Page 2

DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

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Research Highlights . . .

Argonne process creates new generation of superconducting materials

Scientists at DOE's Argonne National Laboratory are developing a new generation of superconducting materials by precisely controlling their microstructures. Argonne scientists are tailoring the size and pattern of the superconducting lattice so that each pin site interacts strongly with only one or a few flux lines, allowing greater control of the critical current. The new materials can be used to make improved and more affordable amplifiers, switches, and logic circuits. Argonne researchers are developing a new process, called "laser interferometric lithography," from which the pattern can be transferred as a lattice of holes to a superconducting film.

[Catherine Foster, 630/252-5580, cfoster@anl.gov]

First Sign of CP Violation in B's

On February 5, the CDF collaboration at DOE's Fermilab announced "tantalizing," though not "ironclad," evidence of CP violation in neutral B mesons. CP violation, the slight asymmetry in the behavior of matter and antimatter, could explain the preponderance of matter and the scarcity of antimatter in the universe. The phenomenon was first observed 35 years ago in particles called neutral K mesons, or kaons, but has not been observed in any other particle until now. Scientists at Fermilab, as well as at recently constructed "B factories," are hoping to learn whether the Standard Model account of CP violation is correct, or whether there are still deeper truths that explain our material world.

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IBM grant aids cluster-computing collaboration

Cluster-computing research at DOE's Ames Laboratory is benefiting from an IBM grant that provides $665,000 worth of state-of-the-art computers to its research collaborators at Iowa State University. The Shared University Research grant allows computer scientists at Ames' Scalable Computing Lab to further their work on "computer clusters"—networked groups of high-performance workstations that operate at speeds comparable to today's best parallel computers at a fraction of the cost. The SCL is home to the 15 dual-processor IBM Power3 computers supplied by the grant. The Power3 systems will be used to determine the best methods of communication between computers in a cluster, and for applications in theoretical chemistry and physics.

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New way to treat mercury waste

Scientists at DOE's Brookhaven National Laboratory have developed a process for treating mercury-contaminated wastes, even those also contaminated with radioactivity. The conventional treatment for such wastes creates a secondary waste problem. But Brookhaven's process generates virtually no waste because it chemically bonds to a sulfur-polymer cement, preventing the mercury from leaching into the soil. The team, led by Paul Kalb, recently demonstrated the process on radioactivity- and mercury-contaminated soils for industry and government officials. Now, they plan to transfer this technology to the commercial/industrial sector. DOE's Mixed Waste Focus Area and BNL's Office of Environmental Restoration sponsored development of the process.

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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).

Gel promises safe, effective decontamination

A research team at DOE's Lawrence Livermore National Laboratory has developed an oxidizing gel that will safely and effectively decontaminate both biological and chemical releases in civilian settings, according to project leader Ellen Raber.

Livermore's work is part of a larger, DOE-sponsored project on biological weapons (BW) and chemical weapons (CW) decontamination, and is being done in conjunction with research at Los Alamos and Sandia laboratories.

Raber said the gel, whose active ingredient is peroxymonosulfate, was more effective in laboratory tests than methods currently in use, is more environmentally acceptable than existing methods and is flexible for use in different scenarios.

Ellen Raber

"Preliminary experiments with our peroxymonosulfate gel," says Raber, deputy department head of environmental protection at Livermore, "showed that it was 100 percent effective under laboratory conditions for all BW and CW simulants on all surfaces, except for the VX simulant on carpet, which was only 95 percent effective."

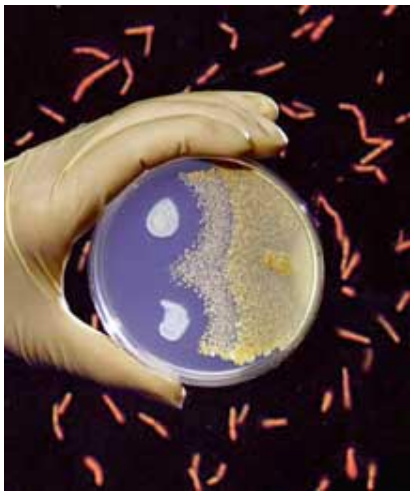
Now, the U.S. Army is testing the gel on actual chemical warfare agents. Before the gel is ready for use, additional tests will be done on live vaccine strains, and spraying systems will be evaluated and developed. The team is also actively studying the level of cleanup needed for civilian settings.

Livermore's testing was done using non-toxic simulants for such biological and chemical agents as anthrax, plague, variola, sulfur mustard, sarin and VX.

DOE started the project two-and-a-half years ago to develop a decontamination system that would be effective against both biological and chemical weapons in three possible scenarios: an open setting such as a stadium; a semi-enclosed facility, such as a subway or a shopping mall; and a closed area, such as an office or home.

The Livermore team tried a number of different oxidants, but peroxymonosulfate worked the best for both chemical and biological agents in the simulant tests.

Submitted by DOE's Lawrence Livermore National Laboratory



Two drops of gel were placed in the Petri dish, killing surrounding spores of B. globiggi, a simulant for anthrax used to test the effectiveness of the oxidizing gel.

Making the Future Brighter

The energy crisis of the 1970s focused national attention on renewable energy, and with it came federally sponsored solar research. As one of the first scientists at DOE's Solar Energy Research Institute (now the National Renewable Energy Laboratory, or NREL), Larry Kazmerski set the pace for 22 years of cutting-edge photovoltaics research.

Over the years he has served as senior scientist, principal scientist, branch manager, center director and division manager. In response to his shining career, he was selected last December to lead the National Center for Photovoltaics (NCPV).

"This is a very exciting time for photovoltaics. The technology is evolving and we're seeing record performance levels," Kazmerski said. "With renewed emphasis on research and development, the NCPV can help the U.S. photovoltaics industry meet the growing demand for current and next generation technologies."

DOE created the NCPV in 1996 to provide a focal point for photovoltaics research, deployment and outreach in the U.S. Based at NREL, the center unites scientists and state-of-the-art research facilities at Sandia National Laboratories and NREL with university and industry research partners across the country.

"Our goal is to help the nation's photovoltaics industry lower the cost and improve the performance and reliability of its products," Kazmerski said. "Photovoltaics has the potential to become the power of choice, and we are here to help make that happen."

What does he remember most about the early days?

"The early days of the lab were very exciting because everything was new, the promise was great and the opportunities seemed endless," Kazmerski said. "The staff was young, motivated and enthusiastic. Our current staff is much more sophisticated and knows a lot more about our technologies. The motivation to do good work has not subsided."

Kazmerski holds a Ph.D. from Notre Dame University. Before coming to NREL, he taught solid-state electronics at the University of Maine. For more information on the NCPV, visit its Web site at http://www.nrel.gov/ncpv.

Submitted by DOE's National Renewable Energy Laboratory