NREL's John Thornton and friend

Page 2

Research Highlights . . .

DOE Pulse

Science and Technology Highlights from the DOE National Laboratories

Number 134 June 9, 2003

Mantle-plume debate heats up

In a recent profile in Science magazine, geochemist Don DePaolo and geodynamicist Michael Manga of DOE's Lawrence Berkeley National Laboratory argue that the mantle-plume model of hotspots is alive and well, despite the current outbreak of seismological "plume bashing." Seismologists who have been unable to obtain clear images of melted rock rising from deep underneath hotspots like Yellowstone and Iceland argue for alternative explanations, but DePaolo and Manga reply that chemical and physical evidence for mantle plumes is strong. Indeed, new seismic tomography techniques clearly show that some plumes, like the one under Hawaii, start as far down as the core-mantle boundary.

[Paul Preuss, 510/486-6249; paul_preuss@lbl.gov]

Enzyme could overcome industrial bleaching waste problems

Taken from a microbe that thrives in the depths of a Yellowstone National Park hot springs pool, a newly discovered enzyme could lead to an environmentally benign treatment for hydrogen peroxide bleaching wastewater. Chemical engineer Vicki Thompson and biologist William Apel at Idaho National Engineering and Environmental Laboratory discovered that an enzyme from a Thermus brockianus microbe flourishes in the high temperature and high pH (base or alkaline) wastewater from hydrogen peroxide bleaching. The T. brockianus enzyme converted hydrogen peroxide into simple water and oxygen for up to 360 hours under these conditions compared to a paltry 15 to 20 minutes for other, commercially available catalases.

[Reuel Smith, 208/526-3733; mrs@inel.gov]

X-ray visions of Andromeda

Based on data from the X-ray Multi-Mirror Newton satellite observatory, an international research team lead by scientists from DOE's Los Alamos National Laboratory has completed one of the most sensitive X-ray surveys of our neighboring Andromeda galaxy. The survey uncovered hundreds of previously unknown X-ray sources and is providing new insights into the nature of the interstellar medium in the spiral arms of our own Milky Way galaxy, as well as that of Andromeda. One of the most interesting discoveries was that of an accreting X-ray pulsar, a strongly magnetized neutron star that is drawing material from its neighbor star.

[Nancy Ambrosiano, 505/667-0471; nwa@lanl.gov]

Berkeley scientists create first insulated nanowires

Berkeley Lab scientists have created insulated electrical wires that are about 100,000 times more narrow in diameter than a human hair. These ultra high-strength insulated wires are single-walled carbon nanotubes encased within an outer sheath of boron nitride nanotubes.

"The ability to insulate nanowires opens up new possibilities for nanoelectronics," says Alex Zettl, a physicist with Berkeley Lab's Materials Sciences Division who lead the research. "Insulation keeps different wires from shorting to each other or to nearby conductors, and will allow the wires to serve as the basis of coaxial cables or a simple gating configuration for the production of electronic devices such as transistors."

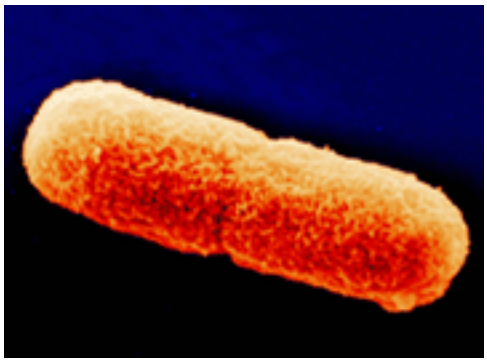
[Lynn Yarris 510/486-5375 lcyarris@lbl.gov]

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).

Extreme microbe study under way

DOE's Joint Genome Institute (JGI) and the Diversa Corporation have announced a collaboration in which they will identify and sequence the genomes of microbes that can thrive under extreme conditions of heat, cold, pressure and radiation. Diversa will use its proprietary technologies to extract DNA from environmental samples and create gene libraries, while JGI will perform the DNA sequencing. All DNA sequence data from the collaboration will be provided to Diversa and deposited in GenBank within six months of the completion of sequencing to allow public access by scientists around the world.

The microbial world is the next genomic frontier," said JGI Director Eddy Rubin in announcing the collaboration. "We believe the scientific, environmental and commercial benefits from this project will be considerable and we're pleased to be working with Diversa."



The microbial world is the next genomic frontier.

Said Jay M. Short, president and CEO of Diversa, a leader in developing novel commercial products from genes and gene pathways, "There are more genes in a handful of soil than in the entire human genome. We believe that our collaboration with JGI will contribute greatly to our understanding and utilization of microbial genes."

Microbes are the oldest form of life on Earth and inhabit a wide range of environments including those hostile to most other life forms. By studying microbial DNA, scientists hope to find ways to use this rich genomic resource to develop new pharmaceutical and agricultural products, energy sources, industrial processes, and solutions to a variety of environmental problems. JGI and Diversa plan to sequence DNA from microbes living in deep-sea thermal vents, insect endosymbionts, soil from nuclear weapons manufacturing sites, and water collected by rainforest epiphytes.

JGI is a collaboration between three DOE national laboratories: Lawrence Berkeley, Lawrence Livermore and Los Alamos. Funding comes predominantly from the Office of Biological and Environmental Research in DOE's Office of Science.

Submitted by DOE's Berkeley Lab

They call him Mr. PV

John Thornton and friend

Since 1963, John Thornton has spent most of his career showing people how to get electricity from sunshine. A principal engineer for the National Center for Photovoltaics (NCPV) at the National Renewable Energy Laboratory (NREL) in Golden, Colorado, Thornton serves as project leader for Domestic Photovoltaic Applications Development.

Thornton's personal and professional mission is to provide a link between the Laboratory's research on photovoltaics and applications for the solar-electric modules in the "real" world.

With help from his development team, Thornton provides technical assistance and information to the public, industry and government agencies. His nearly constant outreach on behalf of photovoltaics has earned him the nickname Mr. PV.

"In the mid-90's I was supporting the Arizona Public Service Utility Company. I knew the chair and he called me up on the stand as a witness as "Mr. PV," and it's been my alias ever since," Thornton said.

In recent years, Thornton has lent his expertise to the U.S. Department of Energy's Solar Decathlon, a solar home design and construction competition for college students; Solar Independence, an American flag (the blue field is solar panels) that was displayed at the Museum of Science and Industry in Chicago; the Solar in the Jungle Project, for which he brought PV electricity to a remote orangutan research station in Borneo; and the Pageant of Peace in Washington, D.C., which used a PV array to power the national Christmas tree.

To provide a more secure energy future, Thornton would like to see the use of renewable energy technologies grow significantly. That's why he relishes his role as a solar energy ambassador. Public understanding and education about the progress in making photovoltaics more affordable, efficient and reliable is crucial to growth of the industry, Thornton believes.

Submitted by DOE's National Renewable Energy Laboratory