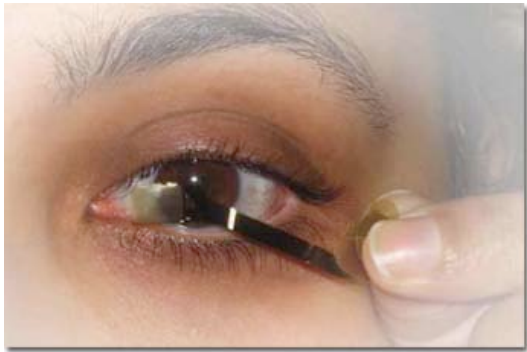


# LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: July 27-Aug. 3, 2009.

## Lab team sets sight on new artificial retina



**A fabricated 200-plus thin-film microelectrode array.**

Laboratory researchers are now developing the implantable system for a third-generation artificial retina as part of a U.S. Department of Energy (DOE) project to produce an "retinal prosthesis" that could restore vision to millions of people suffering from eye diseases.

The DOE artificial retina project brings together five national labs, four universities and a private company, and Lawrence Livermore is now serving as the lead organization for technical work on the project.

Researchers at the Lab are today using advanced polymer-based micro-fabrication methods to further develop a biocompatible microelectrode array for the third-generation artificial retina device.

The LLNL team contributes three major components to the artificial retina: the thin-film electrode array that contains the neural electrodes; the biocompatible electronics package that contains the electronics for stimulating the retina and wireless power and communications; and an ocular surgical tool that will enable the replacement of the thin-film electrode array. In addition, Lawrence Livermore is responsible for the system integration and assembly of the complete implantable artificial retina system.

To read more, go to [https://newsline.llnl.gov/\\_rev02/articles/2009/jul/07.31.09-retina.php](https://newsline.llnl.gov/_rev02/articles/2009/jul/07.31.09-retina.php)

## **Scientific American captures new CO2 separation technique**



As Congress debates ways to encourage coal-fired power plants to capture carbon dioxide emissions and store it underground, scientists are racing to find cleaner and more efficient ways of collecting the greenhouse gas.

And Livermore physicist Amitesh Maiti is on his way to doing that with the use of ionic liquids -- a special type of molten salt that becomes liquid under the boiling point of water (100 degrees Celsius).

Currently, the few coal plants with commercial CO2 capture capability use processes based on chemical absorption with a general-purpose solvent developed by chemists some 75 years ago. Unfortunately, it is non-selective, corrosive, requires the use of large equipment, and effective only under low to moderate partial pressures of CO2.

But the new system overcomes many of these shortcomings. Chemists recently became interested in ionic liquids because they are solvents with almost no vapor pressure, and do not evaporate, even under high temperature conditions.

"With ionic liquids serving as the solvent, the process could be a lot cleaner and more accessible than what is used today," Amitesh Maiti said.

To read more, go to <http://www.scientificamerican.com/article.cfm?id=carbon-dioxide-capture-coal-plants-ionic-liquids>

## CAMS is an indispensable part of Lab



The Lab's Center for Mass Spectrometry (CAMS) has played a pivotal role in criminal investigations, human health studies, graduate education and investigations of climate change and air quality.

This year, the center celebrates its 20th birthday and *The Independent* was there to cover it.

An accelerator mass spectrometer identifies and measures the concentration of unprecedentedly small amounts of rare ingredients, most notably the invaluable biological marker carbon-14.

It helped the FBI solve the 2001 case of deadly anthrax samples sent through the U.S. mail; showed that our brain cells have been with us from infancy. It also demonstrated that the Amazon Basin is less effective at storing climate-warming carbon dioxide than had been hoped.

To read more, go to <http://www.independentnews.com/fullstory.php?newsid=467>

## **SF Business Times taps into energy use**



Americans used less energy overall in 2008, according to a Livermore Lab report, and more of that energy came from renewable sources.

The report from the Laboratory says the United States used 99.2 quadrillion BTUs, or "quads" of energy in 2008, down from 101.5 quads in 2007.

Use of energy in the transport and industrial sectors of the economy fell slightly, while residential and business usage climbed slightly.

Usage of "green" or renewable sources grew, with the largest chunk of that coming from hydroelectric generation. Hydroelectric sources made up 34 percent of renewable energy generated in the United States last year.

To read more, go to

<http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2009/07/27/daily11.html>

## **Latest *Newsline* available**



*Newsline* provides the latest Lab research and operations news. See the most recent issue at <https://newsline.llnl.gov>

## Photo of the week



**Into the inferno:** Workers finish the installation of the Dante precision diagnostic at the National Ignition Facility's target chamber. The Dante soft X-ray power diagnostic is used to characterize the X-rays generated by the National Ignition Campaign (NIC) experiments to help scientists understand how well the experiments perform.

---

LLNL is managed by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy's National Nuclear Security Administration.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the Livermore Lab Report, send e-mail <mailto:labreport@llnl.gov>.

The Livermore Lab Report archive is available at:  
[https://publicaffairs.llnl.gov/news/lab\\_report/2009index.html](https://publicaffairs.llnl.gov/news/lab_report/2009index.html)