LAWRENCE LIVERMORE
REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: April 25-May 3, 2010

It's like the Wright Brothers

Inside the NIF target chamber.

Similar to the Wright Brothers first flight, LLNL's National Ignition Facility is on the brink of another making history: creating a star on Earth.

NIF will begin fusion experiments in late summer and when fusion occurs, the world's largest laser (NIF) may just help solve the world's energy woes. The plan is to set off a nuclear reaction so intense that it will make a star bloom on the surface of the Earth. If the scientists are successful, they hope to solve the global energy crisis by harnessing the energy generated by the mini-star.

"We have a very high confidence that we will be able to ignite the target within the next two years," thus proving that controlled fusion is possible, said Bruno Van Wonterghem, a NIF manager. That would put the Lab a step closer to "our big dream," he said, which is "to solve the energy problems of the world."

To read more, go to
http://www.cnn.com/2010/TECH/science/04/28/laser.fusion.nif/index.html?hpt=C1

Diamond in the clear

Time-integrated photograph of an OMEGA laser shot to measure high-pressure diamond strength. Photo credit: Eugene Kowaluk, LLE

As one of the hardest materials on Earth, diamond has long been used to put the squeeze on other materials. Using the OMEGA laser at the University of Rochester, LLNL researchers have learned that diamond can support almost a million atmospheres of pressure without warping.

The LLNL research shows that under dynamic conditions, diamond acts like a brittle material instead of deforming like a metal would. In a series of experiments, Lab researchers fired laser pulses at diamond targets and found they behaved very differently than expected.

The research provides insight into the understanding of diamond.

For more, read http://www.photonicsspectra-digital.com/pp/photonicsspectra201004-3afdbd66e7-pp.pdf?lm=1270264656000

This is no Six Million Dollar Man

Artificial retina team member Terri Delima holds a thin-film artificial retina array in the LLNL cleanroom.

To some it may seem like a bionic eye similar to what the character Steve Austin had in the Six Million Dollar Man. But to the millions of people suffering from eye diseases such as retinitis pigmentosa, macular degeneration or those who are legally blind due to the loss of photoreceptor function, the artificial retina could be a sight for sore eyes.

Scientists and engineers at Lawrence Livermore are developing the electronics for a third-generation artificial retina as part of the U.S. Department of Energy (DOE) project to produce an "epiretinal prosthesis" that could restore vision to millions of people around the world suffering from eye diseases.

Early, lower-resolution versions of the device allow people blinded for decades by the genetic eye disease retinitis pigmentosa or by age-related macular degeneration to see images.

To read more, go to
http://sanfrancisco.bizjournals.com/sanfrancisco/stories/2010/04/05/story1.html

She had a dream

When Megan Bennett was looking for a good doctoral program, she picked the the University of Nevada, Las Vegas after hearing about a presentation on radiochemistry.

She applied, was accepted and spent a couple of years doing science and writing papers and then last year as an LLNL postdoc, she, was invited to participate in a project taking place in Russia that aimed to create an entirely new radioactive material that does not exist anywhere on the planet.

She ended up as one of more than a couple dozen authors of a paper on the creation of what's being called element 117. "I went to college to be a chemist," Bennett said. "You always think, 'Wouldn't it be cool to put a new block on the periodic table?"

And that's exactly what she helped do.

To read more, go to http://www.lvrj.com/news/unlv-chemist-helps-author-paper-on-creation-of-new-element-92075154.html

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Photo of the week

Itsy bitsy, teeny weeny: Just a few millimeters long, NIF targets are complicated, precision assemblies, often requiring novel material structures. Components have to be machined to an accuracy of within one micrometer, or one millionth of a meter. Some joints can be no larger than 100 nanometers, which is just 1,1000th of a human hair's width.

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.

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