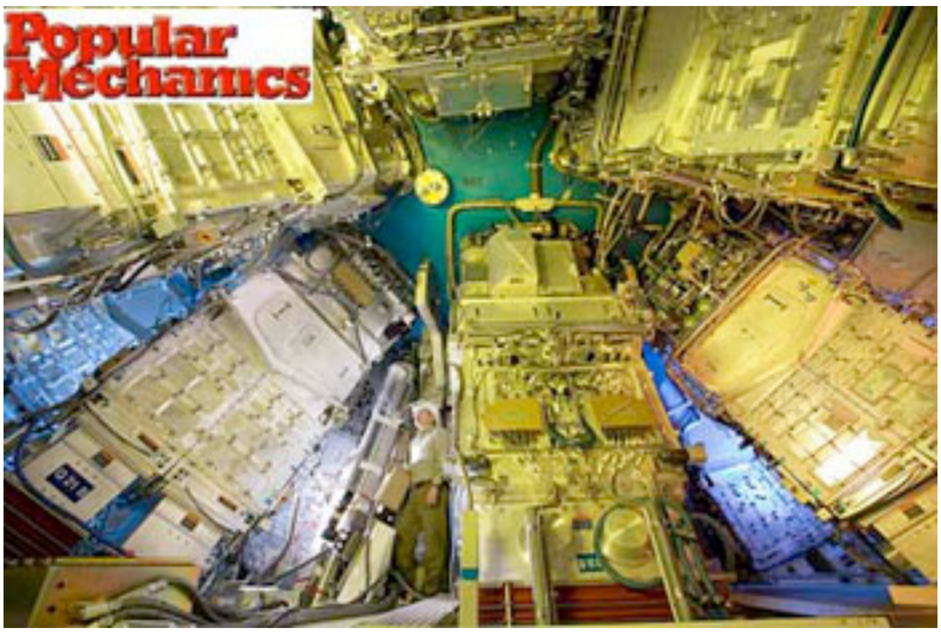
LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: June 29-July 6, 2009.

NIF one of six best ideas for energy future



The target chamber at the National Ignition Facility.

The idea of fusion power has been reawakened with the goal of being the ultimate clean-energy technology.

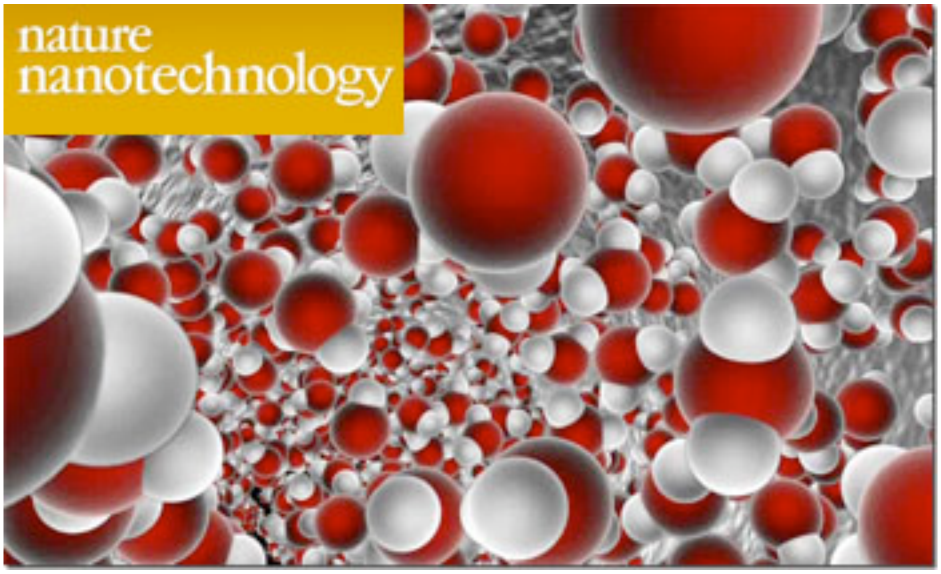
Next year, the array of 192 lasers that form the heart of the National Ignition Facility (NIF) at Lawrence Livermore will begin firing at a tiny hydrogen target, creating fusion energy.

NIF Director Ed Moses hopes that within a few years, the machine will release 20 times more energy than it consumes. "If this works, over the next couple of decades we can change the geopolitical story," he says.

Popular Mechanics recently named NIF as one of six best ideas for creating energy of the future.

To read more, go to http://www.popularmechanics.com/science/earth/4322757.html

Proteins make for finer filters



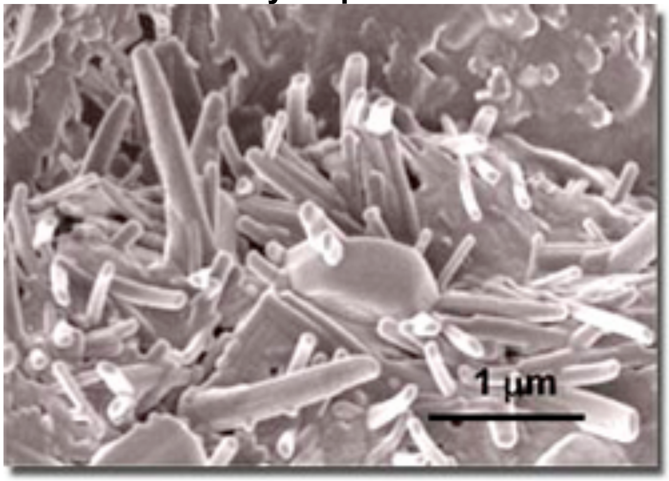
Lab scientists Olgica Bakajin and Aleksandr Noy authored a news article in *Nature Nanotechnology* that delves into using protein-based membranes for water transport.

Membrane interfaces are some of the most unsung heroes of the modern world. The basic concept is quite simple: A membrane barrier allows some molecules to pass through it while stopping others. Membranes provide one of the most energy-efficient ways to separate chemical species on the basis of size, charge or chemical properties.

Modern industrial membrane technology, dominated by polymer membranes, is used in applications as diverse as dialysis for kidney patients and the supply of clean drinking water.

To read more, go to
http://www.nature.com/nnano/journal/v4/n6/full/nnano.2009.133.html

New research may help address radionuclide contamination at DOE sites



A scanning electron microscope image of mineral colloids containing plutonium filtered from groundwater. Mineral colloids consist of clay and zeolites, common secondary minerals found in rocks at the Nevada Test Site.

Five years from now, Lab scientists will be able to better determine how, when and why plutonium moves in soil and groundwater.

The way to predict how plutonium is transported in groundwater away from a site is by looking at the dominant geochemical processes that control plutonium's (Pu) behavior in the subsurface at environmental levels. But that isn't always so easy.

A $6 million five-year proposal funded by the Department of Energy's Office of Science, Biological and Environmental Research (BER), will allow about a dozen LLNL scientists to study Pu transport at concentration levels at the picomolar to attomolar scale (equivalent to dissolving one grain of salt in 100 Olympic-size swimming pools).

Plutonium can move on small particulates, called colloids, which are often found in groundwater, but the conditions that control whether Pu migrates or remains immobile are not well understood.

Annie Kersting, director of the Lab's Glenn T. Seaborg Institute and manager of the study, said previous experiments of plutonium movement in the subsurface were performed at Pu concentrations orders of magnitude higher than those observed in the field. Now they will do experiments at much lower, environmental conditions.

To read more, go to https://publicaffairs.llnl.gov/news/news_releases/2009/NR-09-06-10.html. To see a video, go to https://publicaffairs.llnl.gov/news/lab_report/2009/july/plutonium_kersting.mov

Photo of the week

All that matters: Inside Livermore's Jupiter Laser Facility, physicist Hui Chen conducts positron (also known as anti-matter) experiments on Titan, a laser that couples a high-energy, petawatt short-pulse (subpicosecond) beam with a kilojoule long-pulse (nanosecond) beam.

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