

# LAWRENCE LIVERMORE REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Sept. 14-21, 2009.

## LLNL computational pioneer receives National Medal of Science



### **Berni Alder**

Retired Lab physicist and computational pioneer Berni Alder has received the National Medal of Science.

President Obama last week named nine eminent researchers as recipients of the National Medal of Science, the highest honor bestowed by the United States government on scientists, engineers and inventors. The recipients will receive the awards Oct. 7 at a White House ceremony.

Alder is widely regarded as the founder of molecular dynamics, a type of computer simulation used to study the motions and interactions of atoms over time. His expertise includes changing kinetic molecular theory by showing that simulations can significantly affect a scientific field. In 1980, Alder was one of the pioneers who used large-scale simulations to solve quantum mechanics problems.

Alder said going into the field of molecular dynamics was "a relatively natural thing to do. The rest of the world didn't have access to the big computers."

To read more, go to [https://publicaffairs.llnl.gov/news/news\\_releases/2009/NR-09-09-02.html](https://publicaffairs.llnl.gov/news/news_releases/2009/NR-09-09-02.html)

***Physics World* uncovers skull fracture research**



A common battlefield brain injury could originate in the blast waves of nearby explosions, even though such waves cause relatively small accelerations of a soldier's body. That is the conclusion of Laboratory physicists who have used computer simulations to study the causes of traumatic brain injury (TBI), a poorly understood condition that appears to be on the increase.

According to the simulations, the blast waves of grenades, landmines and other devices can bypass a soldier's helmet, distort the skull and inflict potentially dangerous loads on the brain. These loads may be sufficient to cause TBI, even when there has been no contact with shrapnel from the explosion.

"This is a potential new mechanism," explains William Moss, a Lab scientist and an author of the study. "There are so many candidate possibilities [for TBI] that have been put out by the Department of Defense and others -- they're frantically searching for an answer to this problem."

To read more, go to <http://physicsworld.com/cws/article/news/40269>

### **The coal nightmare comes to light**



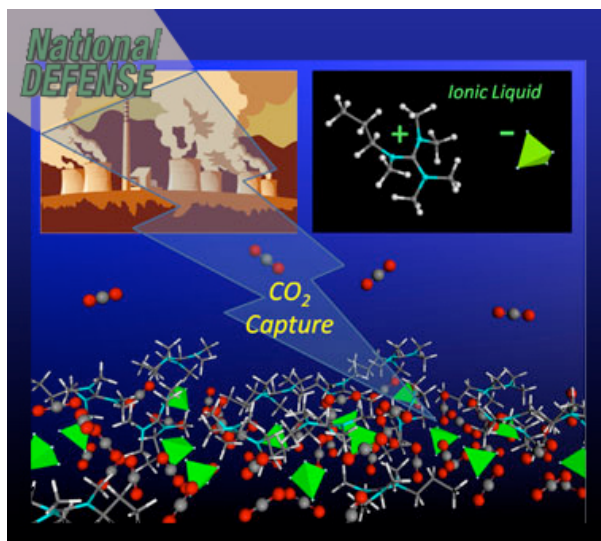
The Australian Broadcast Company's program "Four Corners" recently featured a program on the worldwide use of coal and what alternatives are out there for creating a cleaner way to use it.

Coal is polluting the planet and accounts for 30 percent of CO<sub>2</sub> emissions, the majority of which comes from burning coal for power. The program focuses on FutureGen, the public-private partnership to design, build and operate the world's first coal-fueled, near-zero emissions power plant in the United States, and GreenGen, the same type of plant in China.

"GreenGen is a down payment for them," said Julio Friedmann, leader of the Lab's Carbon Management. "This is a way they can show technology leadership and understand the costs for something they think they ultimately have to do."

To watch the program, go <http://www.abc.net.au/4corners/content/2009/s2676520.htm>

### A cleaner, more efficient method for capturing CO<sub>2</sub>



Laboratory researchers have developed a screening method that would use ionic liquids -- a special type of molten salt that becomes liquid under the boiling point of water (100 degrees Celsius) -- to separate carbon dioxide from its source.

This is a cleaner, more viable and stable method than what is currently available.

Before CO<sub>2</sub> emissions from burning fossil fuels can be sequestered, they must first be separated from the source, a step known as "capture." Currently, a handful of coal plants with commercial CO<sub>2</sub> capture capability use processes based on chemical absorption with monoethanolamine, a general-purpose solvent developed by chemists some 75 years ago.

According to Livermore researchers, this method is corrosive, requires the use of large equipment, and is effective only under low to moderate partial pressures of CO<sub>2</sub>.

In its October issue, *National Defense Magazine* looks at research from LLNL's Amitesh Maiti who devised a computational strategy that can reliably screen any solvent, including an ionic liquid, for high CO<sub>2</sub> capture efficiency.

To read more, go to

<http://www.nationaldefensemagazine.org/archive/2009/October/Pages/Cleaner,MoreEfficientMethodforCapturingCO2.aspx>

### **YouTube gets up close and personal with NIF**



A new video recently posted on YouTube features the inner workings of the Lab's National Ignition Facility.

The video goes through the process of how NIF operates and how it will achieve ignition, the same power found in the stars and sun.

Fusion experiments are scheduled to begin in 2010.

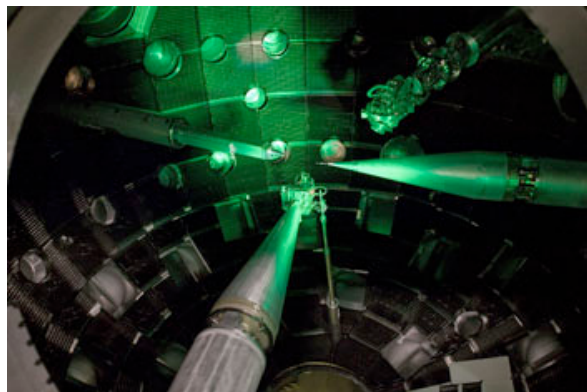
To see the video, go to <http://www.youtube.com/watch?v=yixhyPN0r3g>

### **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



**Lean, green machine:** Inside the National Ignition Facility target chamber, the Target Alignment Sensor Positioner (TASPOS), Target Positioning System (TARPOS), Final Optics Damage Inspection System (FODI) and Diagnostic Instrument Manipulators) are extended to prepare for a shot.

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