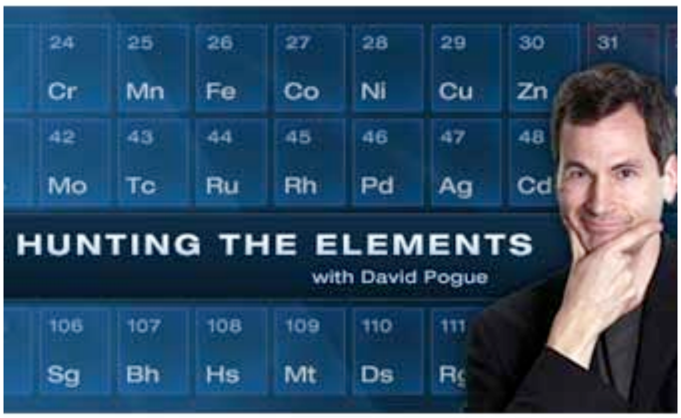
LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, April 2-6, 2012

NOVA THE HUNT FOR ELEMENTS



***New York Times* technology correspondent David Pogue.**

You can find them in a diamond ring (carbon and gold). You can find them in a child's balloon (helium). You can even find them in an open sign (neon) at a cafe.

Where do nature's building blocks, called the elements, come from? To unlock their secrets, David Pogue, the host of NOVA's popular "Making Stuff" series and technology correspondent of *The New York Times*, spins viewers through the world of weird, extreme chemistry: the strongest acids, the deadliest poisons, the universe's most abundant elements, and the rarest of the rare -- substances cooked up in atom smashers that flicker into existence for only fractions of a second.

The two-hour special "Hunting the Elements," features the Lab's Center for Accelerator Mass Spectrometry where scientists there use isotopes of carbon to date ancient items as well as identify some of the causes of global warming.

The National Ignition Facility section focuses on the use of hydrogen in an attempt to create fusion energy.

Lab heavy element guru Ken Moody also is featured and talks about the process of discovering the heaviest elements known to man.

To view the program, go to NOVA.

BIGGER THAN A BLOCKBUSTER

NIF Director Ed Moses speaks to CBS Sunday Morning correspondent David Pogue.

Though as big as many movie sets, the National Ignition Facility has a bigger outcome than a blockbuster – to take on the most ambitious science experiment in history.

That experiment involves creating the same energy that powers the sun and the stars – fusion. At NIF, scientists are trying to control that reaction here on Earth to generate a clean, limitless source of power.

Ultimately, the team hopes to get more energy out of the largest laser in the world than what goes in. Scientists hope to achieve ignition later this year.

To see the interview, go to CBS News Sunday Morning.

SHE'S ELEMENTAL

Dawn Shaughnessy

Dawn Shaughnessy and her team at the Laboratory are pushing the boundaries of the physical world, discovering the heaviest elements the world has ever known.

As the group leader for experimental nuclear and radiochemistry and the principal investigator for the heavy element group at the Lawrence Livermore National Laboratory, Shaughnessy, along with her team, has discovered six new elements (113-118) on the periodic table, the heaviest elements found to date.

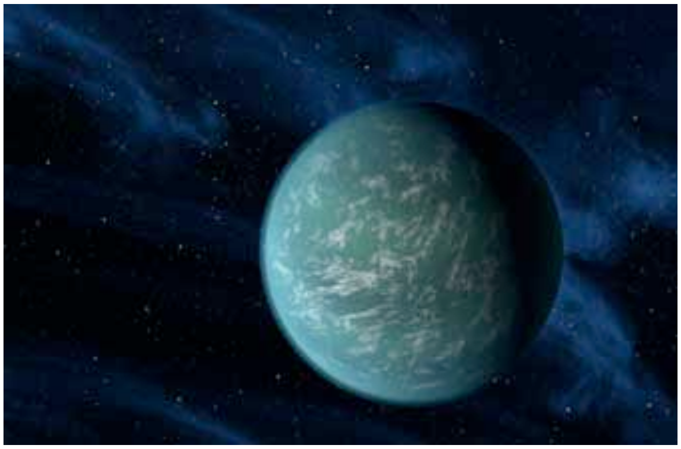
She recently led a group in the proposed name of the newest heavy element to be accepted to the periodic table - element 116, which is to be named Livermorium. The name was chosen to honor Lawrence Livermore National Laboratory and the city of Livermore, Calif.

"Nuclear theory states that once you get so far on the periodic table, these newly found elements shouldn't really exist," Shaughnessy said. "But what we've found as we travel down the periodic table is that these elements get more stable the heavier they get, and once an element is stable we can figure out how they can be useful."

Shaughnessy recently was inducted into the Alameda County Women's Hall of Fame for 2012.

To see an interview, go to NBC Bay Area.

PHOTONICS SPECTRA **PUTTING THE SQUEEZE ON EXOPLANETS**



An artist's conception of planet Kepler-22b, which orbits in a star's habitable zone -- the region around a star where liquid water, a requirement for life on Earth, could persist. The planet is 2.4 times the size of Earth.
Image courtesy of NASA

Experiments using high-power lasers could help scientists understand how planets are formed.

Just as graphite can transform into diamond under high pressure, liquid magmas may similarly undergo major transformations at the pressures and temperatures that exist deep inside Earth-like planets.

Using high-powered lasers, scientists at the Laboratory and collaborators discovered that molten magnesium silicate undergoes a phase change in the liquid state, abruptly transforming to a more dense liquid with increasing pressure. The research provides insight into planet formation.

"Phase changes between different types of melts have not been taken into account in planetary evolution models," said lead scientist Dylan Spaulding, a University of California, Berkeley graduate student who conducted most of his thesis work at the Laboratory's Jupiter Laser Facility. "But they could have played an important role during Earth's formation and may indicate that extra-solar 'Super-Earth' planets are structured differently from Earth."

Melts play a key role in planetary evolution. The team said that pressure-induced liquid-liquid phase separation in silicate magmas may represent an important mechanism for global-scale chemical differentiation and also may influence the thermal transport and convective processes that govern the formation of a mantle and core early in planetary history

To read more, go to *Photonics Spectra*.

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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