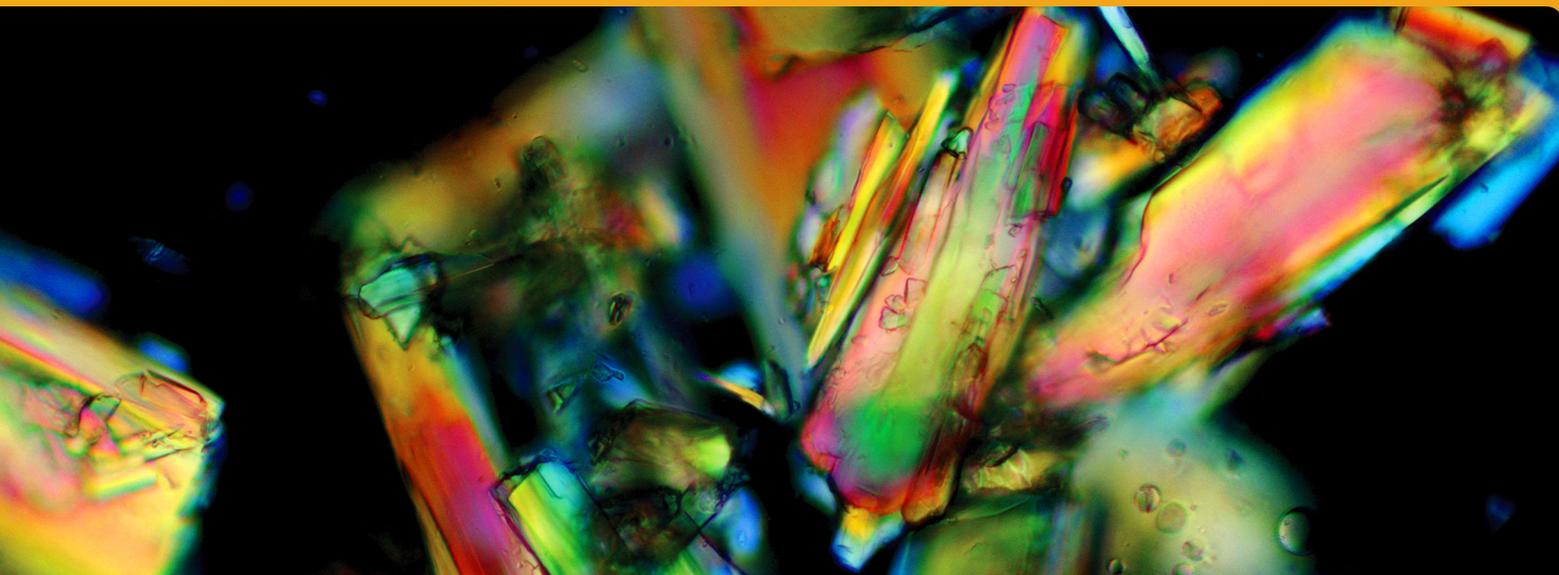


# At a Glance



**Pacific Northwest**  
NATIONAL LABORATORY

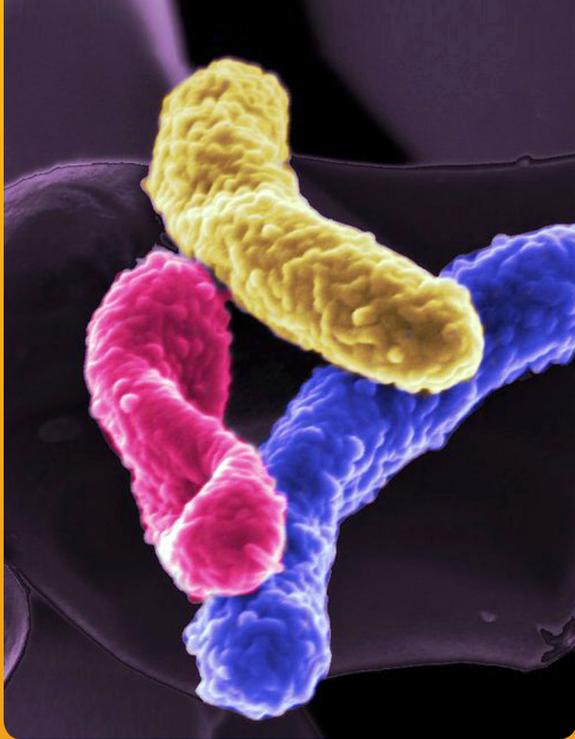
*Proudly Operated by Battelle Since 1965*



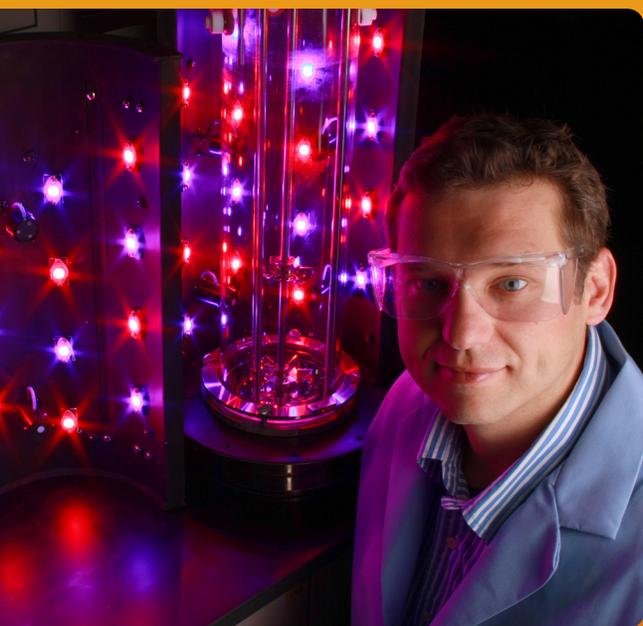
## Big Problems. Big Results.

Energy demands, environmental impacts, and national security are some of America's toughest challenges. At Pacific Northwest National Laboratory, we are driven to provide science and solutions to meet these challenges. We accomplish this mission through the power of our interdisciplinary teams, bringing together experts from multiple disciplines to tackle complex problems.

- » Through fundamental research, PNNL is advancing scientific frontiers in biological system science, chemical and materials sciences, atmospheric and climate science, computational science, subsurface science, and weak interaction physics.
- » PNNL is driven to help increase U.S. energy capacity and reduce our dependence on imported oil. Collaborating with our partners, we are developing ways to use today's energy sources more cleanly and efficiently while helping shift our nation to more renewable sources.
- » Our world-leading expertise in subsurface science is reducing the environmental impacts of human activities. Environmental innovations from PNNL are being used to protect water sources, clean up underground contamination, and explore how greenhouse gases can be stored in deep geologic formations.
- » PNNL is enhancing America's security by discovering, assessing, and mitigating complex threats. Our focus is on ultra-sensitive nuclear measurements, threat signature discovery, information analytics from multi-source data, cyber infrastructure protection, and countering nuclear trafficking.



This color-enhanced, microscopic view shows bacterial cells on a metal oxide in groundwater. The results are revealing new insights about microbiological activity and contaminant movement below the ground's surface.



PNNL scientists invented this patent-pending photobioreactor for converting organic materials such as algae into bio-based fuel. The red and blue lights help organisms turn carbon dioxide into sugar by acting as a more effective form of sunshine.

On the cover: Finding tiny crystals of thorium nitrate and uranyl sulfate is a clue that nuclear weapons may have been produced in the area where the crystals were found. The polarized light microscope that “sees” these crystals is a powerful tool for identifying and understanding materials of all kinds.

## Unique Facilities

As a national laboratory, we combine award-winning expertise with nearly 50 years of government and private investment in advanced equipment and facilities—examples of which are described here.

**Bringing grand challenges down to size.** EMSL, the Environmental Molecular Sciences Laboratory, a U.S. Department of Energy national scientific user facility located at PNNL, offers integrated experimental and computational resources in the biological, chemical, and environmental sciences to the global scientific community. EMSL and its 750 annual users provide innovative solutions to the nation's greatest challenges. Beyond instruments and facilities, EMSL is breaking through traditional approaches by catalyzing interdisciplinary teams of top researchers to deliver game-changing science in carbon cycling, aerosol science, and bioenergy.

PNNL scientists at EMSL pioneered the concept of building a working lithium ion battery using a single nanowire as an electrode. More recently, scientists used sophisticated instruments to “see” the electrochemistry process that occurs when the battery is operating. The resulting insights could improve the design and assembly of advanced batteries that operate more efficiently over a wider temperature range than traditional batteries.

**Meeting national needs.** To support national needs in nuclear energy, environmental management, and national security, PNNL has some of the nation's most specialized facilities for conducting research involving radioactive materials.

For example, scientists in the Radiochemical Processing Laboratory develop and characterize fuel cycle chemistry using numerous state-of-the-art tools, such as mass spectrometers, x-ray diffraction tools, optical spectrometers, and sophisticated equipment for precisely measuring radioactivity in materials. In the Physical Sciences Facility, an underground laboratory shields against cosmic radiation so that scientists can produce pure materials for radiation detection research.

Outdoors on a test track about the size of a high-school football field, a series of mock port-of-entry configurations are used to evaluate the performance of integrated detection and interdiction systems for enhanced border security.

## Recognition

Our researchers are frequently recognized for their outstanding achievements.

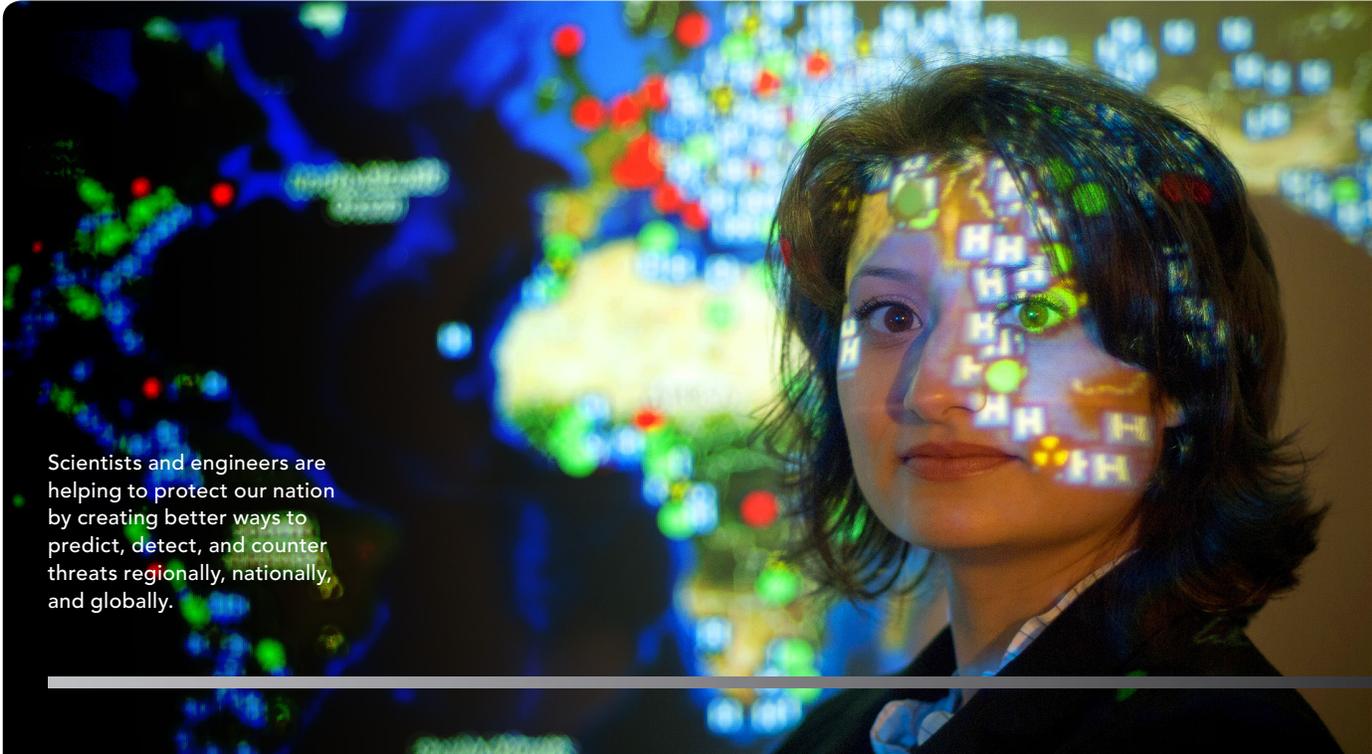
**The Oscars of invention.** R&D Magazine annually selects the year's top 100 technical advancements worldwide. PNNL has earned 89 R&D 100 Awards, ranging from scientific instruments and novel materials to information analysis systems that help ensure the nation's security and provide a competitive advantage to industry.

**Discoveries that change lives.** Our researchers have won more than 200 awards since 2005, including honors at the Presidential level for scientific achievement and leadership in their fields.

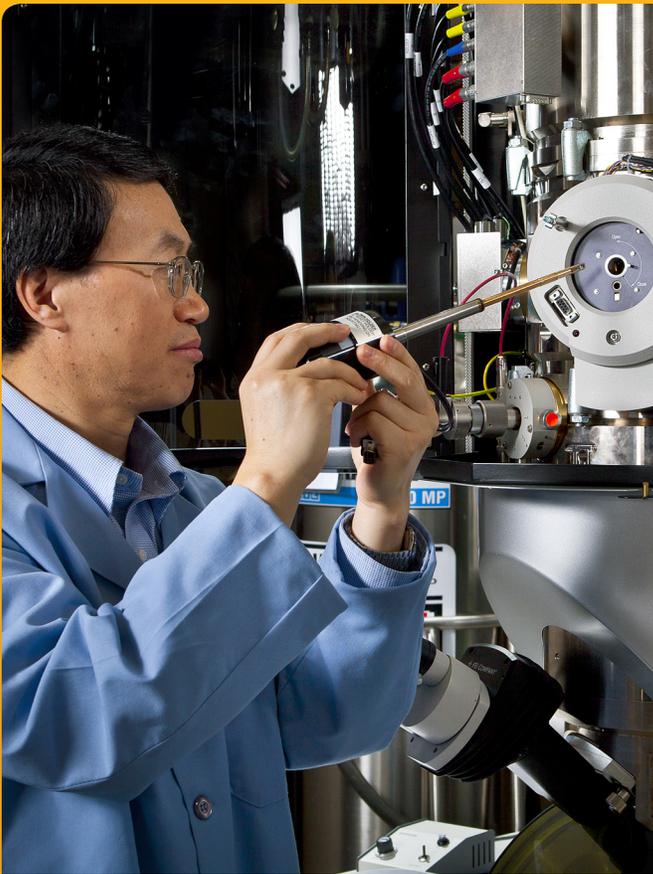
**Marketplace transformation.** PNNL has received 78 Federal Laboratory Consortium awards for excellence in Technology Transfer since the program began in 1984—by far the most of any DOE national laboratory.

**“Assembling a great team of international experts, Pacific Northwest National Laboratory effectively created a new field called visual analytics. The National Visualization and Analytics Center, which PNNL leads for the U.S. Department of Homeland Security, has had a major impact on improvements to the way government intelligence communities do their work.”**

George G. Robertson  
Principal Researcher  
Microsoft Research



Scientists and engineers are helping to protect our nation by creating better ways to predict, detect, and counter threats regionally, nationally, and globally.



A scientist loads a sample into an aberration-corrected scanning transmission electron microscope at EMSL. This state-of-the-art instrument enables high-resolution imaging of structural and chemical information for nanomaterials, catalysts, and minerals, and will help in the design of new materials for energy production and storage.

## Intellectual Powerhouse

PNNL is a DOE laboratory under DOE's Office of Science. Our quest for innovation is powered by about 4,500 researchers and staff, more than 1,000 of them have doctoral degrees.

Our researchers have earned more than 2,150 U.S. and international patents. Licensing patent rights to commercial companies creates more jobs and generates marketplace growth. Science journals publish more than 1,000 peer-reviewed articles from PNNL annually, demonstrating our leadership in advancing science worldwide.

**Our strength is in our roots.** Our "family tree" shows more than 150 companies that use technology or leadership originating from the Laboratory.

**Treasure trove.** Considered a national treasure in the Pacific Northwest and beyond, PNNL's main campus is located in Richland, Washington. Other offices include the Marine Sciences Laboratory in Sequim, Washington, and offices in Seattle, Washington; Portland, Oregon; College Park, Maryland; and Washington, DC. Battelle, a global science and technology enterprise headquartered in Columbus, Ohio, manages the Laboratory for DOE.

**Business facts.** Our research expenditures were approximately \$1.0 billion in the 2012 fiscal year. About 67 percent supports DOE missions in science, energy, the environment, and national security. About 24 percent represents work for federal agencies in national security, health, and other areas. We also collaborate with universities to advance science and with industry to move technology to the marketplace.

## Committed Leadership

Our proud heritage of engagement and leadership improves lives.

**Seeding the technology economy.** PNNL economic development programs have helped hundreds of technology businesses develop products, acquire new customers and contracts, obtain access to funding sources and strategic partners, and secure specialized facilities and staff.

**Making a difference.** Since 1965, Battelle, which operates PNNL, has invested more than \$24 million to improve science education and quality of life in the communities where PNNL resides. Staff volunteered more than 160,000 hours in educational and community projects since 2005.

**Workforce of the future.** PNNL works with the educational community from kindergarten through post-graduate levels to equip the future workforce. In 2007, *Fortune Magazine* included PNNL in a list of 20 great employers for new college graduates.

