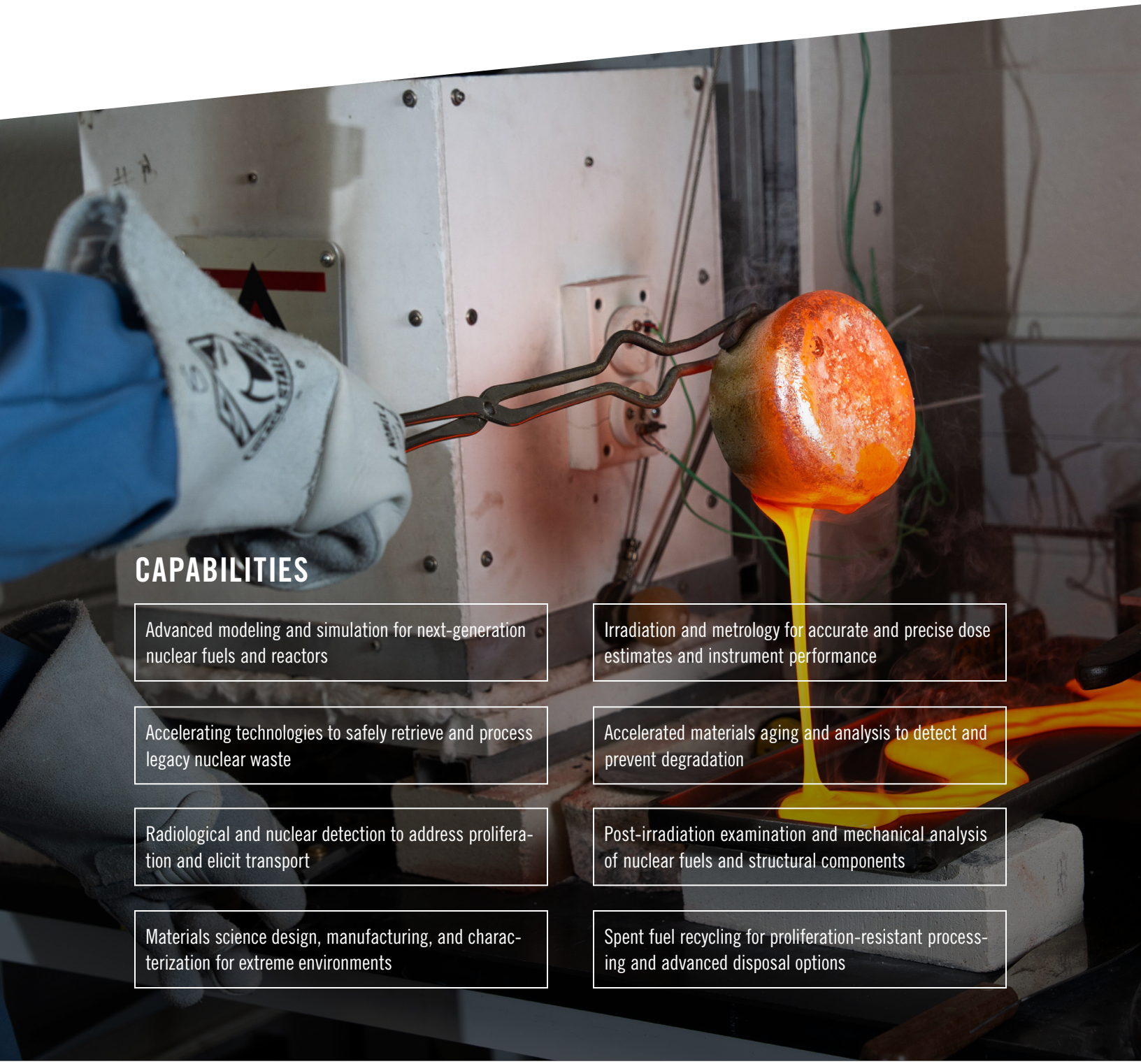
Pacific Northwest
NATIONAL LABORATORY

NUCLEAR SCIENCES DIVISION

Providing solutions to the world's most complex environmental and radiological challenges.



CAPABILITIES

- Advanced modeling and simulation for next-generation nuclear fuels and reactors
- Irradiation and metrology for accurate and precise dose estimates and instrument performance
- Accelerating technologies to safely retrieve and process legacy nuclear waste
- Accelerated materials aging and analysis to detect and prevent degradation
- Radiological and nuclear detection to address proliferation and elicit transport
- Post-irradiation examination and mechanical analysis of nuclear fuels and structural components
- Materials science design, manufacturing, and characterization for extreme environments
- Spent fuel recycling for proliferation-resistant processing and advanced disposal options

MISSION

Through experimentation and modeling of nuclear materials behavior and processing, we enable our nation's energy independence, remediate legacy nuclear waste, and prevent acts of terrorism by providing innovative solutions to the U.S. government and industry.

WHO WE ARE

At a time when complex energy, environmental, and national security problems are emerging on every front, the Nuclear Sciences Division leverages the broad expertise of more than 250 staff to provide solutions. Our deep capabilities are complemented by state-of-the-art research facilities and strong partnerships. Pacific Northwest National Laboratory is committed to delivering science and technology innovations to support the nation's nuclear mission.

Our diverse work addresses a wide range of national and international challenges, from protecting the health of people who must work in hazardous environments, to developing durable new materials, streamlining industrial processes for improved productivity and effectiveness, and delivering new approaches for environmental cleanup.

Our scientists and engineers are developing and improving the performance of wasteforms like glass and grout, solving chemistry and processing challenges for waste stored in underground tanks at the U.S. Department of Energy's Hanford and Savannah River sites, and assuring the integrity of materials used in the extreme environments of nuclear power reactors.

WE ENCOURAGE BOLD NEW IDEAS AND BUILD ENDURING CAREERS

Exceptional People

We provide the tools that enable exceptional people to accomplish extraordinary things in a collaborative research environment. Our people are our most valuable asset.

Stakeholder Focused

We seek to accelerate the research discovery, development, and deployment cycle by engaging prospective end-users early in the process. Through close collaboration with industry partners and other stakeholders, we develop a real-world understanding of what success must look like.

Trusted Performance

Our goal is to exceed our stakeholder's expectations 100 percent of the time.

FACILITIES

- Radiochemical Processing Laboratory
- Materials Science and Technology Building
- Radiological Exposures and Metrology Laboratory
- Wasteform Development Laboratory
- Radiological Microscopy Suite
- Process Development Laboratory

TECHNICAL GROUPS

EXPERIMENTAL AND COMPUTATIONAL ENGINEERING

- Computational Fluids and Nuclear Processes
- Computational Structural Mechanics
- Experimental Fluids
- Nuclear Material Storage and Transportation
- Nuclear Design Concepts and Integration
- Nuclear Systems Analysis

NUCLEAR CHEMISTRY AND ENGINEERING

- Actinide Chemistry
- Materials Analysis and Radiation Science
- Nuclear Process Engineering
- Process Monitoring and Separations
- Radiochemical Science
- Radiometric and Inorganic Analysis
- Nuclear Chemistry

RADIOLOGICAL MATERIALS

- Alternative Immobilization Strategies
- Material Development and Testing
- Process Engineering
- Waste Form Development
- Waste Vitrification

REACTOR MATERIALS

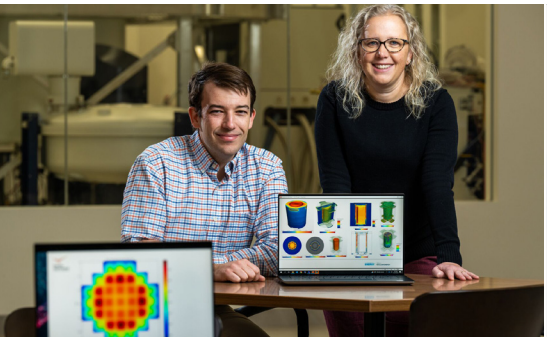
- Materials Performance
- Advanced Materials Characterization
- Materials and Systems Design
- Multiscale Materials Research
- Corrosion and Metallography
- Materials Dynamics

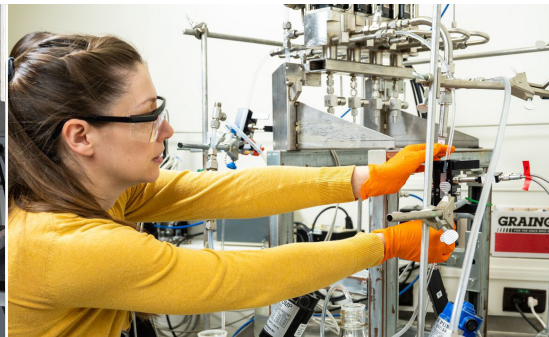
IRRADIATION SCIENCES

- Field Testing and Calibration
- Radiation Measurements and Irradiations
- Radiation Testing and Calibration

Our **Experimental and Computational Engineering** group explores and delivers engineered solutions based on multi-disciplinary expert analysis, experimentation, and computation. Our science and engineering capabilities address challenges involving multi-phase fluid dynamics, structural and safety analysis, heat transport, nuclear radiation modeling, and reactive transport from small- to full-scale. Modeling expertise in finite element analysis and computational fluid dynamics, combined with advanced manufacturing techniques in our Rapid Prototyping Lab, help us explore engineering solutions to real-world scientific problems. Our clients include government, commercial, and regulatory entities within the nuclear power, nuclear waste treatment, radioactive material packaging, and alternative energy industries.

Our **Nuclear Chemistry and Engineering** group supports legacy waste cleanup and long-term storage, river corridor protection, the beneficial use of nuclear materials, the full life cycle of nuclear fuel, national security missions, and nuclear energy production. Through fundamental radiochemical science and strong academic collaborations, we are fostering a renewed national focus on radiochemistry and irradiated materials research in several areas including, nuclear nonproliferation, environmental cleanup and protection, advanced nuclear energy, and the beneficial use of isotopes for medicine and industry. Our technical capabilities include radiochemical process engineering, irradiated materials characterization, dosimetry and radiation effects analysis, and radiochemical separations and conversions—all supported by a full-service, in-house laboratory that provides a comprehensive suite of analytical instrumentation that support research in process modeling and on-line monitoring, colloidal dispersion science, and surface science. We maintain stewardship for the Radiochemical Processing Laboratory, one of the few remaining multipurpose Hazard Category II nuclear facilities in the U.S. Department of Energy complex focused on research and development.





Our **Radiological Materials** group integrates engineering and materials science to develop and demonstrate novel materials and innovative processes. We aim to increase the nation's energy independence by supporting the nuclear energy sector, to protect human health and the environment from legacy waste, and to support the nation's nuclear stockpile. Our work includes advanced waste-form development, waste vitrification and immobilization, glass and materials science and fabrication, cementitious material development and characterization, process engineering and development, and off-gas capture and immobilization in support of the nuclear fuel cycle.

Our **Reactor Materials** group advances fundamental materials science and provides the scientific basis for fission and fusion reactor materials development, light water reactor life extension, safe storage of spent fuel, radiation detection, and design of materials and systems for extreme operating conditions. We specialize in stress corrosion cracking, post-irradiation examination, non-destructive examination, materials characterization through electron microscopy, computational materials science and data analytics, and design of electro-mechanical hardware. Our group has more than 40 highly qualified and experienced staff, including internationally recognized scientists and fellows of professional societies.

Our **Irradiation Sciences** group focuses on detecting the transport of radioactive materials across borders and conducting precise irradiation and measurement to study the effects of radiation dose on humans, equipment, and nuclear power reactors. We are based in the 318 Building, also known as the Radiological Exposures and Metrology Laboratory. Our core capabilities include field testing, radiation testing, calibration, irradiation, and radiation measurement. To achieve our mission, we employ radiation-generating devices and sealed sources dedicated to the research and application of specialized technologies, including those with highly calibrated neutron and gamma irradiation capabilities—some of these technologies are not available or licensed anywhere else in the United States.

ABOUT PNNL

Pacific Northwest National Laboratory draws on signature capabilities in chemistry, Earth sciences, and data analytics to advance scientific discovery and create solutions to the nation's toughest challenges in energy resiliency and national security. Founded in 1965, PNNL is operated by Battelle for the U.S. Department of Energy's Office of Science. DOE's Office of Science is the single largest supporter of basic research in the physical sciences in the United States and is working to address some of the most pressing challenges of our time.

CAREERS

The Nuclear Sciences Division actively seeks candidates with expertise in disciplines including chemistry, radiochemistry, radiation chemistry, materials science, nuclear engineering, mechanical engineering, computational sciences, applied artificial intelligence, and machine learning.

View PNNL job listings at:
https://www.pnnl.gov/careers

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