

About Los Alamos

As the senior laboratory in the DOE system, the Laboratory executes work in all of DOE's missions: national security, science, energy, and environmental management. Our contributions are part of what makes DOE a science, technology, and engineering powerhouse for the nation.

About Chemistry Division

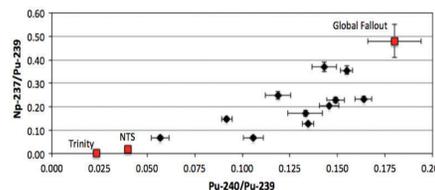
With five groups and a staff of nearly 300, the Chemistry Division serves the Laboratory's missions with innovative chemical science and technology for energy research, threat identification and mitigation, weapons science, health, space research, and much more.

Our capabilities are also essential for energy security, civilian-sector R&D, and industrial partnering.

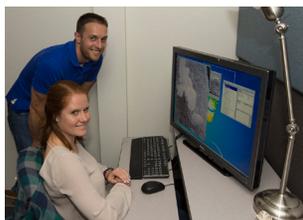
We have expertise in

- Actinide chemistry
- Isotope science
- Synthetic and mechanistic chemistry
- Chemistry for measurement and detection science
- Chemistry of materials
- Data analysis and modeling for chemical sciences
- Radiochemistry and nuclear science

Over the years, many of our postdoctoral fellows have joined the Laboratory as technical staff members. Others have gone on to academic, research, national laboratory, or industrial appointments.



In work published in the *Journal of Radioanalytical and Nuclear Chemistry*, researchers describe using lichens collected in New Mexico to detect residual airborne radionuclides from the atmospheric nuclear testing that happened as long as 50 years ago.



NR has a very active student program. Here Julie Gravelle and Mike Klosterman examine samples related to nuclear forensics.

Opportunities

Chemistry Division offers opportunities across the employment spectrum, from student positions, to graduate and postdoctoral fellowships, to mid-career research positions. We also have active programs in industrial partnering.

Learn more about Chemistry Division:

<http://www.lanl.gov/org/padste/adcles/chemistry/>

Nuclear and Radiochemistry office: (505) 667-4546
Chemistry Division Office: (505) 667-4457

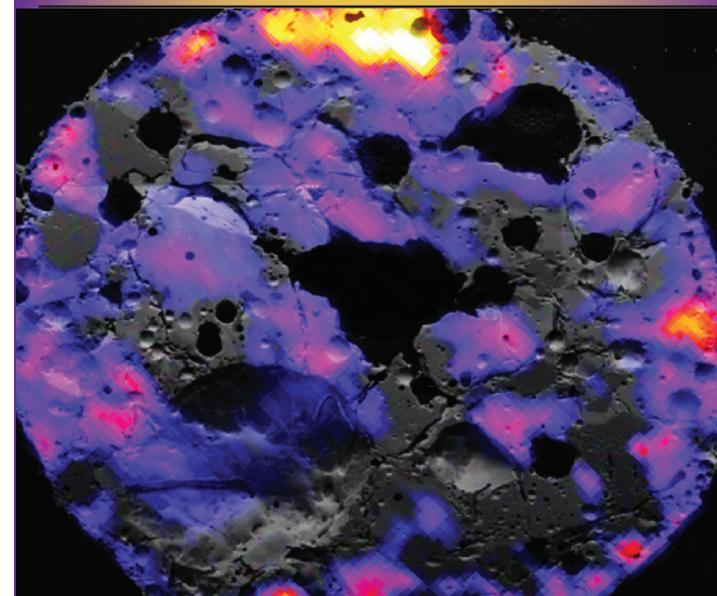
Cover: Nuclear debris from historic U.S. nuclear tests is analyzed for trace actinide isotopic composition and persistent signatures of nuclear fission to develop new forensic science techniques. Shown is a digital autoradiograph of a debris sample.

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LA-UR-17-25390

CHEMISTRY

Nuclear and Radiochemistry (C-NR)



C-NR provides vital radiochemical and radioanalytical capabilities to a wide range of programs

 **Los Alamos**
NATIONAL LABORATORY

About C-NR

C-NR programs include maintenance and stewardship of the nuclear stockpile, nuclear non-proliferation, environmental management, international safeguards, repository validation, and civilian nuclear energy programs. C-NR performs research and addresses immediate mission needs for sponsors in nuclear weapons, global security, and for those requiring the use of radioanalytical and radiochemical handling capabilities at a range of (radio) activity levels. Current major sponsors include the National Nuclear Security Administration, other federal agencies (Department of Defense, Department of Homeland Security, etc.), and LANL institutional support. Basic and applied research is conducted in support of radiochemistry and radioanalytical methods, nuclear chemistry and physics, and inorganic chemistry.

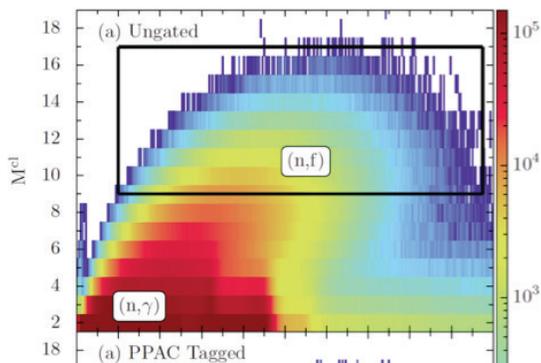
Capabilities

Assessment Team

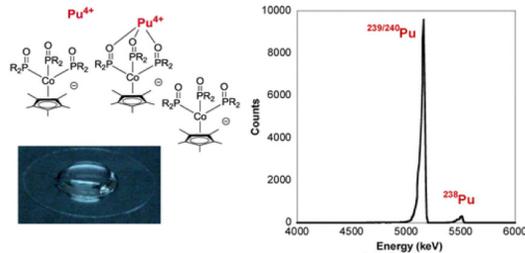
The Assessment Team validates the performance of LANL-designed nuclear weapons as measured by radiochemistry. The team also participates in multi-laboratory nuclear forensics exercises and contributes to future nuclear test readiness.

Clean Chemistry Team

The Clean Chemistry Team maintains expertise and capabilities for the handling methodologies and



Measuring the neutron capture cross-section of ^{239}Pu helps support of the the Advanced Reactor Concept program, a DOE program considering the next generation of reactor designs.



Separations science and analytical methodology development. Analytical chemists in C-NR are active in the development of new methods development for elemental and isotopic measurements of samples. Further work addresses the discovery of new approaches for addressing arising needs in separation science.

cleanroom facilities required for measurement of very low concentrations of radionuclides in environmental samples. Analytical platforms include multicollector thermal ionization mass spectrometry (TIMS), single and multicollector sector field inductively coupled plasma mass spectrometry (ICP-MS), quadrupole ICP-MS, and large geometry secondary ion mass spectrometry (LG-SIMS).

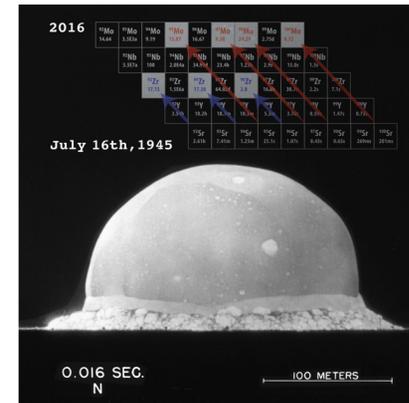
Countroom Team

The Countroom Team occupies a 7,000 ft² facility with manual and automated gamma spectrometers, alpha spectrometers, beta counters, liquid scintillation counters, and autoradiography scanners. Many of these systems date back to the beginning of nuclear testing, and historic calibrations of these systems are maintained. This team is capable of quantifying activity from sub-environmental and bioassay levels to highly radioactive, freshly irradiated materials. The team supports many institutional programs, as well as treaty monitoring efforts at national and international levels.



Nuclear Chemistry Team. The Nuclear Chemistry Team engages in advanced studies of nuclear fission, neutron capture, and nuclear isomers, along with

The high purity Ge Clover Detector is a high efficiency low background detector system with active background suppression and event-by-event data capture. It is part of a 7000 ft² facility located at TA-48 that houses almost 200 gamma, alpha, and beta counters.

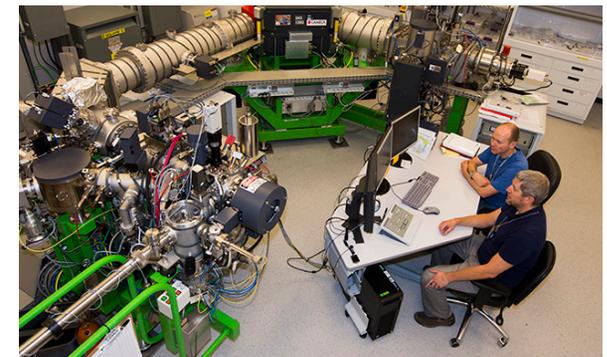


Debris Diagnostics. Using information learned from decades of underground testing, C-NR maintains expertise to model post-detonation debris formed from weapon types, enabling estimation of yield and emissions of a nuclear explosion.

the development of radiochemical diagnostics for inertial confined fusion. The team also contributes to the development of new technologies for the ultra-sensitive detection of fundamental properties of the actinides and other isotopes of interest for threat reduction and stockpile stewardship.

Radioanalytical Chemistry Team

Work conducted by the Radioanalytical Chemistry Team spans research and development for the advancement of measurement capabilities and methods, development of new signatures based upon fundamental properties of interesting radionuclides, participation in national and international exercises, and data interpretation for understanding nuclear tests. The team routinely characterizes a range of sample matrices and conducts separations for further analysis by radiometric and mass spectrometry techniques.



The CAMECA IMS 1280 LG-SIMS allows analysis of both radiological and non-radiological samples.