

University of Nevada, Las Vegas Capabilities and Commitments

UNLV Radiochemistry Updated 06.08.2020

A severe shortage exists of scientists with nuclear expertise and training in radiochemistry, as well as the handling of highly radioactive substances. The need for additional radiochemists and nuclear scientists has been extensively documented in reports published by the American Chemical Society, the American Physical Society, the Nuclear Regulatory Commission and the National Academies of Sciences. The shortage is even more problematic in the light of recent considerations regarding national security. A continuous pipeline providing students trained in all aspects of nuclear sciences is required to fill a large number of positions in areas related to nuclear safeguards and non-proliferation. These positions will become vacant in the near future as the current workforce reaches retirement age and cannot be filled without an available pool of well-trained students. The University of Nevada, Las Vegas has a strong doctoral program in radiochemistry with a significant number of students enrolled and an excellent track record of graduating students that go on to work for the national laboratories or other government agencies in areas related to nuclear non-proliferation.

The Radiochemistry Ph.D. Program at UNLV was founded in 2004 and has historically drawn its faculty members from Chemistry, Health Physics, Physics and Mechanical Engineering departments. Its curriculum consists of a series of core courses which are complemented by a number of elective classes offered by several different colleges, making it a truly interdisciplinary program. The Radiochemistry Program offers research opportunities to undergraduate and graduate students, providing them with unique training and educational opportunities. Currently, fourteen graduate students are actively enrolled in the Ph.D. program. Additionally, radiochemistry graduate students currently serve as research mentors to undergraduates from Chemistry and Engineering. This pool of students has provided a constant source of undergraduate researchers for numerous radiochemistry projects with five students entering the Radiochemistry Ph.D. program directly from UNLV undergraduate programs and three from UNLV masters programs.

Since its inception in 2004, the program has graduated a total of 42 Ph.D. students. The faculty members and students associated with the Radiochemistry Ph.D. program have a strong track record in areas of research that relate directly to the technical areas of expertise sought after by the Department of Energy complex. This is especially the case for advancements in analytical techniques and instrumentation used in determining inventory and characterization of nuclear materials, the identification of ways to improve laboratory or in-field instrumentation and techniques for the physical, chemical, and radiological analysis of nuclear materials and the development of advanced safeguard approaches and techniques that can be applied to existing and future nuclear facilities, including uranium enrichment, reprocessing, and reactor facilities. For example, researchers and students associated with the program have worked on projects to develop rapid automated dissolution and analysis techniques for radionuclides in recycle process streams. Another project aimed at the development of UV/Vis spectrophotometric probes that can be used to monitor conditions in recycling process streams and to provide real time data on radionuclide concentrations and chemical conditions. The later

technique was then deployed during the Nuclear Safeguards campaign conducted at Argonne National Laboratory.

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The UNLV Radiochemistry Program maintains close ties to several DOE laboratories, in particular with Lawrence Livermore National Laboratory, Los Alamos National Laboratory, Argonne National Laboratory and Idaho National Laboratory. These ties are not restricted to research collaborations. DOE researchers have frequently held seminars and lecture series at UNLV and several staff scientists from national laboratories have held positions as adjunct faculty with the Radiochemistry Program. These interactions can be used to further expand education opportunities for students.

In particular, the Summer Internship Programs directed by the Glenn T. Seaborg Institutes at LLNL and LANL as well as the summer programs at George Washington University and UC Davis directed by the Nuclear Science and Security Consortium (NSSC) have established a pathway for interested students to gain direct exposure to the problems confronting nuclear forensics by spending a summer working with staff scientists on cutting-edge issues. In the past year, UNLV joined the Consortium on Nuclear Security Technologies (CONNECT) in collaboration with LANL and ANL through the National Nuclear Security Administration Minority Serving Institution Partnership Program. Over the course of the last five years a large number of students from the Radiochemistry Program have been selected for the Glen T. Seaborg Summer Internship at LANL and the Nuclear Forensics and Nuclear Safeguards summer programs at LLNL. In addition, two students were selected for summer internships at ANL and INL and have participated directly in measurements conducted as part of the nuclear safeguards campaign.

Interactions with the DOE laboratories further expands the educational opportunities for students and gives them the chance to gain firsthand knowledge of the critical national issues related to radiochemistry. In addition, graduate students involved in our program are able to interact with other scientists working on projects related to nuclear safeguards and non-proliferation at meetings and workshops. Training young scientists in each of these areas is necessary for continued expertise in radiochemistry for many years to come.