

CAPABILITY STATEMENT: NUCLEAR ENGINEERING
INSTITUTION: UNIVERSITY OF NEVADA, LAS VEGAS, HOWARD R. HUGHES COLLEGE OF ENGINEERING

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OVERVIEW

Our faculty are active in many aspects of nuclear engineering including radiation detection and spectroscopy, remote sensing using UAS, active neutron interrogation and non-destructive assay of materials, prompt gamma neutron activation analysis, radiation effects, radiation shielding, computational modeling of radiation transport, and design and analysis of nuclear reactors and systems. The nuclear engineering laboratory has a separate 20 ft. by 20 ft. radiation vault. The laboratory is licensed for radioactive material handling and research.

RESEARCH CAPABILITIES

Nuclear Engineering Laboratory

- A suite of x-ray and gamma-ray sources, ²³⁹Pu-Be, and ²⁵²Cf neutron sources;
- A variety of x-ray, gamma-ray and neutron detectors (solid and liquid scintillators, semiconductor SiLi, HPGe, CZT, and gaseous detection systems) with associated high-speed data acquisition electronics and software;
- Bonner spheres for neutron counting;
- Ludlum ionization chambers for gamma and beta monitoring;
- Gas handling and vacuum equipment;
- PIP's detectors for beta and alpha measurement;
- An assortment of activation foils and cadmium shields available for the measurement of neutron flux;
- A controlled high-temperature furnace available for work with salts and crystals; and
- A 200-processor cluster dedicated to Monte Carlo simulations with MCNP6, MCNPX and Geant4 codes.

Radiochemical Instrumentation:

- Inductively coupled plasma atomic emission spectroscopy;
- Inductively coupled plasma mass spectroscopy;
- Ultraviolet and visible absorption spectroscopy;
- Time-resolves/breakdown laser fluorescence spectroscopy;
- Fourier transform infra-red spectroscopy;
- High-performance liquid chromatography;
- Ion chromatography; and
- Electrospray mass spectroscopy.

Radioanalytical Instrumentation:

- Alpha spectroscopy system (2);
- HPGe gamma detectors (8);
- HPGe well detector;
- NaI(Tl) gamma detectors (3);
- Alpha/Beta gas-proportional counter (3);
- Gas-less automatic Alpha/Beta counting system;
- Liquid scintillation counter;
- Automated gamma counter;
- Thermoluminescence dosimeter reader; and
- Autoradiography system.

Solid Phase Characterization:

- Surface area analysis;
- FT-infrared spectrometer; and
- LA-ICP-Mass spectrometer.

Solid State Analytical Equipment and Laboratories:

- Metallographic optical microscopy;
- Powder X-ray diffraction;
- Single crystal X-ray diffraction;
- Scanning electron microscopy;
- Electron probe microanalysis;
- Transmission electron microscopy;
- X-ray fluorescence spectrometer;
- X-ray photoelectron spectroscopy; and
- Physical property measurement systems

PAST PERFORMANCE

Department of Energy, Savannah River Nuclear Solutions, Idaho National Laboratory, National Security Technologies, Environmental Protection Agency, Defense Threat Reduction Agency, Naval Air Warfare Center Aircraft Division, Naval Research Laboratory, Office of Naval Research, Nuclear Regulatory Commission, Department of Homeland Security, Mission Support and Test Services