

UNIVERSITY OF NOTRE DAME
DEPARTMENT OF PHYSICS

NUCLEAR SEMINAR

Monday, January 23

Environmental Aging and Surrogate Materials Development in Support of Pre- and Post- Detonation Nuclear Forensics

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Nuclear forensics seeks to determine the physical, chemical, elemental and isotopic characteristics of nuclear material with unknown origin and has two aspects—pre-detonation and post-detonation. Pre-detonation nuclear forensics focuses on the characterization of interdicted nuclear materials to determine their origin, whereas post-detonation nuclear forensics produces information about the design of the exploded device, level of sophistication, and origin of the nuclear material. Study of the diffusion of trace elements into and out of solid-phase nuclear materials in contact with water under different aging scenarios may lead to the identification of definitive aging signatures. Therefore, the first goal of this work was to investigate rare earth element (REE) interactions with UO_2 as a function of pH. The removal of rare earth elements from the aqueous phase of a batch system was monitored using inductively coupled plasma-optical emission spectroscopy (ICP-OES) or inductively-coupled plasma mass spectrometry (ICP-MS) and X-ray fluorescence (μ -XRF) was used to determine if rare earth elements precipitated from solution. The second goal of this work, related to post-detonation nuclear forensics, was to characterize and analyze the distribution of uranium and plutonium in solid fallout debris materials. Traditional and sol-gel approaches to glass synthesis were used with the goal of creating a final material that is homogeneous on a mesoscopic scale (i.e., hundreds to thousands of nm).

4 pm – 5 pm
Nuclear Science
Laboratory
124 Nieuwland
Science Hall

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All interested  
persons are  
cordially invited  
to attend

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Refreshments will be
served prior to the
seminar in room 124