



JAMES MADISON
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SEMINAR

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Environmental Aging of Nuclear Materials

Abstract. The characterization of nuclear materials under controlled conditions promotes a better understanding of their chemistry and provides insight into their stability. Of particular importance is identifying how environmental and storage conditions affect both bulk and sub-bulk scale chemical and physical properties. Such data may provide insight for nuclear forensic applications and can help address fundamental safety and storage concerns. This presentation will discuss the aging of thorium dioxide (ThO_2), uranium dioxide (UO_2), and plutonium dioxide (PuO_2) as a function of time, temperature, and relative humidity (RH). Morphological changes were monitored using scanning electron microscopy and interpreted using a previously-published lexicon of descriptive imaging terminology. Changes in phase were observed using X-ray diffraction. Ancillary techniques, including energy-dispersive X-ray, infrared, Raman, and X-ray photoelectron spectroscopy, were used to further probe and interpret aging effects. The results highlight important stability differences between actinide oxides and underscore the need for further research targeted at understanding the fundamental chemical and physical properties of actinide compounds near ambient temperatures and humidities.

About Dr. Hixon. Dr. Amy E. Hixon is an Associate Professor and Director of Graduate Studies in the Department of Civil & Environmental Engineering & Earth Sciences at the University of Notre Dame, where she teaches courses in environmental aquatic chemistry, actinide chemistry, and nuclear forensic analyses. She also serves as Director of GLOBES, which is an interdisciplinary certificate program for graduate students interested in exploring how their research intersects with the environment and society. Dr. Hixon received her Ph.D. and M.S. degrees in Environmental Health Physics from Clemson University in 2013 and 2008, respectively, and her B.S. degree in Chemistry from Radford University in 2006. While a doctoral candidate at Clemson University, she also held a position at the U.S. Nuclear Regulatory Commission in the Office of Federal and State Materials and Environmental Management Programs, where she supported the work of the Performance Assessment and Environmental Review branches. Dr. Hixon's research integrates analytical chemistry, instrumental analysis, and modeling techniques to gain a fundamental understanding of the behavior of the actinide elements in natural and engineered systems.

Meet the Speaker
Seminar

2:00 pm, PCB 3144
3:35 pm, King 159