

# Department of Chemistry & Biochemistry

School of Integrated Science and Humanities

## Departmental Seminar Announcement

### An emphasis on nuclear forensics efforts

Professor Jenifer C. Braley

### Radiochemistry at Colorado School of Mines

The international interest in growing nuclear energy capacity as a baseline source of CO<sub>2</sub>-free power production has concomitantly led to domestic interest in further developing nuclear forensic capabilities. Nuclear forensics can nominally be divided into pre-detonation and post-detonation areas. Pre-detonation nuclear forensics considers the analysis of interdicted nuclear material to assess where the material came from, when chain-of-custody lost, and if more material is available. Post-detonation nuclear forensics generally supports efforts assessing the source and magnitude of a given nuclear device. Ongoing radiochemistry research at Colorado School of Mines (CSM) seeks to develop more robust nuclear forensic signatures for pre- and post-detonation forensics efforts as well as shorten forensic analysis timelines relevant to post-detonation analysis. Signature development at CSM focuses on understanding the fate of trace metals in the Plutonium Uranium Redox EXtraction (PUREX) solvent extraction process used internationally for the recovery of uranium and plutonium from used nuclear fuel. This project uses a combination of diffusion NMR spectroscopy and the USGS 1 MW TRIGA reactor to understand extractant aggregation driving the recovery of certain trace metals. Projects aiming to shorten the post-detonation analysis timeline develop functionalized mesoporous carbon nanomaterials for the more selective and deployable recovery of fission products that can inform device design. Results suggest the implementation of diffusion NMR spectroscopy could be integral in informing signature development efforts relevant to the PUREX process and functionalized carbon nanomaterials can be used for the recovery of fission products relevant to forensics efforts.



Bio: Professor Braley joined the faculty at Colorado School of Mines in the fall of 2012 after a two-year employment at Pacific Northwest National Laboratory. During her undergraduate research, she studied the solid-state synthesis of *f*-block elements at Colorado State University with Professor Peter Dorhout. In 2006 she joined the group of Professor Ken Nash at Washington State University (WSU). Here she examined the fundamental solution chemistry of the *f*-elements relevant to solid-liquid and liquid-liquid separations chemistry. While in graduate school, she was able to complete an internship at Eichrom Technologies with Dr. Phil Horwitz and bolstered her understanding of extraction chromatographic (solid-liquid) separations. She has joined the faculty at Colorado School

**Date: Friday, November 18, 2016**

**Time: 11:00 am to 12:00 pm**

**Location: GL-100 MMC (Live)**

**Marine Sciences Building Room 105 (MSB-105) – BBC (via Polycom)**



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