

# Seminar

9:45 a.m. Monday, December 12

402 Walter Library

Professor

**Thomas  
Albrecht-Schmitt**

University of Notre Dame



## *The Strange Structures and Unusual Properties of Actinide Borates*

### **Abstract**

The use of molten boric acid as a reactive flux for synthesizing actinide borates has been developed in the past two years providing access to a remarkable array of exotic materials with both unusual structures and unprecedented properties.  $[\text{Th}_5\text{B}_5\text{O}_6(\text{OH})_6][\text{BO}(\text{OH})_2] \cdot 2.5\text{H}_2\text{O}$  possesses a cationic supertetrahedral structure and displays remarkable anion exchange properties with high selectivity for  $\text{TcO}_4^-$ . Uranyl borates form noncentrosymmetric structures with extraordinarily rich topological relationships. Neptunium borates are often mixed-valent and yield rare examples of compounds with one metal in three different oxidation states. Plutonium borates display new coordination chemistry for trivalent actinides. Finally, americium borates show a dramatic departure from plutonium borates, and there are scant examples of families of actinides compounds that extend past plutonium to examine the bonding of later actinides. These compounds are of considerable fundamental interest, but may also exist in vitrified nuclear waste and as solubility-limiting products in certain repositories for nuclear waste.

Hosts: Professors Christopher Cramer & Laura Gagliardi  
Refreshments will be served prior to the seminar.