

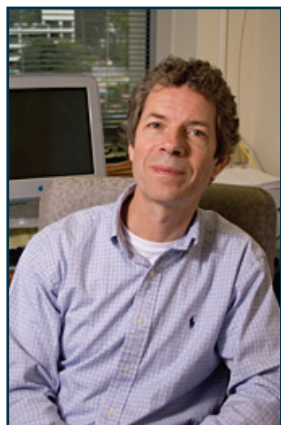


UNIVERSITY OF MINNESOTA
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Department of Chemistry

Seminar

9:45 a.m. Tuesday, March 6 • 331 Smith Hall



Michael Heaven

Professor
Department of Chemistry
Emory University

Spectroscopic Studies of Prototype Actinide Compounds (and closely related species)

Research interests include the electronic spectroscopy of transient intermediates, energy transfer kinetics, intermolecular forces, and unimolecular decay dynamics.

Websites: <http://www.chemistry.emory.edu/faculty/heaven.html>

Abstract

High-level theoretical models of the electronic structures and properties of actinide compounds are being developed by several research groups. This is a challenging problem due to the need for explicit treatment of relativistic effects, and the circumstance that many of these molecules exist in states where the *f* and/or *d* orbitals are partially filled. Current theoretical models are being evaluated through comparisons with experimental results. Gas phase data are most suitable for this purpose, but there have been very few gas phase studies of actinide compounds. We are addressing this issue by carrying out spectroscopic studies of simple uranium and thorium compounds. Multiple resonance spectroscopy and jet cooling techniques are being used to unravel the complex electronic spectra of these compounds.

Our recent studies have focused on the electronic structures of the oxides, sulfides fluorides and nitrides of Th and Hf. Comparisons between isoelectronic species indicate that relativistic effects play a relatively minor role in the ionic bonding of ThO, ThO⁺, ThF and ThF⁺. ThO and the ions HfF⁺ and ThF⁺ have been identified as excellent candidates for measurements that probe the electric dipole moment of the electron (a manifestation of CP symmetry violation). The characteristics that render these molecules favorable for studies of fundamental constants will be reviewed, and the first gas phase spectra for the Th fluoride and nitride species will be presented.

Host: Professor Doreen Leopold
Refreshments will be served prior to the seminar.