



## Glenn T. Seaborg Center Seminar

### 5f-element chemistry revealed by actinide ions in the gas phase

**Dr. John Gibson**

*Chemical Sciences Division, Oak Ridge National Laboratory*

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Reactions of atomic and molecular actinide ions in the gas phase elucidate fundamental aspects of 5f-element chemistry. Actinide ion electronic configurations are key in interpreting their reactivities, which can provide insights into the role of the quasi-valence 5f electrons. One focus is reactions of  $An^+$ ,  $An^{2+}$  and  $AnO^+$  ( $An = Th, Pa, U, Np, Pu, Am, Cm$ ) with small alkanes and alkenes. Hydrocarbon activation by a metal ion in the gas phase typically requires two chemically active valence electrons at the metal center for formation of  $\sigma$  bonds during oxidative insertion, as in  $C-M^+-H$ . The distinctive efficiencies of  $Pa^+$ ,  $Pa^{2+}$  and  $PaO^+$  in inducing such activation suggest extraordinary 5f-electron participation in organoprotactinium chemistry. Along with new developments in gas-phase organoactinide chemistry, we will present recent results for naked actinyls,  $AnO_2^{2+}$  ( $An = Pa, U, Np, Pu$ ), actinide-transition metal bonding in bimetallic ions,  $AnM^+$  ( $M = Ir, Pt, Au$ ), and synthesis of the “metalloactinyl”,  $OUIr^+$ . Central themes in this work are the interplay between experiment and theory, and the relevance to understanding “conventional” actinide chemistry.

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