

[ABSTRACT]

Fundamental aspects of actinide-zirconium pyrochlore oxides through systematic studies of transneptunium systems.

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Several zirconium/hafnium based, f-element oxide matrices have been promoted recently for different applications. Considered here is the solid-state materials science of certain pyrochlore oxides (e.g., $An_2M_2O_7$; An=actinide and M=Zr/Hf) in terms of the fundamental chemistry of five actinides (Pu, Am, Cm, Bk and Cf). We have pursued both the crystal and chemical restraints for these particular materials via systematic studies. Important aspects were the electronic energy levels and the pseudo-oxidation potentials of the f element. In cases where both an An(III) and a An(IV) state could be acquired, an interesting oxidization-reduction cycle was formulated. The presentation will provide structural comparisons and discuss important differences between these materials in terms of the chemistries of the f element incorporated. [Research sponsored by the Division of Chemical Sciences, Geosciences and Biosciences, OBES, USDOE under contract DE-AC05-00OR22725 with ORNL, managed by UT-Battelle, LLC].