Glenn T. Seaborg Center Seminar

Synthesis and Characterization of Actinide Nitrides and Oxide Solid Solutions

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Synthesis of actinide nitrides and their oxide solid solutions were performed using a novel route developed at UNLV. In this method, actinide oxide was mixed with excess ammonium bifluoride to produce ammonium actinide fluorides. Heating the ammonium actinide fluorides under O_2(g) and Ar(g) was utilized to synthesize the oxide solid solutions. The ammonium fluorides species were heated under NH_3(g) to synthesize actinide nitrides. Evaluation of four different systems was completed for nitride synthesis using this method. The reaction mechanism and kinetics of UN_2 decomposition to UN were determined. Microscopy (SEM and TEM) was employed to characterize the resulting uranium nitrides. Synthesis and characterization of ThNF and Th_2N_3 was also performed. A few new compounds were identified in the neptunium system. Among them, NpN_2 and Np_2N_3 are important because only NpN was the only known nitride of neptunium up to now.

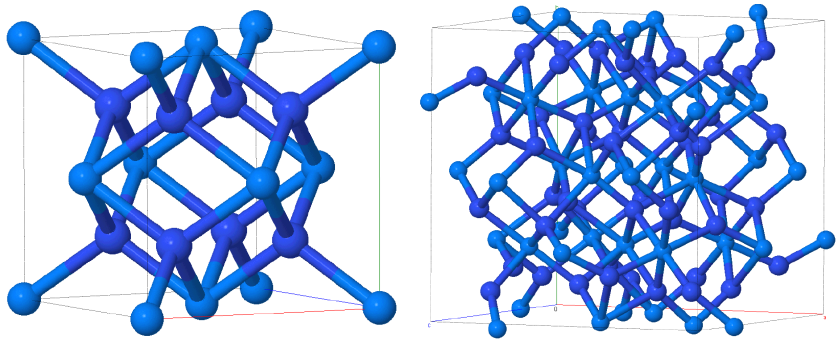

Figure 1. Unit cells of NpN_2 (left) and Np_2N_3 compounds.

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