

High Density Uranium Silicide Fuels – Fabrication and Oxidation Resistance

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U_3Si_2 is being considered as a promising accident tolerant fuel (ATF) currently under active development due to its high thermal conductivity and high fissile element density; however, U_3Si_2 is prone to oxidation at low temperatures under synthetic air and steam conditions. Innovative fuel design and fabrication are required for the development of the high density silicide fuels with enhanced oxidation and water corrosion resistance. Monolithic and composite U_3Si_2 fuels with sintering additives are fabricated by spark plasma sintering (SPS), and the microstructure and phase behavior of the SPS-densified silicide fuels are characterized and correlated with the sintering process. Dynamic oxidation and mechanical tests of the densified fuels are also performed and compared with the silicide fuels fabricated by conventional sintering. The concepts of using chemical doping and sintering additives for developing U_3Si_2 fuels with enhanced properties are also highlighted.