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Uranium nitride and silicide composite fuels used to reduce fuel oxidation

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Resumo:

: In the 1960s, the space nuclear program started reactor propulsion designs, sparking interest in uranium mononitride (UN) as a fuel. Since then, UN has become attractive due to its higher thermal conductivity and elevated uranium density compared with standard UO_2 . Reactors using sodium and lead as liquid coolants show a long experience with UN fuel. Recently, uranium UN mixed with uranium silicide (U_3Si_2) has been an option as a more tolerant fuel for power units. However, a few silicide compounds exist, such as USi , USi_2 , USi_3 , U_3Si , U_3Si_2 , and U_3Si_5 . Thus, nitride-silicide composites like UN- U_3Si_5 took the place of UN- U_3Si_2 in order to reduce the energetic interaction with steam and shield the nitride phase from water reactions. There is increasing interest in UN- U_3Si_5 fuel, which has a secondary fissile phase with an elevated uranium density. This way, we compare UN- U_3Si_2 and UN- U_3Si_5 using Kanthal APMT as cladding.