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Fabrication Characteristics of Injection-cast Metallic Fuels

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The fabrication process of metallic fuels for sodium-cooled fast reactor (SFR) was developed using the injection casting. U-Zr-RE(Nd-Ce-Pr-La) fuel slugs were fabricated and characterized to optimize the injection casting process. The microstructure examined by SEM showed that precipitates were uniformly distributed over the fuel slug. The fuel weight loss after the injection casting was measured to be about 1.5%. The reaction between the melt and the crucible was found to be significant in the fabrication of RE-containing fuel slugs compared to U-Zr fuel slugs. The pressurized injection casting method was also developed to fabricate the fuel slugs containing volatile elements. U-Zr-Mn fuel slugs were fabricated as a surrogate for Am-bearing metallic fuels under three different melting pressure conditions. From the chemical composition analysis by the ICP-AES method, no evaporation of Mn was detected in the fuel slugs fabricated under Ar atmosphere higher than 400 torr.

Country/Int. Organization

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