

Microstructural characterization of metallic fuel alloys

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The behavior of U-Pu-Zr fuels during reactor operation depends on the phase behavior of the alloy. Therefore, it is very important to the advancement of this fuel type that we understand the phase behavior. This contribution will report microstructural characterization results of the unirradiated and heat treated metallic Pu-based alloys. In addition, postirradiation examination (PIE) data on U-Pu-Zr fuels with different Zr content will be presented. The varying Zr content in fuel pins was used to study the effect of Zr on fuel restructuring and fuel-cladding compatibility. Multi-scale PIE activities were focused on the investigation of fundamental aspects of the fuel performance, such as species diffusion and migration, fission product behavior, and constituent redistribution. The microstructural data is used as a basis for the development of MARMOT models of U-Pu-Zr fuel performance at the mesoscale.