

Characterization of U-10wt%Zr Alloy Powder and Dispersion Type (U-10wt%Zr)-Zr Fuels

Choon Ho Cho, Bong Sang Lee, Won Seok Park, Byoung Oon Lee
Korea Atomic Energy Research Institute

Abstract

The characteristics of U-10wt%Zr alloy powder solidified rapidly by the centrifugal atomization process and dispersion-type (U-10wt%Zr)-xZr(x=50,55,60wt%) fuels have been examined. The results indicate that most of atomized U-10wt%Zr alloy powders have a smooth surface and frequently near-perfect spherical shape with few attached satellites. All phases of atomized powder are found to be α -U phases and δ -UZr₂ with fine and homogeneous structure, and as powder size decreases, these phases are much finer owing to high cooling rate. The atomized powder was cold pressed, and then hot extruded to rod at 1073K. During the extrusion, U-10wt%Zr particles are dispersed in Zr matrix by mechanical work, and they are broken and torn into harder Zr matrix.

UO₂, UO₂-Gd₂O₃ 및 UO₂-Er₂O₃의 용융점 측정 Measurement of the Melting Points of UO₂, UO₂-Gd₂O₃ and UO₂-Er₂O₃ Fuel

강기원, 양재호, 김건식, 이영우, 송근우, 김종현, 정연호

한국원자력연구소

대전광역시 유성구 덕진동 150

요약

UO₂, UO₂-6wt%Gd₂O₃, UO₂-12wt% Gd₂O₃, UO₂-2wt%Er₂O₃, UO₂-4wt%Er₂O₃ 핵연료에 대한 용융 온도를 측정하였다. Black body 조건에 맞는 형상을 갖도록 텅스텐 도가니를 준비하고, 핵연료 재료를 장입한 후 밀봉 용접하였다. 이 도가니를 전기유도로에서 가열하면서 "thermal arrest" 방법으로 용융점을 측정하였다. 용융점은 표준재료를 사용해서 보정하였다. 본 실험에서 구한 용융점은 다음과 같다: 2815℃(UO₂), 2787℃(6wt%Gd₂O₃), 2793℃(12wt%Gd₂O₃), 2807(2wt%Er₂O₃), 2808(4wt%Er₂O₃).