

분쇄방법을 달리한 $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ 혼합분말의 소결분위기 및 Li_2O 첨가에 따른
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Variation of Sinterability with Sintering Atmosphere and Li_2O Addition
for $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ Mixed Powder Milled with Different Milling Techniques

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요 약

분쇄방법을 달리한 $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ 혼합분말의 소결분위기 및 Li_2O 첨가에 따른 소결성 및 미세구조 변화를 조사하였다. $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ 분말을 बै취형 attrition mill로 분쇄처리를 한 후에, 1700°C , 환원성분위기에서 소결하면 밀도는 95%T.D. 이상이 되지만, 결정립분포는 불균일하여 $3\mu\text{m}$ 이하의 결정립이 cluster를 이루고 있는 부분과 약 $8\mu\text{m}$ 의 결정립이 형성되어 있는 부분이 모두 존재하였다. 2단계 연속식 attrition mill로 $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ 분말을 분쇄한 후에 1600°C , 1700°C 에서 환원성분위기로 소결하였을 때에는, 미세결정립 cluster가 거의 관찰되지 않고 결정립분포가 균일하였다. $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ 분말을 CO_2 분위기로 소결하거나, $0.1\text{wt}\%\text{Li}_2\text{O}$ 가 첨가된 분말을 환원성분위기로 소결하였을 때는, 두 분쇄방법에 따른 결정립분포의 차이는 거의 없었다.

Abstract

The variations of sinterability and microstructure were studied for $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ mixed powder by different milling techniques in terms of the atmosphere and Li_2O -doping. When $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ powder milled with batch-type attrition mill was sintered at 1700°C in reducing atmosphere, sintered densities were above 95%T.D., but grain size distribution was inhomogeneous and both micrograin clusters of the size below $3\mu\text{m}$ and grains of about $8\mu\text{m}$ existed in sintered pellet. When $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ powder milled with two-stage continuous attrition mill was sintered at 1600°C and 1700°C in reducing atmosphere, grain size distribution was homogeneous and also micrograin clusters were not observed. When $\text{UO}_2\text{-5wt}\%\text{CeO}_2$ powder was sintered in CO_2 atmosphere or that doped with $0.1\text{wt}\%\text{Li}_2\text{O}$ was sintered in reducing atmosphere, grain size distribution was almost the same for both batch-type and two-stage continuous attrition mill.