

Study of the interaction between UO_2 and U_3O_8 during the sintering of nuclear fuel pellets

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Nuclear fuel pellets are manufactured by sintering UO_2 with addition of U_3O_8 to control the microstructure and porosity. The aim of this study is to determine the impact of morphology and grain size of the U_3O_8 powder on the sintering. To assess the presence of chemical interactions between the two uranium oxides, the early stages of sintering are studied using a combination of High-Temperature-XRD and TGA measurements. In addition, using different UO_2 oxidation cycles, U_3O_8 powders are produced with “lamellar”, “dense”, and “fine granular” morphologies to study their effects on the sintering process. Dilatometric analyses and interrupted sintering experiments followed by microstructural observations using EBSD are used to determine a sintering map describing the evolution of density, grain and pores sizes as the sintering thermal cycle progresses. Correlating these data with kinetic laws will enable the identification of the involved sintering mechanisms. Ultimately, these results will help establishing the characteristics that make U_3O_8 more efficient in an industrial context.

Professional Status of the Speaker

Doctoral or Master Student

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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