

FORMATION OF A PUO/PUCO TYPE OXIDE LAYER AND ITS INFLUENCE ON THE HIGH TEMPERATURE COMPORIMENT ON THE δ PHASE OF PLUTONIUM

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Abstract:

Plutonium and its alloy share the particularity of being extremely sensitive to oxidation. This oxidation is widely addressed in the literature [1-3]. However, though the majority of the works agrees on the presence of an external PuO₂ layer covering an α -Pu₂O₃ layer (even sometimes a β -Pu₂O₃ layer), only a few works record the formation of a PuO/PuCO type oxide layer [4].

The aim of this present work is to present the first characterization results done on this PuO/PuCO type oxide layer, and its influence on the kinetics of the oxidation scale growth. The formation of this layer has been observed by XRD during post-scouring heating at 360°C in secondary void. Then, several ageings were made at 150°C under 100 mbar of O₂, with and without this PuO/PuCO type oxide layer, in order to determine its impact on the kinetics. During the exposures, XRD analyses were realized, allowing an *in-situ* characterization of the growth of the different phases making up the oxide layer [5]. These analyses also showed the protecting nature of this layer.

XPS analyses have also been realised in order to determine the chemical nature of this oxide layer. The first results show the presence of oxy-carbides coherent with the literature [4], and the presence of carbides. These results were obtained by progressively eroding the oxide layer by argon ion sputtering, allowing to establish a depth-profile.

References:

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