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Book of Abstracts

Chemical and Microstructural Characterization of Remelted Zircaloy by X-ray Fluorescence Techniques and Metallographic Analysis

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Brazilian nuclear reactors (PWR type) employ, as nuclear fuel, sintered UO₂ pellets Zircaloy clad. Brazil is self-sufficient in the nuclear fuel production since mining, enrichment and nuclear fuel manufacture processes, excluding production of Zircaloy, which is imported. Usually, Zircaloy scraps from nuclear fuel parts fabrication can't be discarded and are disposed in drums, without any treatment, contaminated by machining fluids and surface oxides due to a high contact area under non-controlled atmosphere. The recycling of this material is important for Brazilian Nuclear Policy, which targets the reprocess of Zircaloy residues for economical and environmental aspects reason. The cladding material has to present high mechanical and corrosion resistance properties, which are related to the material chemical composition and microstructural characteristics. The Zircaloy machining scraps were remelted using a VAR process (vacuum arc remelting). Usually, this process presents microstructural anisotropy due to the intense thermal gradient due to the solidification process. In this work, a remelted billet had the elemental composition determined by X-ray fluorescence techniques. The major elements Zr, Sn, Fe, Cr and Ni were determined by WDXRFS; Hf and contaminants determined by EDXRFS; the ICPAES technique was used for B determination. The billets microstructure was evaluated using optical and scanning electron microscopy.

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