Short Communication

Shifts in the Binding Energies of Cr2p, Fe2p and O1s electrons of Alloy Oxide Films in the Presence of Pb During High-Temperature Water Corrosion

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Pb (lead) in high-temperature pressurized water of a PWR secondary circuit may cause stress corrosion cracking in stainless steel and Ni-based alloys. A simulated primary circuit environment of PWR was employed to form an oxide film on stainless steel 304 and Incoloy 800 and investigate high-temperature water corrosion with trace additions of Pb. The morphology of the alloy surfaces suggested differences in whether protective spinel oxides or ineffective scaly oxides were formed with trace additions of Pb. The binding energies of chromium, iron and oxygen of the alloy oxide films were shifted to lower energies by Pb addition as verified from an XPS analysis.

Keywords: lead; PWR-type reactor; stainless steel; water chemistry

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