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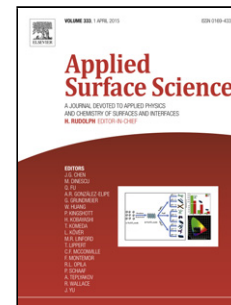
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Oxidation of Stainless Steel 316 and Nitronic 50 in Supercritical and Ultrasupercritical Water

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Abstract

Corrosion of stainless steel 316 and Nitronic 50 exposed to supercritical and ultrasupercritical water was studied as a function of temperature and exposure time. Post-exposure surface analysis was performed using Raman and X-ray photoelectron spectroscopies to determine the chemistry of the oxides formed as a result of the exposure. When exposed to supercritical water, Nitronic 50 and stainless steel 316 were observed to have similar weight gains; however, stainless steel 316 was found to gain less weight than Nitronic 50 in exposure tests performed in ultrasupercritical water. Stainless steel 316 developed surface films primarily composed of iron oxides, while the surface of Nitronic 50 contained a mixture of iron, chromium and manganese oxides. Based on these analyses, the differences in weight gain and oxidation characteristics of the two materials are attributed to the higher concentration of Cr and Mn in Nitronic 50 compared to stainless steel 316.

Keywords: Austenitic, Corrosion, Raman, XPS, and Oxide

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