

Effect of grain size on the isothermal oxidation of Fe-33Ni-19Cr alloys at 700 °C

Abstract

The isothermal oxidation behavior of two different grain size of Fe-33Ni-19Cr alloys was investigated at 700 °C in laboratory air. Different grain size of alloyed was made of solution annealing treatment at different temperatures, namely, 1050 °C and 1150 °C for fine and coarse grain, respectively. Optical microscopy, scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS) and X-ray diffraction (XRD) were employed in this study to analyze the oxidation behavior of solution-annealed samples. Results indicate that the fine grain size solution-annealed alloys possess a better oxidation resistance and reduced oxidation rate than the coarse grain. The differences observed are attributed to the finer grains increasing the relaxation of the oxide scale stress and improving the adhesion of the oxide layer on the matrix.

Keywords; Fe-Ni-Cr Alloy, Grain Size, Isothermal Oxidation