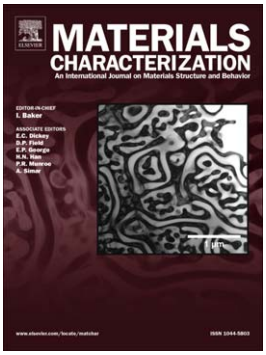

Abnormal Grain Growth in AISI 304L Stainless Steel

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Abnormal Grain Growth in AISI 304L Stainless Steel

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Abstract

The microstructural evolution during abnormal grain growth (secondary recrystallization) in 304L stainless steel was studied in a wide range of annealing temperatures and times. At relatively low temperatures, the grain growth mode was identified as normal. However, at homologous temperatures between 0.65 (850 °C) and 0.7 (900 °C), the observed transition in grain growth mode from normal to abnormal, which was also evident from the bimodality in grain size distribution histograms, was detected to be caused by the dissolution/coarsening of carbides. The microstructural features such as dispersed carbides were characterized by Optical metallography, X-ray diffraction, scanning electron microscopy, energy dispersive X-ray analysis, and microhardness. Continued annealing to a long times led to the completion of secondary recrystallization and the subsequent reappearance of normal growth mode. Another instance of abnormal grain growth was observed at homologous temperatures higher than 0.8, which may be attributed to the grain boundary faceting/defaceting phenomenon. It was also found that when the size of abnormal grains reached a critical value, their size will not change too much and the grain growth behavior becomes practically stagnant.

Keywords: Austenitic stainless steel; Grain growth; Secondary recrystallization.

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