Accepted Manuscript

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PII: S0022-3115(17)30302-1

DOI: 10.1016/j.jnucmat.2017.07.053

Reference: NUMA 50425

To appear in: *Journal of Nuclear Materials*

Received Date: 24 February 2017

Revised Date: 28 May 2017

Accepted Date: 27 July 2017

Please cite this article as: A. Telang, A.S. Gill, K. Zweiacker, C. Liu, J.M.K. Wiezorek, V.K. Vasudevan, Effect of thermo-mechanical processing on sensitization and corrosion in alloy 600 studied by SEM- and TEM-Based diffraction and orientation imaging techniques, *Journal of Nuclear Materials* (2017), doi: 10.1016/j.jnucmat.2017.07.053.

Effect of Thermo-Mechanical Processing on Sensitization and Corrosion in Alloy 600 Studied by SEM- and TEM-Based Diffraction and Orientation Imaging Techniques

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Abstract

In this study, we investigate the effect of thermo-mechanical processing (TMP) on the evolution of low coincident site lattice (CSL) grain boundaries ($3 \leq \Sigma \leq 27$) and thence on the precipitation behavior of carbides at various types of grain boundaries in Alloy 600. Detailed analysis of the microstructure using Electron Back-scattered Diffraction (EBSD) in the scanning electron microscope (SEM) as well as Precession Electron Diffraction (PED) and Energy Dispersive X-ray Spectroscopy (EDS) in the transmission electron microscope (TEM) has been used to study the effects of TMP on the precipitation of Cr carbides and Cr depletion. After TMP, the fraction of low-CSL grain boundaries is increased appreciably and the precipitation behavior of carbides is modified resulting in lower sensitization. The results showed that Σ3