Deformation-induced grain growth in ultrafine-grained Ni and Ni-Fe alloy

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The effect of compressive deformation on the microstructural variations was investigated on ultrafine-grained pure Ni, and Ni-5wt.%Fe synthesized through electrodeposition. Both samples were compressed to 5, 10, and 15% strain. Microstructural characterization such as grain size, strain, and grain boundary character distribution (GBCD) were performed before and after the deformation using the electron back-scattered diffraction (EBSD) technique. GCBD analysis revealed the presence of approximately 25% Σ3 boundaries in both the as-electrodeposited samples. Σ3 boundaries are expected to be generated during the electrodeposition process itself. The initial average grain size was nearly identical for both samples (150±92nm for pure Ni and 120±98nm for Ni-5wt.%Fe). In both cases, grain growth was observed as a result of deformation. The phenomena of grain growth could be attributed to the presence of clusters of grains less than 100 nm, which get coalescence under the applied stress. However, a difference in the rate of grain growth was observed in pure Ni and Ni-5%Fe. It could be related to the presence of solute in the case of Ni-5wt.%Fe.

Keywords: *Electrodeposition; deformation induced grain growth; Electron back-scattered diffraction.*

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