

Understanding the strengthening by annealing in cold rolled NiCrCo medium entropy alloy

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Abstract

Strengthening by annealing has been generally observed for low-temperature annealing of nanocrystalline materials synthesized by severe plastic deformation (SPD). In pure metals, this phenomenon is attributed to the reduction in the defect densities during annealing, whereas for nanocrystalline alloys grain boundary segregation is considered to be the primary cause. It is expected that the defect density would also reduce for SPD alloys. However, the interaction of these two effects on strengthening is not very clear. An attempt has been made in this study to understand the strengthening by annealing for equiatomic NiCrCo medium entropy alloy (MEA). An increase in hardness by nearly 20 percent was observed for low temperature annealing of cold rolled NiCrCo MEA alloy. Furthermore, the same trend was observed for cold-rolled samples with different amounts of reduction, i.e., an increase in hardness during low-temperature annealing. A detailed microstructural investigation is performed to understand the role of initial defect density on strengthening by annealing phenomenon.

Keywords: Annealing, strengthening, microstructure, medium entropy alloy

References:

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