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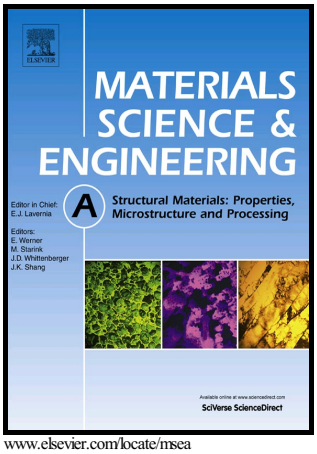

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The effects of phase transformation on the microstructure and mechanical behavior of $FeNiMnCr_{0.75}Al_x$ high-entropy alloys

Rongbin Li[b,a*], Weiwei Zhang[a], Yong Zhang[c] , Peter K Liaw[d]

[a]*School of Materials Science and Engineering, University of Shanghai for Science and Technology, Shanghai 200093, P. R. China.*

[b]*Institute of Materials Science, Shanghai Dian Ji University, Shanghai 201306, P. R. China.*

[c]*State Key Laboratory for Advanced Metals and Materials, University of Science and Technology Beijing, Beijing 100083, China.*

[d]*Department of Materials Science and Engineering, the University of Tennessee, Knoxville, Tennessee 37996, USA.*

[*]Corresponding author: Tel.: 15116800186; 842363159@qq.com

Abstract

The effects of phase transformation on the microstructures and mechanical behavior of $FeNiMnCr_{0.75}Al_x$ (x = 0.25, 0.5 and 0.75) high-entropy alloys (HEAs) were investigated. The crystal structures of the $FeNiMnCr_{0.75}Al_x$ HEAs transitioned from the primary FCC1 and minor BCC (x = 0.25) to primary BCC and minor FCC2 (x = 0.5 and 0.75) phases. TEM images of the as-cast $FeNiMnCr_{0.75}Al_x$ (x = 0.25, 0.5 and 0.75) alloys showed the BCC precipitates embedded in the FCC matrix phase. After annealing, two substantial phase transitions occurred for the x = 0.25 and 0.5 alloys from the BCC phase to the σ phase and between the FCC2 phase and the FCC1 phase, effectively increasing the yield strength and sharply reducing the strain. The