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Effect of Co content on the mechanical properties of A2 and B2 phases in $AlCo_xCrFeNi$ high-entropy alloys

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Abstract

The effect of entropy on the strengths of the disordered and ordered phases was investigated. Cost effective $AlCo_xCrFeNi$ (x=0, 0.25, 0.5, 0.75, and 1) high-entropy alloys were fabricated reducing Co content. The strength was considerably reduced when the Co content was zero. This was attributed to the low hardness of the A2 phase due to reduced configurational entropy compared with quinary system. On the other hand, the ordered B2 phase showed the opposite tendency. This result shows that the configurational entropy causes opposing effects on disordered and ordered phases, and the importance of considering the effect of entropy on each phase when the number of elements changed, and an alloy is composed of two or more phases, in particular, having BCC structure.

Keywords: High entropy alloy; Indentation; Hardness