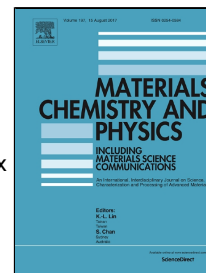


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Effects of reducing Co content on microstructure and mechanical properties of $\text{Co}_x\text{CrFeNiTi}_{0.3}$ high-entropy alloys

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Abstract

In this work, three high-entropy alloys of $\text{Co}_x\text{CrFeNiTi}_{0.3}$ ($x = 1.0, 0.8,$ and 0.6 molar ratio) were prepared by arc melting. We studied the effects of reducing Co content on the microstructure and mechanical properties of the alloys. The crystal structures of the three alloys consisted of the major FCC phase and the minor $\eta + \sigma$ phases. When the Co content was reduced from 1.0 to 0.6, the volume fraction of $\eta + \sigma$ phases rose from 13% to 26%, while the hardness and yield stress increased from HV 366 up to HV 436, and from 522 MPa to 667 MPa, respectively. However, the compressive strength and fracture strain decreased from 1290 MPa to 955 MPa, and from 0.56 to 0.24, respectively. The experimental results showed that, for a ductile high-strength $\text{CoCrFeNiTi}_{0.3}$ alloy, reducing the Co content degraded its mechanical properties.

Keywords: High-entropy alloy; Microstructure; Hardness; Compressive test

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