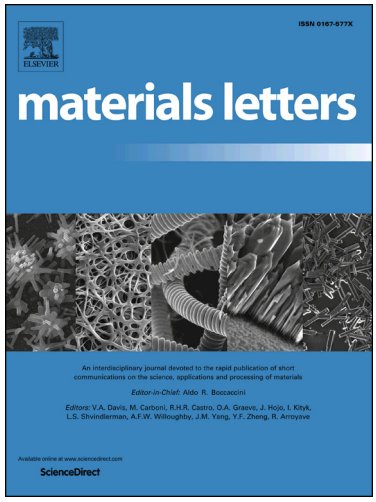

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Strengthening of $Fe_{40}Mn_{40}Co_{10}Cr_{10}$ high entropy alloy via Mo/C alloying

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Abstract The effects of the addition of Mo and C elements on the microstructure and room-temperature mechanical properties of $Fe_{40}Mn_{40}Co_{10}Cr_{10}$ high-entropy alloy (HEA) were investigated. The yield strength of the HEA increased from 240 MPa to 560 MPa through the addition of 1 wt% Mo and 1 wt% C. The strengthening mechanism of the HEA was found to be mainly attributed to the solid-solution strengthening. Surprisingly, the addition of Mo and C also prompt the deformation twinning in the HEA, which enhances the working hardening ability and basically maintains the large plasticity.

Keywords: Metals and alloys; High-entropy alloys; Deformation and fracture; Mechanical properties; Solid-solution strengthening.

1. Introduction

Face-centered-cubic (FCC) structured high-entropy alloys (HEAs) are currently receiving extensive attentions due to their excellent ductility and high fracture toughness [1-5]. However, the plasticity of the HEAs is often surplus while their strength is generally insufficient. Consequently, fine-grain strengthening [6] and precipitation strengthening [7] have been introduced to improve the strength of the HEAs, however these tactics are accompanied by obvious decrease in plasticity. Recently, substitution Mo [8] or interstitial C [5, 9] strengthening offers another route to improve their