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Theoretical evaluation of solid solution interaction in  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  medium- and high-entropy alloysMaya Putri Agustianingrum <sup>a, 1</sup>, Ibrahim Ondicho <sup>a, 1</sup>, Dennis Edgard Jodi <sup>a, 1</sup>, Nokeun Park <sup>a, b</sup>  , Unhae Lee <sup>c</sup>  [Show more](#)<https://doi.org/10.1016/j.msea.2019.05.082>[Get rights and content](#)

## Abstract

Solid solution interaction in medium- and high-entropy of  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  ( $x=20, 40, 50,$  and  $60$  at. %) alloys was evaluated theoretically. The different Fe contents were found to affect the yield strength ( $\sigma_y$ ) of the  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  system, with higher Fe content leading to reduced  $\sigma_y$ . The focus of this study was to investigate, using various theoretical approaches, the effect of different Fe contents on the solid solution interaction in the  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  system. The theoretical approaches demonstrated a decreasing atomic size misfit with increasing Fe content, which reduced lattice distortion. The critical resolved shear stress for slip to occur also decreased with increasing Fe content, leading to the least solid solution contribution with higher Fe content in the  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  system. The solid solution interaction of the  $\text{Fe}_x(\text{CoCrMnNi})_{100-x}$  system at lower temperature was also observed, showing good agreement with the results obtained at room temperature.

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