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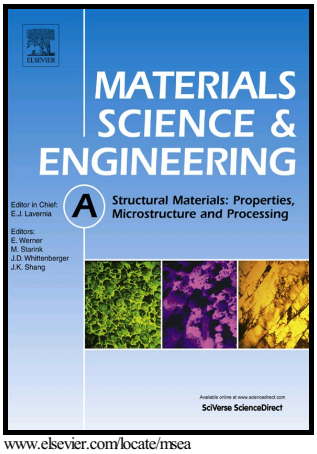

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PII: S0921-5093(18)30215-6
DOI: https://doi.org/10.1016/j.msea.2018.02.031
Reference: MSA36118

To appear in: *Materials Science & Engineering A*

Received date: 9 August 2017
Revised date: 6 February 2018
Accepted date: 7 February 2018

Cite this article as: Jeong Min Park, Jongun Moon, Jae Wung Bae, Min Ji Jang, Jaeyeong Park, Sunghak Lee and Hyoung Seop Kim, Strain rate effects of dynamic compressive deformation on mechanical properties and microstructure of CoCrFeMnNi high-entropy alloy, *Materials Science & Engineering A,* https://doi.org/10.1016/j.msea.2018.02.031

Strain rate effects of dynamic compressive deformation on mechanical properties and microstructure of CoCrFeMnNi high-entropy alloy

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Abstract

In this work, the effects of strain rate on mechanical deformation and microstructural evolution of CoCrFeMnNi high-entropy alloy (HEA) under quasi-static and dynamic compression were investigated. The HEA exhibited high strain-rate sensitivity values (m = 0.028) of yield strength under quasi-static conditions. In particular, due to the viscous drag effect, the variation of yield strength with strain rate under dynamic compression was much larger than that under quasi-static compression. Microstructural analysis using electron backscatter diffraction shows profuse twinning under both conditions. The dynamically deformed specimens exhibited strongly localized deformation regions (i.e., adiabatic shear bands). The process of dynamic compressive behavior in this HEA is competitive between hardening by dislocation and twinning, and thermal softening. To analyze numerically the flow behavior of the HEA under dynamic conditions, the modified Johnson-Cook model considering