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Influence of severe straining and strain rate on the evolution of dislocation structures during micro-/nanoindentation in high entropy lamellar eutectics

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1 **Influence of severe straining and strain rate on the evolution of dislocation**
2 **structures during micro-/nanoindentation in high entropy lamellar eutectics**

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16 **ABSTRACT**

17 Eutectic high entropy composites (EHECs) can exhibit an excellent combination of high strength
18 and high ductility; however, the mechanisms responsible for the strength-ductility trade-off
19 remain unpredicted. The influence of strain rate ($\dot{\epsilon}$) on the severe deformation imposed by high-
20 pressure torsion (HPT) was used to evaluate the deformation mechanisms for a series of
21 CoCrFeNiNb_x (x molar ratio, $0 \leq x \leq 0.80$) EHECs. Systematic and detailed micro-/
22 nanoindentation investigations were performed and the results suggest that strain hardening
23 (Taylor hardening) and grain-boundary strengthening (H - P strengthening) are the predominant
24 strengthening mechanisms. Nanoindentation at different loading conditions (varying $\dot{\epsilon}$) revealed
25 that the measured hardness in the eutectic regime increases gradually because of dislocation-
26 lamellae-interface interactions. Based on the deformation mechanisms operating at different

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