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Abstract

The polycrystalline face-centered cubic high-entropy alloy CrMnFeCoNi was deformed under tension at temperatures between 4 K and 973 K and a strain rate of 10⁻⁴ s⁻¹. The microstructure was analyzed by electron backscatter diffraction. The texture was measured by diffraction of synchrotron radiation. Depending on the stress-strain behavior, microstructure and texture, different characteristic temperature ranges can be distinguished. While at all temperatures the deformation is dominated by dislocation slip, below 125 K mechanical twinning and above 775 K dynamic recrystallization contribute to the plastic deformation. Moreover, below 25 K serrated flow takes place. The texture represents a <111> <100> double fiber parallel to the tensile axis. It changes with respect to the volume fractions of the fibers in the characteristic temperature ranges. Accompanied by texture simulations, the texture changes are discussed with respect to mechanical twinning, non-octahedral slip, dislocation cross-slip and climb, and dynamic recrystallization.

Presenter: Prof. SKROTZKI, Werner