

COMPOSITION EFFECTS IN ALLOY PLASTICITY

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ABSTRACT

A fundamental problem of strength of alloys is the dependence of plastic yielding and hardening on alloy composition. Classical research in this area has focused on evaluating the effects of solutes or precipitates on the onset of plastic yielding. Solute effects also play an important role in dynamic strain ageing phenomena, where solute-dislocation interactions cause serrated stress-strain behavior. With the advent of additive manufacturing and the development of compositionally complex alloys, the question of compositional heterogeneities and short-range order effects on dislocation plasticity of structural alloys has become important, given the possibility of controlling, at least partially, the composition heterogeneities in alloys, from the atomic to the structural scale. These same issues/questions do also apply to irradiated materials, where composition inhomogeneities develop as a result of inverse-Kirkendal effect. This symposium seeks participation of researchers interested in both dislocation dynamics and the connection to mechanical properties of compositionally complex alloys. Topics of interest include but are not limited to:

- Compositional effects on dislocation mobility and cross slip.
- Dislocation dynamics and self-organization in inhomogeneous alloys.
- Interaction between solute hardening and strain hardening in alloys.
- Pinning/depinning mechanisms in alloys and plastic instabilities.
- Plasticity-induced atomic disorder.
- Mesoscale coherency strain due to compositional heterogeneities and their impact on plasticity.
- Dynamic strain ageing phenomenon in alloys.
- Continuum level investigations of solute effects in alloys.

Experimental, theoretical, multi-scale modeling, data-driven and machine learning contributions related to the above topics, and spanning monotonic, cyclic and fracture behavior of alloys are all encouraged.