TMS 2018
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PHOENIX, ARIZONA

SUBMIT AN ABSTRACT TO:

PHYSICAL METALLURGY

NON-EQUILIBRIUM FEATURES OF GRAIN BOUNDARIES

The interfacial regions separating different grains in polycrystalline materials, while occupying only a small fraction of total volume, largely control the system's properties, including mechanics, mass/heat transfer, radiation resistance, etc. The misorientation angle has been widely used to describe the structures of grain boundaries (GBs), but only a few types of GBs (i.e. with low energy and some special "coincidence number" S) are well understood at the current stage. In reality, given the large variety of possible geometries, the higher disorder levels at interfaces, and their different responses to external stimuli, global equilibrium is rarely achieved in GBs of polycrystalline materials. In contrast, the large scale of non-equilibrium metastable states and the thermodynamics and kinetics therein play decisive roles in determining the GBs' properties and their microstructural evolutions.

This symposium aims to accelerate the development of new concepts and methodologies in effectively describing GBs. The role of disorders at interfaces, the broad distributions of energies and activation barriers, and their interplays with complex surrounding environments will be a particular focus. Both experimental and theoretical (including modeling and simulation) studies are encouraged. The topics of interest to this symposium include the following:

- Energetics and activation barriers spectra in materials with high levels of disorder (e.g. grain boundaries, amorphous states, etc.)
- Non-equilibrium thermodynamics and metastabilities of grain boundaries
- Novel experimental and theoretical techniques for microstructural characterization of interfaces
- Interactions between interfaces and extrinsic defects (e.g. dislocations, point defects, impurities, etc.) and their mechanical consequences
- Grain boundary kinetics and phase transformations at different external stimuli (e.g. mechanical loading, temperature variation, irradiation, etc.)

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