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Mechanics and Structural Reliability

Deformation and Transitions at Grain Boundaries VII

It is well established that grain boundaries are nucleation sites for dislocations, twins, and phase transformations. Deformation at the microstructural scale is heterogeneous, due to differences in elastic properties and deformation resistance of specific grain boundaries with respect to an externally applied stress. This can lead to differences in strain accumulation, cause structural changes and transformations within the boundary, and generate gradients in neighboring grains. Due to these effects, the local stress and strain tensors can differ significantly from globally imposed stress states.

This symposium will examine how heterogeneous strains and transformations originating from grain boundaries can be characterized, analyzed, modeled, and used to account for and ultimately predict continuum scale properties, involving all aspects of material production and service, from initial solidification or consolidation to crack or void nucleation, and the processes by which damage coalescence becomes large enough to be modeled with continuum modeling strategies. Topics anticipated include, but are not limited to:

- Characterization of heterogeneous strains due to grain or phase boundaries
- Atomistic modeling of deformation that includes grain or phase boundaries
- Boundaries as dislocation or partial dislocation sources and sinks
- Slip transfer/slip penetration and deformation details at interfaces
- Meso-scale modeling of ensembles of grains
- Crystal plasticity and/or transformation modeling
- Damage and crack nucleation at grain or phase boundaries
- Influence of grain boundary structure or character on microstructure evolution
- Concurrent dislocation generation and recovery processes at grain boundaries
- Influence of grain boundary precipitates on plasticity and phase transformations
- Coupling between the local grain boundary structure and other properties of materials
- The composition, structure, stability, and transition of grain boundary complexion (a.k.a., 2-D interfacial “phase”)
- Influence of alloy or impurity atoms on localized boundary deformation
- Formation of boundaries during deformation such as cell-wall structure, GNBs, IDBs, cell-block boundaries, etc.

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Abstract Deadline is July 1, 2019. Submit online at
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