Symposium | A. Advances in Materials Theory for Multiscale Modeling

[SY-A3] Symposium A-3

Chair: Katsuyo Thornton(University of Michigan, Ann Arbor, United States of America)
2018年10月30日(火) 09:45 ～ 11:00 Room6

[SY-A3]Challenges and gaps in length and time scaling of dislocation models

Invited

○David L McDowell (Woodruff School of Mechanical Engineering, Georgia Institute of Technology, United States of America)

We consider multiple crystalline plasticity model constructs that address evolution of dislocation structures over a broad range of length and time scales, from atomistic modeling and coarse-graining strategies through discrete dislocation theory to reduced order generalized and local continuum models. The predictive character of each construct is considered, along with the notion of uncertainty of modeling phenomena at various scales and for two-scale transitions, either concurrent or hierarchical in nature. In each case, we list the set of phenomena that each model construct addresses. Challenges to modeling the evolution of the dislocation network are discussed, including the important role of the entropic barrier to collective dislocation bypass of obstacles. Gaps and future challenges are summarized.