

[PO-F1]Poster Session 1

Symposium F

Mon. Oct 29, 2018 5:45 PM - 8:00 PM Poster Hall

**[P1-44]Combining 4D experiments and phase-field modeling to
determine reduced grain boundary mobilities**

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Reduced grain boundary mobilities play an essential role in accurate multi-scale modeling of grain growth in polycrystalline materials. The reduced mobility is a function of a large five-dimensional parameter space. Traditional bi-crystal experiments only determine one point in this space at a time. In this paper, we present a method to determine the reduced mobilities by comparison between 4D experiments and phase-field simulations. The growth of 1327 grains in a pure iron sample is visualized in 3D using diffraction contrast tomography (DCT) at a synchrotron source. Using the first time-step from the experimental microstructure as input, the evolution of the entire grain structure is simulated using a phase-field model. A fitting approach is applied to find the set of reduced mobilities that yield the best match between the experimental microstructure and the simulated microstructure. An efficient fitting algorithm is constructed based on a sensitivity analysis. The fitting algorithm converges fast, and more than 1000 reduced mobilities can be determined simultaneously.