

UNIVERSITY OF CALIFORNIA, IRVINE

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

IS PROUD TO HOST A SEMINAR BY

***“UNDERSTANDING THE IMPACT OF GRAIN
BOUNDARY INCLINATION ON GRAIN GROWTH USING
MODELING AND SIMULATION AND EXPERIMENTS”***



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Thursday, January 22, 2026

2:00 PM - 3:20 PM

McDonnell Douglas Engineering Auditorium

Abstract: Recent experiments using non-destructive 3D characterization has shown that our understanding of grain growth mechanisms is incomplete. Grain boundary (GB) migration is being driven not just to reduce the GB area but to also reduce the GB energy via GB reorientation and replacement. These mechanisms are related to the impact of a GB's inclination on its energy. In this work we use modeling and simulation together with 3D non-destructive characterization of grain growth experiments to understand the impact of GB inclination on grain growth behavior. We start by illustrating how inclination dependence is added to a Monte Carlo Potts model. We then use models of inclination-dependent grain growth to help interpret results shown in grain growth experiments of textured alumina slip cast in an applied magnetic field. We end by using models of inclination- and misorientation-dependent grain growth to understand GB migration opposite the direction of the GB curvature that has been observed in grain growth of SrTiO_3 .

Bio: Michael R. Tonks is the Interim Department Chair and Alumni Professor of Materials Science and Engineering at the University of Florida. Prior to joining UF in the Fall of 2017, he was an Assistant Professor of Nuclear Engineering at the Pennsylvania State University for two years and a staff scientist in the Fuels Modeling and Simulation Department at Idaho National Laboratory for six years. Prof. Tonks was the original creator of the mesoscale fuel performance tool MARMOT and lead its development for five years. He helped to pioneer the approach taken in the DOE Nuclear Energy Advanced Modeling and Simulation (NEAMS) program to use multiscale modeling and simulation to inform the development of materials models for the BISON fuel performance tool that are based on microstructure rather than burn-up, and he won the NEAMS Excellence Award for that work in 2014. He also won the Presidential Early Career Award for Scientists and Engineers in 2017 and the TMS Brimacombe medal in 2022. His research is focused on using mesoscale modeling and simulation results coupled with experimental data to investigate the co-evolution of microstructure and properties in materials in harsh environments.

