CENTER FOR MATERIALS PROCESSING AND TRIBOLOGY SEMINAR

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Tuesday, July 9, 11:00 AM
Michael Golden Labs (MGL) Room 1315 – MGL Conference Room

Modelling microstructure evolution in polycrystalline materials

Abstract

Many materials such as ice, metals and their alloys and ceramics are polycrystalline, consisting of several grains (crystallites) separated by grain boundaries. These grain boundaries are mobile, especially under applied stress or at moderate to high homologous temperatures. The motion of the grain boundaries is curvature driven and causes larger grains to grow at the expense of smaller grains. This effect is particularly significant for ultrafine grained and nanocrystalline materials. Since the mechanical properties of a polycrystalline material are strongly dependent on its grain size (for example, the strength of a material increases with decreasing grain size as given by the Hall-Petch relation), its control has been an important quest for materials scientists. One of the primary means of grain size control is through pinning of the grain boundaries by second phase particles.

In this talk I will discuss a theoretical model of pinning of grain boundaries by mobile and immobile second phase particles. I will also present a mesoscale phase field model to describe polycrystalline grain growth in the presence of second phase particles.

About the Presenter

Srikanth Vedantam is an Associate Professor in the Department of Engineering Design at the Indian Institute of Technology, Madras, India. He obtained his B.Tech degree from IIT Madras, MS from Penn State, and ScD from MIT under the mentorship of Prof. Rohan Abeyaratne. His previous positions include Assistant Professor at National University of Singapore and Mechanical Engineer at General Electric R&D at Schenectady, NY.

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