

An Indian-Australian research partnership

Analysis of micro yielding activity in metals

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The problem

Specifically we are interested in exploring the role of grain orientation on dislocation activity. In polycrystalline materials, dislocation activity in one crystal will influence the activation and propagation of similar dislocation activity in the adjoining crystal. The impact of this influence is dependent on the relative orientation of the two crystals. Since modeling an entire polycrystalline sample is rather difficult, we propose to use bi-crystals as model systems, to understand how dislocation activity in one grain and subsequent accumulation of dislocations at the grain boundary influences yielding in a neighboring grain.

The project involves simulating dislocation motion and interactions using dislocation dynamics (DD), and carrying out experiments that can be used to validate simulation results. We will initially focus on single crystals (the material needs to be decided), and then work on bicrystals of the same material.

The project

The aim of this project is to examine at the microscopic phenomena that occur in the early stages of yielding in metals, and subsequently to extend it to model the early stages of grain fragmentation.