

MD Simulation of Metallic Solidification under Shear Flow

In the presence of gravity, growth of a crystal from the melt is inevitably accompanied by convection. This is known to have a strong influence on growth velocity and morphology.

We perform Molecular Dynamics simulations of a nickel crystal growing into its melt under shear flow condition. The system is out of equilibrium in two respects: The undercooling provides the driving force for the crystallization and the shear rate introduces a new time scale into the system. We discuss how this affects the growth behavior.