Grain Boundary Motion Assisted via Displacement Cascades in bcc Fe

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We study the influence of displacement cascades on grain boundary (GB) structure and stability in bcc Fe using molecular dynamics simulations. The crystal geometry considered in this work corresponds to a Sigma = 5,(310)[001] symmetric tilt boundary with a tilt angle of 36.9 degrees. We find that under the action of diplacement cascades, GB motion, i.e. sliding or migration, is activated at lower internal stresses as compared to unirradiated GBs. We observe how radiation-induced GB damage aids the nucleation mechanisms that trigger GB motion depending on the nature of the internal stress. Our results suggest that radiation-induced GB sliding may provide a viable atomistic mechanism that could promote irradiation creep via GB accommodation processes.