

Ion beam interaction with Semiconductors and nano-scale materials

While traveling through a material energetic ions lose energy by nuclear (Sn) and electronic (Se) energy loss. Sn is an elastic energy loss process that is well described by Rutherford scattering cross-section. This stochastic binary collision process produces vacancies and interstitials and their complexes. With increasing energy Se dominates over Sn and peaks at around 1 MeV/nucleon. This inelastic energy process generates energetic electrons through the Coulomb interaction of the nuclear charge of the projectile and the bound and free electrons in the material. These energetic electrons generate thermal spike along the ion path by interacting with the lattice. Beyond a material-dependent threshold, a collective atomic movement is possible leading to an ion track. In this talk, I shall discuss how thermal spike which is unique to swift heavy ions is used for the shaping of nano-particles. And to modify semiconductors, namely recrystallization of partially damaged semiconductors and controlled defect formation. Also, discuss the possible utilization of radioactive ions to study these effects.

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