

Mechanism of bijunction semiconductor device damage induced by heavy particles

Abstract

The physical phenomena associated with the stopping of energetic ions in semiconductor materials have always been a subject which receives great theoretical and experimental interest. Consequently, bombardment of high energy particles and high energy gamma (?) rays causes potential hazards to these electronic systems. These effects range from degradation of performance to functional failure that can affect the system operations. Such upsets becoming increasingly likely as electronic components are getting more sophisticated while decreasing in size and moves to larger integration. In this paper, the penetration of gamma rays, utilizing Cobalt-60 (Co-60)) into bipolar junction transistor (BJT) is being simulated using the program simulation SRIM. From the findings, it is observed that the penetration of Co-60 ions into the simulated BJT leads to production of lattice defects in the form of vacancies, defect clusters and dislocations. These can alter the material parameters and hence the functional properties of the devices.