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Probability of divacancy trap production in silicon diodes exposed to focused ion beam irradiation

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Abstract | **References (17)** | **Article Objects (4)** | **Related Content**

We present ion beam induced charge (IBIC) measurements of the critical displacement damage dose D_d values and modeling of the probability of divacancy trap production in p^+-n-n^+ silicon diodes exposed to megaelectron volt energy ion beam irradiation. The normalized induced charge (Q_0/Q) measured by He ion probe in tested silicon diodes irradiated by focused He, Li, O, and Cl ion beams with energies of about 0.3 MeV/u increases linearly with D_d according to the modified radiation damage function and nonionizing energy loss (NIEL) theory. A simple IBIC model based on Gunn theorem showed clear dependence of the induced charge Q and corresponding equivalent damage factor K_{ed} value on both a depth profile of charge created by ionizing particle (probe) and a depth distribution of stable defects created from primary defects produced by damaging ions. The average probability of the divacancy production (defined as the ratio of the final electrical active defect quantity and primary ion induced vacancy quantity for each impinging ion) of 0.18 (18%) was calculated by the IBIC modeling for all damaging ions.