THERMAL ANNEALING OF RADIATION-INDUCED DEFECTS IN n-Si IRRADIATED WITH FAST REACTOR NEUTRONS

G.P. Gaidar, A.P. Dolgolenko, P.G. Litovchenko

Institute for Nuclear Research,
Nat. Acad. Sci. of Ukraine
(*47, Nauky Ave., Kyiv 03680, Ukraine;*
e-mail: gaidar@kinr.kiev.ua)

S u m m a r y

Thermal stability of defect clusters in n-Si grown by the Czochralski technique (Cz) and irradiated with fast reactor neutrons has been studied. The effective concentration of carriers ($n_0 = 1.2\times10^{14}$ cm^{-3}) obtained in silicon after a number of isochronal annealings followed by its irradiation to a fluence of fast reactor neutrons $\Phi = 3.75 \times 10^{13}$ neutron/cm^2 has been described in the framework of the corrected defect cluster model. Three stages of the annealing of the clusters of defects with the following activation energies and frequency factors have been identified: $E_{a1} = 0.81$ eV, $\nu_1 = 5.4 \times 10^6$ s^{-1}; $E_{a2} = 0.4$ eV, $\nu_2 = 1$ s^{-1}; and $E_{a3} = 1.3$ eV, $\nu_3 = 6 \times 10^4$ s^{-1}. The deformation potential of defect clusters was demonstrated to reduce the activation energy of A-center annealing (E_a = 1.5 eV) in a conducting matrix. It is established that the effective radius of the interstitial-type defect capture by defect clusters is determined by the barrier of defect capture by divacancies ($U_{\mathrm{b}} = 0.41$ eV).