11. RADIATION HARDNESS OF SILICON DOPED BY GERMANIUM WITH HIGH CONCENTRATION OF FREE OXYGEN

M. D. Varentsov, G. P. Gaidar, A. P. Dolgolenko, P. G. Litovchenko

Radiation hardness of Czochralski grown n-type silicon samples, doped by germanium ($N_{Ge} = 2 \cdot 10^{20}$ cm^{-3}) and without that was investigated after irradiaton by fast neutrons of WWR-M reactor at room temperature.The dependence of effective carrier concentration on fluence was described in the framework of the improved Gossick's model. It was found that the introduction of germanium leaded to the increase of n-Si radiation hardness by factor of seven times. The isothermal annealing of n-Si<Ge> after fluence $1{,}4 \cdot 10^{14}$ n$^{o}\cdot$cm^{-2} was studied for three temperatures. It was shown that the annealing of defect clusters is caused by the annihilation of vacancy type defects in clusters with the interstitial defects. Migration energy and frequency factor for di-interstitial ($E_1 = 0{,}74$ eV; $\nu_1 = 3{,}5 \cdot 10^6$ s^{-1}), for silicon interstitial atom ($E_2 = 0{,}91$ eV; $\nu_2 = 7 \cdot 10^7$ s^{-1}) and for vacancy ($E_v = 0{,}8$ eV; $\nu = 1 \cdot 10^7$ s^{-1}) were determined.