# LONG-RANGE EFFECTS IN SILICON SINGLE CRYSTALS IRRADIATED WITH PROTONS AND ALPHA-PARTICLES

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S u m m a r y

Radiation effects in silicon single crystals irradiated with protons of the energies $E = 6.8$, 43, and 50 MeV at the fluences $\Phi = (1 \div 3) \times 10^{17}$, $1 \times 10^{17}$, and $5 \times 10^{16}$ cm$^{-2}$, respectively, and with alpha-particles of the energy $E = 27.2$ MeV at the fluence $\Phi = 1 \times 10^{17}$ cm$^{-2}$ have been studied. The extension of a periodic defect structure into the region located behind the ion stopping range has been revealed ("long-range effects"), which cannot be explained in the framework of the available ion implantation theory. The effect of the proton radiation on an increase of the thermal defect generation in crystal growth layers located in this region is found to be more intensive and to occur at a temperature by 50° lower than that in the proton free-path region. In the case of the irradiation with alpha particles, the formation of a defect structure in the form of defect walls oriented perpendicularly to the ion beam and extending over the ion stopping range and behind it was detected. We associate the formation of a periodic defect structure with the self-organization of radiation-induced defects, and the extension of the radiation effect into the region behind the ion stopping range with a probable implementation of the soliton mechanism of propagation.