THE DEPENDENCE OF ELECTROPHYSICAL PROPERTIES OF HIGH-RESISTANCE n-SI, GROWN BY VARIOUS METHODS ON FAST-PILE NEUTRONS FLUENCE

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Silicon n-type samples with resistivity ~$2.5 \cdot 10^3$ Om · cm grown by the method of the floating-zone (FZ) in vacuum, in argon atmosphere (Ar) received by the method of transmutation doping (NTD) are investigated at room temperature before and after irradiation by fast-pile neutrons. Our experimental studies has shown that the radiation hardness of n-type silicon is determined in the first place by the introduction rate of the defect clusters and then already by the introduction rate of point defects in conducting matrix of n-Si. The effective concentration of carriers, measured at room temperature, is determined in the framework of Gossick's model taking into account the recharges of defects both in conducting matrix of n-Si and in the space-charge region of defect clusters. The temperature dependence of the concentration of carriers in conducting matrix of n-Si is simulated with constant introduction rate of two acceptor levels at (E_c – 0,43 eV) and (E_c – 0,315 eV) under the calculating of the dependence dose of effective concentration of carriers. Our research has shown that neutron-transmutation-doped n-Si, grown by the method of a floating-zone in argon atmosphere possess the increased radiation hardness.