INFLUENCE OF Γ-IRRADIATION ON ELECTROPHYSICAL PROPERTIES OF INDIUM SELENIDE

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VAC in indium selenide and InSe+0.2%Sn, InSe+0.4%Sn before and after γ- irradiation which approximates at three areas were investigated. The first area is an ohmic area, the second one is "arrester" quadratic area, and the third one is the area of sharp growth. The theory of space charge restricted current (SCRC) was used for interpretation of experimental results, which is expressed as the following [1]:

$$I = \frac{9}{8}\varepsilon\varepsilon_0\mu\theta\,\frac{V^2}{L^3}$$

Here ε_0-dielectric constant; ε – dielectric permeability of crystal; θ - trapping factor; L- thickness of crystal; μ -charge carrier mobility; V – applied electric tension.

Before irradiation: trapping factor θ=0.21; equilibrium concentration of current carrier P_0=1·10^{11}sm^{-3}; concentration of ionizing centers N_t=4·10^{12} sm^{-3}, energy of occurrence depth E_t=0.41eV and after γ-irradiation (dose $D\gamma$=50 krad) the following results were obtained: trapping factor θ=0.03; equilibrium concentration of current carrier P_0=2.1·10^{10}sm^{-3}; concentration of ionizing centers Nt=6·10^{11}sm^{-3}; energy of occurrence depth E_t=0.35 eV.

The obtained results authenticate that decrease of hole concentration at low irradiation doses is conditioned by compensation of initial levels by acceptor type defects formed by donor levels

of interstitial selenium. In comparison with "clean" crystals in impurity-containing crystals after γ-irradiation (dose up to Dγ=50 krad) electrophysical properties don't change substantially.

Reference

Lampert M., Marc P. Injection current in solids.
Peace 1973. 416 p-s.