ANISOTROPY OF ELECTROCONDUCTIVITY OF LAMELLAR ELECTRON-IRRADIATED MONOCRYSTAL $GaS_{0.85}SE_{0.15}$<Er>

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It is known from experimental investigations that electro-conductivity of lamellar semiconductor A^3B^6 and its solid solutions are along basal plane rather that in perpendicular direction to it. This is interpreted with the presence of great anisotropy in these materials.

The investigated mono-crystals $GaS_{0.85}Se_{0.15}$<Er> with specific resistance ~10^{10} Ohm·sm at room temperature had been grown by Bridgman method. The impurity Er was injected into batch mixture during syntheses process and its concentration was ~$10^{18}sm^{-3}$. The samples were irradiated in linear electron accelerator of ELA-6 type with nominal energy 4.5 MeV at yield. Irradiation process was conducted in open air; forced cooling of the samples by blow-off of compressed air was used. Irradiation temperature didn't exceed 30°C.

In order to affirm the model put forward for interpretation of experimental data anisotropy of electro-conductivity $\sigma_{\parallel c}/\sigma_{\perp c}$ of the samples $GaS_{0.85}Se_{0.15}$<Er> and influence of ionizing radiation on it at temperature range (100÷380K) were studied. Anisotropy of electro-conductivity and its temperature dependence were measured at different radiation doses (10^{15}÷10^{16}el/sm^2).

Variation of temperature dependence of anisotropy of electro-conductivity $\sigma_{\parallel c}/\sigma_{\perp c}$ of non-irradiated samples can be divided into three ranges: at range T<250 K doesn't depend on temperature, at range 250÷350 K decreases but higher than T>350 K increases.

After irradiation the dose 10^{15} el/sm^2 of electro-conductivity anisotropy decreases. Electro-conductivity anisotropy increases with increase of radiation dose up to 10^{16}el/sm^2, though dependence behavior doesn't change.

The obtained results, in particular decrease of electro-conductivity anisotropy at small radiation doses authenticates that beginning from some doses depending on initial concentration of impurities radiation defects accumulate at internodes along the plane. Future increase of radiation dose up to 10^{16}el/sm^2 leads to increase of $\sigma_{\parallel c}/\sigma_{\perp c}$. As it's seen, this increase is conditioned by accumulation of defects near dislocations in these samples because of increase of radiation dose.

So we come into such conclusion that potential barriers, connected with interlayer stacking fault are responsible for high value of electric anisotropy and its temperature activated dependence $GaS_{0.85}Se_{0.15}$<Er>.