ELECTRICAL PROPERTIES OF $Hg_3In_2Te_6$ CRYSTALS DOPED WITH GADOLINIUM

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The temperature dependences of electrical conductivity, the Hall coefficient, thermoelectric power, and the transversal Nernst – Ettingsgausen effect of $Hg_3In_2Te_6$ crystals doped with gadolinium are investigated. It is shown that, under strong doping, the Fermi level descends and remains in the upper half of the energy gap in the impurity miscibility range, while the transparency of crystals is decreasing essentially. It causes the impurity self-compensation and preservation of bipolar conductivity typical of intrinsic semiconductors. In this case, the band gap, mobility ratio $b = \mu_n/\mu_p$, and effective mass ratio m_p/m_n (n – electrons, p – holes) are reduced. Experimental results are explained by using the model of disordered semiconductor, in which the borders between forbidden and allowed energy bands are blurred and the transfer of electrons and holes occurs on the corresponding percolation levels because of the presence of the large density of localized states.