INTERVALLEY REDISTRIBUTION OF ELECTRONS IN $GE_{1-X}SI_X$ SINGLE CRYSTALS UNDER HYDROSTATIC PRESSURE

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Abstract:
$Ge_{1-x}Si_x$ alloys have attractive physical properties to practical applications including direct transformation thermal energy to electric one. at high temperature range. In most cases related to investigation electrical and thermoelectrical properties of $Ge_{1-x}Si_x$ alloy single crystal have been taken into account L_1-valleys of germanium and Δ_1-valleys of silicon [1]. The influence of Δ_1-valleys of germanium to electrical and thermoelectrical properties of n-Ge have been investigated in series of papers [2-6] and have been shown that in the straine single crystal it is remarkable especially at room and high temperatures. For this reason the follow energetic model for $Ge_{1-x}Si_x$ alloy single crystal have been considered: four L_1 – and six Δ_1-germanium valleys and six Δ_1- silicon valleys oriented as well as the Δ_1-germanium ones. The kinetic of all type of valleys in energetic scale have been considered and their changes in the presence of hydrostatic elastic stress. The dependences of relative numbers of electrons in L_1 - , $\Delta_{1,Ge}$ - and $\Delta_{1,Si}$ –valleys as the function of applied hydrostatic pressure, composition and temperature have been calculated. It is shown that Δ_1-valleys of germanium side by side with Δ_1-valleys of silicon must be taken into consideration in a number of cases with small relative quantities of silicon in deformes single crystals.

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