SIMULATION OF DISTRIBUTION OF ELECTROPHYSICAL PARAMETERS OVER A CHROMIUM COMPENSATED GALLIUM ARSENIDE WAFERS*

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The paper presents the results of simulation and experimental studies of resistivity and charge carrier lifetimes distribution over chromium-compensated gallium arsenide (HR GaAs:Cr) wafers, made of n-GaAs wafers by means of high-temperature diffusion of chromium.

It has been demonstrated that the inhomogeneity of resistivity and charge carrier lifetime distribution is determined, in particular, by the inhomogeneity of the donor impurity in n-GaAs wafers.

Analysis of the research results allows to conclude:

- application of a four-level model, including deep and shallow acceptors and donors, makes it possible to qualitatively and quantitatively evaluate and predict the characteristics of the HR GaAs:Cr material and sensors based on it;

- the best qualitative and quantitative agreement between the calculated and experimental values of nonequilibrium charge carrier lifetimes, Hall mobility and resistivity in HR GaAs:Cr wafers are achieved when using EL2 center concentration in the range $(1 – 3)\times10^{15}$ cm^{-3}, Cr concentration about 1×10^{17} cm^{-3} and concentrations of thermal acceptors in the range of $(1 – 4)\times10^{16}$ cm^{-3};

- the lifetime of nonequilibrium electrons and holes is determined by the concentration of ionized EL2+ centers and Cr- ions, respectively.

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