

Field properties of $p\text{Si-nSi}_{1-x}\text{Sn}_x$ ($0 \leq x \leq 0.04$) heterostructures

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In this article, the processes of current flow in $p\text{Si-nSi}_{1-x}\text{Sn}_x$ ($0 \leq x \leq 0.04$) diode structures were studied. It can be seen from the results obtained that in the studied samples, at low voltages, the current obeys Ohm's law. And with a further increase in voltage, the current begins to increase according to a nonlinear law. Based on the dependence $\ln \sigma = f(\sqrt{E})$ analysis, it was found that the nonlinearity is due to the Poole-Frenkel field effect. On the basis of the performed analyzes of the obtained results, the prospects of using $\text{Si}_{1-x}\text{Sn}_x$ ($0 \leq x \leq 0.04$) solid solutions grown on silicon substrates as an active material in thermal-to-electrical energy converters based on the thermovoltaic effect are substantiated.

Keywords: the substitutional solid solution, activation of charge carriers, current-voltage characteristic, the Poole-Frenkel effect, field mechanism, the Frenkel coefficient, trap concentration.

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