

Physicochemical and X-ray diffraction study of phase formation in the InSe-SrSe system and study of electrophysical properties of solid solution alloys

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Using the methods of physicochemical analysis (DTA, X-ray diffraction, MSA, as well as density and microhardness measurements), phase formation in the InSe-SrSe system has been studied and its phase diagram constructed. It is found that the InSe-SrSe system is a quasi-binary section of the ternary system Sr-In-Se and is eutectic. A ternary compound of the formula SrInSe_2 is formed in the system with a component ratio of 1:1. The SrInSe_2 compound melts congruently at 1180°C . According to the results of X-ray structural analysis, it is established that the SrInSe_2 compound crystallizes in the orthorhombic syngony, the lattice parameters are: $a = 10.95 \text{ \AA}$; $b = 8.65 \text{ \AA}$; $c = 8.42 \text{ \AA}$. The coordinates and temperatures of the two eutectics formed in the system are 15 and 65 mol % SrSe and $t = 847 \text{ K}$ and $t = 1273 \text{ K}$, respectively. In the system at room temperature based on the InSe compound, solid solutions reach up to 5 mol % SrSe, and on it is SrSe up to 3 mol % InSe. As a result of studying the electrical conductivity (σ), thermal conductivity (α), current (I) and specific resistance (ρ) of solid solution alloys $(\text{InSe})_{1-x}(\text{SrSe})_x$ ($x=0.01; 0.02; 0.03; 0.05$), it has been established that solid solution alloys are semiconductors with medium resistance.

Keywords: System, Quasi-Binary, Eutectic, Phase, Incongruent