Spinodal Decomposition in $(A^3B^5C^6{}_2)_{1-x}$ $(2A^4B^6)_x$ system - a New Approach for Suppressed Lattice Thermal Conductivity of Lead Chalcogenide - based Thermoelectric Materials.

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Among thermoelectric materials lead chalcogenides, represent great interest because their unusual properties in respect to other semiconductors: multi-valley nature of energy bands, low value of lattice thermal conductivity caused by heavy atoms which form these phases, high mobility of carriers at high doped level caused by low scattering efficiency on electrical centers because of high static electrical permittivity, positive sign of thermal coefficient of band gap due to the contribution of intrinsic conductivity sharply declining figure of merit Z shifting to higher temperature. High efficiency of thermoelectric conversion can be achieved by using materials with a high Seebeck coefficient **S**, high electrical conductivity σ, and low thermal conductivity **K.** Mass-difference-scattering of the phonons is one of the most effective way for reducing the thermal conductivity in bulk thermoelectric materials. Therefore the best thermoelectric materials are solid solutions. However, the researches of last years have shown that the embedded nanoparticles can reduce thermal conductivity of crystalline semiconductors essentially below the alloy limit. [ ]. In this work the investigations results of transport phenomena in solid solutions of a type $(A^3B^5C^6{}_2)_{1-x}$ $(2A^4B^6)_x$ after phase decomposition are analyzed.

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