

Nanocomposites and nanomaterials

Thermoelectric properties PbTe:Ag with carbon nanoparticles

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Thermoelectric figure of merit for semiconductor materials determines by the values of the Seebeck coefficient S , electrical conductivity σ and thermoconductivity κ : $ZT = (S^2 \sigma) / \kappa$.

These parameters can be changed by the variation of chemical composition of the compounds. However, these changes affect only the values of S and σ . Coefficient κ changes difficult because of phonon scattering on the nanoscale centers. Formation of these centers requires additional heat treatment processes.

We propose the creation of centers of scattering of phonons by entering the nanoporous carbon in compound PbTe:Ag. The compound was synthesized by fusing method with forced mixing of the components at temperature of 1270 K in vacuumed quartz ampoules. Nanoporous carbon powder was added to PbTe:Ag with concentrations of 0.2; 0.6 and 1.0 wt.%. Samples weighing 0.5 g with diameter of 4 mm and height of (5-6) mm made from powder by cold pressing method under pressure to $9.5 \cdot 10^9$ Pa.

The impact of nanoparticles of carbon on numerical values of the Seebeck coefficient was investigated. The results show on figure.

Change of Seebeck coefficient's sign at temperature (60...80)°C observed in all samples with carbon. The variation of the Seebeck coefficient can be caused by additional electrical conductivity of carbon nanoparticles.