

Thermoelectric Lead Telluride with ZnO nanoparticles

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One of the methods increasing the thermoelectric figure of merit ZT is to reduce the thermal conductivity, the reason is the relationship between the Seebeck coefficient (S) and the electrical conductivity (σ), because with increasing conductivity - thermopower decreases. It is assumed that to achieve this result, requires the use of spatially inhomogeneous materials with inhomogeneities whose size compared with the characteristic wavelengths of electrons or phonons and lying in nanometer plane.

A thermoelectric material properties of lead telluride with ZnO nanoparticles were investigated. In particular, measurement of the electrical conductivity (σ) (fig. 1, a), Seebeck coefficient (S) (fig. 2, b) and thermal conductivity (χ) (fig. 3, c). The calculated value of the specific thermoelectric power ($\alpha 2\sigma$) (fig. 4, d) and thermoelectric figure of merit (ZT) (fig. 5, e). It was established that the addition of ZnO powder Nanodispersed diameter grains (40-60) nm PbTe reduces the thermal conductivity of the material, while adding 0.5 wt.% ZnO to an increase of lead telluride thermoelectric figure of merit (ZT) to 1.3.

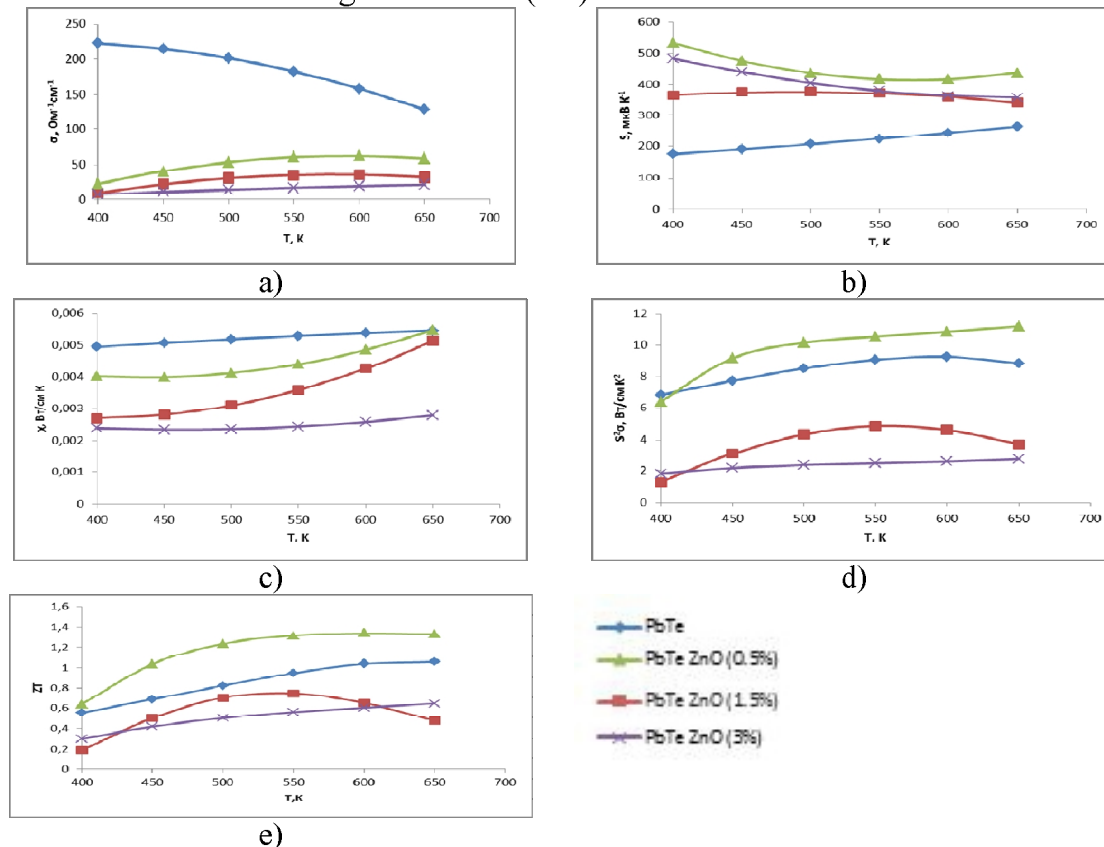


Fig 1. Thermoelectric material properties of lead telluride with ZnO nanoparticles.

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