

Doping study of SnS

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Thermoelectric (TE) materials are substances that show strong thermoelectric effects. These effects describe the link between temperature difference and difference of electric potential. Thus, these materials allow mutual transformation between thermal energy and electric energy. This fact can be utilized in waste heat power generation or green cooling technologies. Efficiency of a thermoelectric device is a function of the dimensionless figure of merit $ZT = \alpha^2 \sigma T / \kappa$, where α , σ , T and κ are Seebeck coefficient, electrical conductivity, absolute temperature and thermal conductivity, respectively. Recently, high TE performance has been reported in single crystals of SnSe [1] which has similar structure to SnS [2].

Aim of this work was to investigate the influence of Tl, P, F and Cl doping on thermoelectric properties of SnS in terms of enhancement of ZT . Hot-pressed polycrystalline samples with 0, 0.25, 0.5 and 1 % of the dopants as substituents in cation or anion sublattice of SnS were prepared. The samples were characterized by X-ray diffraction, electrical and thermal conductivity, Hall and Seebeck coefficient. These parameters were measured over a temperature range of 300-725 K. Figure of merit ZT was calculated from obtained data.

[1] Zhao L.-D., Lo S.-H., Zhang Y., Sun H., Tan G., Uher C., Wolverton C., Dravid V. P., Kanatzidis M. G.: *Nature* 508, 373 (2014).

[2] T. Chattopadhyay, J. Pannetier, H. G. Von Schnering: *J. Phys. Chem. Solids* 47, 9 (1986).