

Thermoelectric properties of $\text{Ba}_8\text{Au}_{5.25}\text{Ge}_{40.3}\square_{0.45}$ type-I clathrate

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The Ba-containing type-I clathrates show promising thermoelectric (TE) properties [1]. Therefore, Ba-Au-Ge type-I clathrates are thus of interest for TE applications as well [2]. Both *p*- and *n*-type conductivity were found in the Ba-Au-Ge system, depending on Au content. Here we present the measurements of the electrical and thermal transport on the *p*-type single crystal $\text{Ba}_8\text{Au}_{5.25}\text{Ge}_{40.3}\square_{0.45}$ along [001], [110] and [111] directions. The sample shows a semiconducting-like behavior. The Hall coefficient R_H exhibits a positive sign, pointing on the dominance of electron-like conduction. The Hall mobility μ_H below ~ 100 K follows approximately $T^{-3/2}$ law, while above 100 K the μ_H is temperature independent, which denotes on neutral-impurity scattering. Thermal conductivity κ , measured by steady state method and 3ω method, is rather low with $\kappa \sim 1 \text{ Wm}^{-1}\text{K}^{-1}$ at room temperature. It is interesting to point out that the electrical resistivity, R_H and κ along [110] direction revealed a different magnitude compared to [001] and [111] directions. It seem reasonable to assume that this observation is due to different electron-phonon coupling for different directions, as it will be shown by low-temperature κ data.

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[2] H. Zhang, H. Borrmann, N. Oeschler, C. Candolfi, W. Schnelle, M. Schmidt, U. Burkhardt, M. Baitinger, J.-T. Zhao, Y. Grin, *Inorg. Chem.* **50**, 1250 (1250).

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