Transport properties of germanium-filled skutterudites

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HIROTSUGU TAKIZAWA, Department of Materials Chemistry, Tohoku University, Sendai, Japan — We report the transport properties of dense polycrystalline Ge-filled skutterudites Ge$_{0.25}$Co$_4$Sb$_{12}$ and Ge$_{0.05}$Co$_4$Sb$_{12}$ prepared by a high-pressure synthesis approach. Low temperature electrical resistivity, Seebeck coefficient, Hall coefficient, and thermal conductivity measurements were performed on these skutterudite compounds, and are compared with those of Co$_4$Sb$_{11}$Ge and CoSb$_3$. The Ge atoms residing inside the interstitial voids of the skutterudite crystal structure act as electron donors. The lattice thermal conductivity of these compounds is lower than that of CoSb$_3$ but higher than that of other filled skutterudites. The potential for thermoelectric applications is also discussed.