THERMOELECTRIC PROPERTIES OF NANOCRYSTALLINE *p*-type $Bi_{0.5}Sb_{1.5}Te_3$ THIN FILMS

Dashevsky Z., Kasiyan V.

Department of Materials Engineering, Ben Gurion University, 84105 Beer-Sheva, Israel

This work is concerned with the effect of the nanostructure on the thermoelectric properties of *p*-type $Bi_{0.5}Sb_{1.5}Te_3$ thin films. Nanostructured thin films were prepared by varying the rate of nucleation as a function of the nature and temperature of the substrates. On low-temperature substrates, the increase rate of nucleation and the limited mobility of the atoms give rise to a nanostructured deposit with a 30 - 100 nm grain size. We observe, for grain size, in a certain range, an enhancement in Seebeck coefficient relative to that of bulk crystals and provide evidence that this enhancement is due to yet another mechanism: selective scattering of holes depending on their energy. While this scattering also decreases the hole mobility and electrical conductivity, it is suggested this may be in part offset by a decrease in thermal conductivity.

E-mail Presenting Author : zdashev@bgu.ac.il