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Electronic transport properties of amorphous Sb_2Te_3 and $Ge_2Sb_2Te_5$ films S.A. BAILY, Space Vehicles Directorate, Air Force Research Laboratory, Kirtland AFB, NM 87117, DAVID EMIN, Department of Physics and Astronomy, University of New Mexico, Albuquerque, NM 87131 — The electrical conductivity, Seebeck coefficient, and Hall coefficient of amorphous Sb_2Te_3 and $Ge_2Sb_2Te_5$ films have been measured as functions of temperature from room temperature down to as low as 200 K. The electrical conductivities manifest an Arrhenius behavior with a larger pre-exponential factor. In Sb_2Te_3 the energy characterizing the p-type Seebeck coefficient's temperature dependence, about 0.10 eV, is considerably smaller than the activation energy of the electrical conductivity, about 0.28 eV. In addition, the heat-of-transport constant of the Seebeck coefficient is much larger than that of conventional semiconductors. The Hall mobility is low (near 0.1 cm^2/V-sec at room temperature), anomalously signed (n-type), and increases with rising temperature with an activation energy of about 0.05 eV. These results are consistent with the charge carriers being hole-like small polarons that move by thermally assisted hopping. $Ge_2Sb_2Te_5$ also has low mobility (0.7 cm^2/V-sec) and a high conductivity activation energy (0.41 eV), but Seebeck data is indicative of multi-band transport.

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