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Effect of doping $Ag_ySb_yGe_{50-2y}Te_{50}$ thermoelectric materials with rare earths E.M. LEVIN, S.L. BUD'KO, K. SCHMIDT-ROHR, Iowa State University and Ames Laboratory US DOE — The $Ag_ySb_yGe_{50-2y}Te_{50}$ system represents some of the most efficient thermoelectrics, the so-called TAGS materials. In order to understand the effect of doping of $Ag_{6.52}Sb_{6.52}Ge_{36.96}Te_{50}$ ("TAGS-85") with rare earth atoms on the Ge and Te sites, $Ag_{6.52}Sb_{6.52}Ge_{36.96-x}R_xTe_{50}$ and $Ag_{6.52}Sb_{6.52}Ge_{36.96}R_xTe_{50-x}$ materials with R = Gd and Dy (rare earth atoms with large magnetic moments) have been studied by measuring X-ray diffraction (XRD) and ^{125}Te nuclear magnetic resonance (NMR) at 300 K, thermopower and resistivity at 300-760 K, and the magnetization at 1.8-350 K and in magnetic field 0-55 kOe. XRD and ^{125}Te NMR show that some rare earth atoms are incorporated into the lattice and enhance the thermopower by ∼10%. At 700 K, this yields a power factor of up to 36 $\mu W \cdot cm^{-1} \cdot K^{-2}$, which is ∼20% higher than in TAGS-85. All materials studied can be considered as degenerate magnetic semiconductors with non-interacting localized magnetic moments formed by rare earth atoms, with a different effect of rare earths on the Ge and Te sites. Reasons for the thermopower enhancement due to doping with rare earths including magnetic and non-magnetic phenomena are discussed.

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