Magnetic and transport properties of Ge1-x-ySixMnyTe crystals

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IV-VI materials doped with magnetic impurities hold potential for spintronic applications particularly by integrating the memory component within the semiconducting matrix. This works intends to investigate the carrier mediated magnetic interactions in GeTe lattice alloyed with Mn ions. We present Ge1-x-ySixMnyTe bulk crystals by altering their chemical composition in the range $0.056 \leq x \leq 0.10$ and $0.0036 \leq y \leq 0.046$. The magnetic phase transition temperature rises from TC = 25 K to about 160 K for the highest impurity level. The analysis of inverse of susceptibility with modified Curie-Weiss law finds ferromagnetic-like interaction in the alloys. The magnetically glassy samples were interpreted with frequency dependent susceptibility. This identified scaling parameter, $R = 0.2 - 0.6$ which indicate the formation of clusters in the glassy samples. Finally, the temperature and concentration dependence of anomalous Hall Effect (AHE) is interpreted in terms of extrinsic scattering mechanisms.

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