Transport Properties of the Bulk Amorphous Alloy $Cu_{50}Zr_{35}Ti_8Hf_5Nb_2$

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Because the investigations of heat transport in amorphous metals have been carried out mainly on thin samples, it is very interesting to study heat transport in bulk samples. In the present report, the electrical resistivity $\rho(T)$ and the thermal conductivity $\lambda(T)$ of a bulk sample of dimensions 2 x 2 x 20 mm^3 of amorphous alloy $Cu_{50}Zr_{35}Ti_6Hf_5Nb_2$ are investigated in the temperature range 1.8 - 250 K. The resistivity decreases with temperature increasing. The temperature dependence of resistivity can by described in terms of electron scattering by phonons and two-level systems. The temperature dependence of thermal conductivity has a "plateau" in the temperature range 50 - 80 K, i.e., $\theta/4 \div \theta/2$ (θ is the Debye temperature). A nonelectronic part of thermal conductivity separated by means of a Wiedemann-Franz law increases linearly with temperature increasing even in the region $T > \theta$. Such a behavior is not typical neither for phononic nor for electronic thermal conductivity. We assume that the heat in specimen is carried by excitations which are like fractons in the fractal nets. On the left from the "plateau," the heat is carried by phonons scattered mainly by point defects and by fluctuations of density and elastic modula.