Abstract Submitted to the
IICAM Workshop on Correlated Thermoelectricity
25 - 30 September, 2005
Hvar, Croatia

Magnetic ordering effects on thermal conductivity of geometrically frustrated system $Cu_2Te_2O_5(Cl_{2-x}Br_x)$

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Spin frustrated systems are characterized by a specific interaction among spins by which none of the spin arrangements can satisfy all the bonds and simultaneously minimize the energy. There are two types of spin frustration: site (with quenched disorder, like in spin-glasses) and geometrical-based frustration, where triangular or tetrahedral distribution of antiferromagnetically ordered spins frustrates the system. Insulating copper-tellurides (of the general formula $Cu_2Te_2O_5(Cl_{2-x}Br_x)$) belong to the class of geometrically frustrated systems due to the tetrahedral arrangement of Cu^{2+} ions. Between 11.4 K and 18.2 K (depending on the Br content) copper-tellurides exhibit a magnetic phase transition with the formation of the long-range spin-ordered state. We present the thermal conductivity data of copper-tellurides. For temperatures higher than the transition temperature, a resonant magneto-elastic coupling takes part in the phonon scattering. At the transition temperatures thermal conductivity increases for an order of magnitude, indicating that spin long-range ordered state switches off the phonon resonance scattering in the spin subsystem.

Keywords : spin frustration, magnetic ordering, thermal conductivity