Thermal conductivity of ABS polymer composite with 0.5 wt% of the thermally reduced graphene oxide

B. Verkin Institute for Low Temperature Physics and Engineering of the National Academy of Sciences of Ukraine
47 Nauky Ave., Kharkiv 61103, Ukraine

V.V. Sagan, A.I. Krivchikov, V.A. Konstantinov

e-mail: sagan@ilt.kharkov.ua

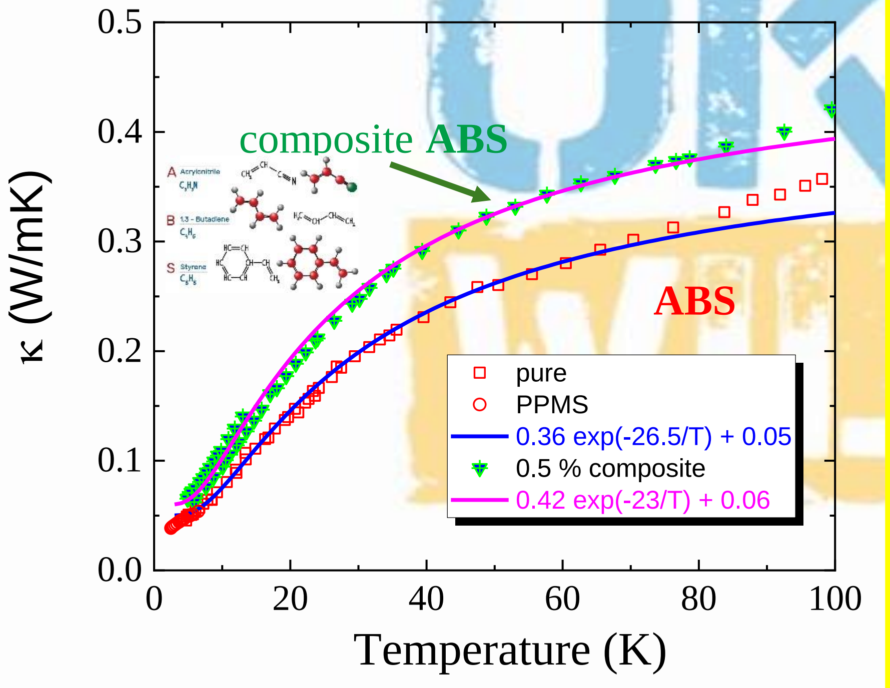

Fig. 1. Temperature dependences of thermal conductivity of ABS pure polymer (□) and ABS polymer composite with 0.5%wt of trGO (Δ).

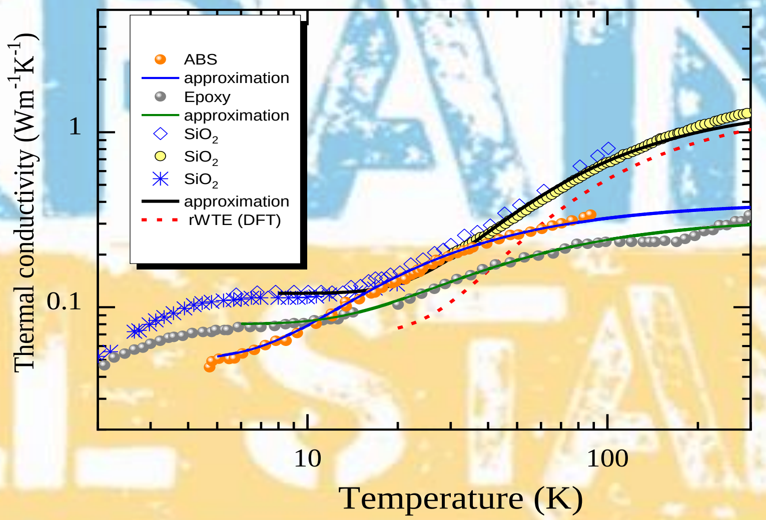

Fig. 2. Temperature dependences of thermal conductivity of two amorphous polymers ABS (●- data of this work), epoxy-resin (●- [lit.]) and structural glass SiO2: ◇- [lit.]; ● -[lit.] and ✳- [lit.]. Curved lines are calculated dependencies: red dotted - first-principles theory for SiO2 glass; three solid lines approximation by the exponential function of an Arrhenius type for ABS (blue), epoxy-resin (green) и SiO2 (black).

$$\kappa(T) = \kappa_c + \kappa_o \cdot exp(-E/T)$$

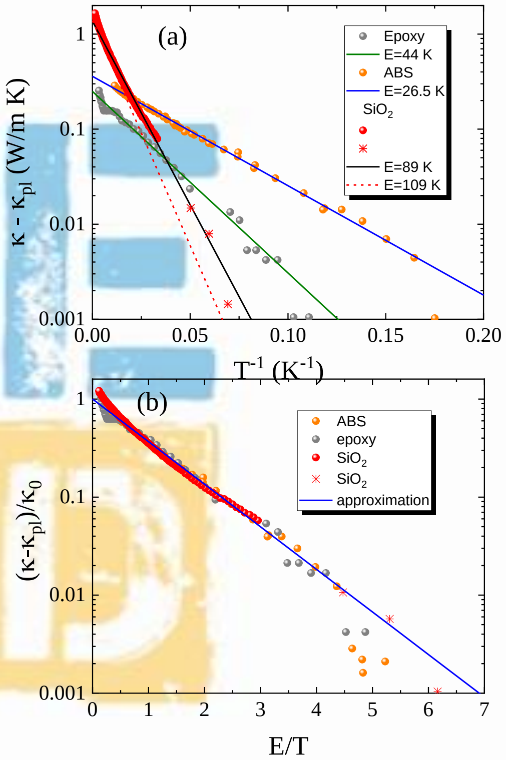

Fig. 3. a) Linear representation of the temperature dependence of the coherence contribution to thermal conductivity $\kappa_c = \kappa(T) - \kappa_{pl}$ on the reciprocal temperature for two amorphous polymers ABS (●- data of this work), epoxy-resin (● [lit.]) and structural glass SiO2: ●- [lit.] and ✳- [lit.];
b) The reduced temperature dependence of the thermal conductivity $(\kappa(T) - \kappa_c)/\kappa_0$ on the reciprocal reduced temperature, which illustrates the universal nature of the thermal conductivity of glasses according to the Arrhenius-type dependence $(\kappa(T) - \kappa_c)/\kappa_0 = exp(-E/T)$.

A.I. Krivchikov, A. Jeżowski, V.A. Konstantinov, V.V. Sagan, O.A. Korolyuk, D. Szewczyk, ***Enhancing thermal transport in ABS polymer with graphene oxide: Insights into low-temperature thermal conductivity behavior and correlation with Boson peak anomaly,*** Thermochimica Acta**,** 179696, https://doi.org/10.1016/j.tca.2024.179696