

Thermal conductivity universality of disorder solids and complex crystals

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The behavior of the thermal conductivity of an amorphous substance, depending on temperature and pressure, is universal and does not depend on the details of the chemical structure of the substance. Polymers, structural glasses, metal glasses and biomaterials, as well as some complex crystal structures: orientation glasses, clathrate compounds, ferroelectrics, skutterudite, etc., have the same (similar) temperature dependence with characteristic pronounced features: low-temperature quadratic growth, "plateau" and the subsequent rise to the high-temperature limit. Within the framework of the phenomenon of hybridization of a low energy localized excitations with an acoustic excitations, a qualitative explanation is given of thermal conductivity universality. The hybridization of a manifold localized states with continuum acoustic modes is described by the well-known Fano-Anderson resonance.