

Evidence of Heat Transport by Radiation in PMMA Found by Guarded Hot Plate, Contact Pulse Transient Method and Heat Wave Method

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A radiation component of the heat transport in solids has been discussed for a long time; however, its evidence encounters experimental difficulties that are not satisfactorily solved up to now. Especially in measurements of thermal conductivity and thermal diffusivity, this component could be responsible for discrepancies in data obtained by different measurement methods. A steady state method (GHP) for measuring thermal conductivity, heat wave method for measuring thermal diffusivity and pulse transient method for measuring thermal diffusivity, specific heat and thermal conductivity have been used for testing this radiation component of the heat transport in the PMMA. The radiation component was visualized by infrared camera in heat wave method. All experiments were performed on specimen composed of two parts alternatively with and without a metallic layer in contact between them. Heat transport was induced perpendicular to this contact. The metallic layer hinders radiation through the specimen. Consequences are discussed considering different measuring methods and measuring regimes.