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M2Po2D-05: The Low-temperature Thermal Properties of Epoxy Resin Composites Enhanced by Graphene and Modified Alumina Hybrid Fillers

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In recent years, polymer/ceramic composites with high thermal conductivity have been widely used in micro-electronic devices, superconducting magnets and aviation, and further improving their thermal conductivity is a great challenge. In this study, spherical alumina nanoparticles were modified with 3-aminopropyltriethoxysilane (APTES) successfully. Furthermore, the modified alumina (M- Al₂O₃)/Epoxy and graphene/(M- Al₂O₃)/Epoxy composites were prepared and their properties were tested in the temperature range of 70 K-300 K. The results showed that the thermal conductivity of the composite with 1 wt% graphene and 60 wt% (M- Al₂O₃)/Epoxy is 13 times higher than that of pure epoxy at 70 K, which indicates its application prospect in thermal interface materials.

Keywords: thermal properties; polymer-matrix composites; low temperatures

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