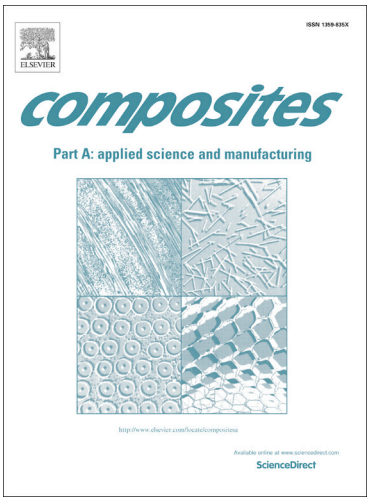

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Enhanced thermal conductivity and ideal dielectric properties of epoxy composites containing polymer modified hexagonal boron nitride

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ABSTRACT: Surface modification of chemically-inert hexagonal boron nitride (h-BN) to reduce its interfacial thermal resistance remains problematic, thereby hindering its application in thermal conductive composites. Here, poly(glycidyl methacrylate) (PGMA) chains were grafted onto the surface of h-BN by using a simple free radical polymerization. The prepared PGMA grafted h-BN (h-BN-PGMA) was incorporated into epoxy (EP) to enhance the thermal conductivity of EP composites. Adding 3, 9 or 15 vol% of h-BN-PGMA into EP leads to 60%, 203% or 505% increases in thermal conductivity, respectively. Meanwhile, the surface modification of h-BN is benefit to enhance the compatibility between the fillers and EP matrix, which reduces the apparent viscosity of composite materials. Furthermore, compared with EP/h-BN, EP/h-BN-PGMA composites with the same filler-loading exhibit higher storage modulus and glass transition temperature. Additionally, the dielectric constant of the composites hardly depends on the testing frequency while the dielectric loss maintained at a very low level.

KEYWORDS: A. Polymer-matrix composites; B. Thermal properties; B. Dielectric properties; Surface grafting