

Surface Modified Nano-Diamond/Polyimide Hybrid Composites

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Abstract : Polyimide (PI) is one of the most important super-engineering materials because of its mechanical properties and its thermal stability. Electronic industry is the typical extensive applications of polyimides including interlayer insulation films, buffer coating, films, alpha-ray shielding films, and alignment films for liquid crystal displays. The mechanical and thermal properties of polymers are generally improved by the addition of inorganic additives. The challenges in this area of high-performance organic/inorganic hybrid materials are to obtain significant improvements in the interfacial adhesion between the polymer matrix and the reinforcing material since the organic matrix is relatively incompatible with the inorganic phase. In this study, modified nanodiamond was prepared from the reaction of nanodiamond and (3-Mercaptopropyl)trimethoxysilane. Poly(amic acid) was prepared from the reaction of 3,3',4,4'-Benzophenonetetracarboxylic dianhydride (BTDA) and 4,4'-Oxydianiline (ODA). Polyimide/modified nanodiamond hybrids were prepared by blending of poly(amic acid) and organically modified nanodiamond. The morphology of the Polyimide/ modified nanodiamond hybrids was characterized by scanning electron microscopy (SEM). Chemical structure of polyimide and Polyimide/modified nanodiamond hybrids was characterized by FTIR. FTIR results showed that the Polyimide/modified nanodiamond hybrids were successfully prepared. A thermal property of the Polyimide/modified nanodiamond hybrids was characterized by thermogravimetric analysis (TGA).

Keywords : hybrid materials, nanodiamond, polyimide, polymer

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