

金属／無機微粒子とのハイブリッド化による ポリイミド樹脂の高熱伝導化設計

安藤 慎治*

Material Design of Thermally Conductive Polyimides via Hybridization with Metallic or Inorganic Particles

Shinji ANDO †

Enhancement of thermal conductivity along the out-of-plane direction in polyimide (PI) blend films containing silver nanoparticles (Ag-NP), μm -sized pyramidal or needle-shaped ZnO, and cubed MgO particles has been extensively investigated. Microphase-separated structures with "vertical double percolation (VDP)" morphology were spontaneously formed in the PI blend films composed of sulfur- and fluorine-containing PIs, in which two phases were separately aligned along the out-of-plane direction, and ZnO and MgO particles were preferentially precipitated in the fluorine-containing PI phase. In particular, the PI blend films containing needle-shaped ZnO particles exhibited significant enhancement of thermal diffusivity along the out-of-plane direction even at lower filler contents, which indicate that the VDP structure with selective incorporation of anisotropic shaped inorganic particles functions as highly efficient thermal conductive pathway.

Key Words : Polyimide, microphase separation, thermal conductivity, anisotropic shape, vertical double percolation