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Synthesis of pyridine-containing diamine and properties of its polyimides and polyimide/hexagonal boron nitride composite films

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Abstract: A pyridine-containing diamine, 4,4'-bis(5-amino-2-pyridinoxy)diphenyl ether, was prepared via a two-step procedure. Based on the diamine, a series of polyimides were prepared by traditional two-step method. The characteristic peaks of polyimides on their fourier transform infrared (FT-IR) spectra indicated full imidization. Thermogravimetric analysis (TGA), dynamical mechanical analysis (DMA), differential scanning calorimetry (DSC) and ultraviolet–visible (UV-vis) spectra data showed that the polyimides displayed good properties. Polyimide/hexagonal boron nitride (PI/hBN) composite films were prepared, 3,3',4,4'-benzophenonetetracarboxylic dianhydride based polyimide (**PI-2**) was used as the matrix. In addition, the effects of hBN content on the thermal conductivity (TC) of PI/hBN composites films were investigated. The TC of pure **PI-2** was $0.148 \text{ W m}^{-1} \text{ K}^{-1}$, when the hBN content increased to 40 wt %, the TC increased to $0.686 \text{ W m}^{-1} \text{ K}^{-1}$. The enhancement in this TC value was as high as 460 % compared to pure **PI-2**. Meanwhile, the PI/hBN composites films retained excellent thermal and dynamic mechanical properties.

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