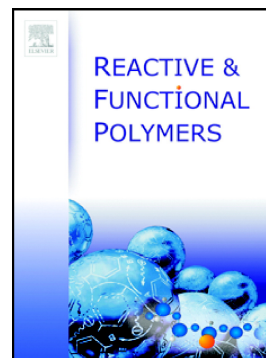


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Miscibility of polyimide blends: physicochemical characterization of two high performance polyimide polymers

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Abstract

The intermolecular interactions and miscibility behavior of two polyimide blend systems, Extem/Matrimid and Extem/U-Varnish, in compositions of 100/0, 80/20, 50/50, 20/80, 0/100 have been evaluated. The polymer blend systems have been characterized by different analytical techniques such as optical microscopy, Differential Scanning Calorimetry (DSC), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD) and rheological measurements. DSC results for the Extem/U-Varnish system showed the existence of a single glass transition temperature (T_g) in each composition, suggesting the miscibility of the blends, whereas DSC analysis of Extem/Matrimid system indicated immiscibility but compatibility between two polymers. In order to study the specific interactions between Extem and U-Varnish polymers, the T_gs of the polymer blends were estimated by theoretical equations and compared with experimental data. The empirical T_g values formed a concave curve as a function of composition and exhibited a positive deviation from the linearity, indicating the presence of specific interactions between Extem and U-Varnish polymer chains; this was confirmed by FTIR spectra. Interactions between studied polymer systems and four aprotic solvents including N-methyl-2-pyrrolidone (NMP), Dimethylacetamide (DMAc), Dimethylformamide (DMF) and Dimethyl sulfoxide

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