

Control of Phase Separation Temperature of Polymer Blends by Copolymer Blending Method

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The phase separation temperature (PST) of polymer blends is an important factor for preparing commercially attractive polymer blends. When a miscible polymer blend has the PST lower than melt processing temperature, one cannot obtain a miscible phase morphology after melt processing. This is because the diffusion in polymer blends is significantly slow. In this case one must elevate the PST of the blend above its processing temperature.

Copolymer blends as an effective way of controlling the PST of polymer blends have been of considerable interest in recent years. Comonomers incorporated into one component of a miscible polymer blend can cause a significant change in its PST. Since the PST of polymer blends reflects the magnitude of the interaction between blend components, its elevation indicates an increase in the strength of the interaction.

Since the PST has been viewed as a balance between an unfavorable free volume term and a favorable interaction term, a more detailed understanding for the effect of comonomer on the two terms mentioned above is required. Thermodynamic factors for affecting the phase behavior of copolymer blends are as follows: 1) the intramolecular interaction within copolymers, 2) the relative magnitude of the characteristic parameters of comonomer selected, 3) the interaction between monomeric units in copolymer blends, etc.

The objective of this study is experimentally to justify the copolymer blend model based on the Prigogine-Flory-Patterson's equation of state theory. The blend of polyvinyl chloride and polymethyl methacrylate is selected as model blend system: *n*-butyl acrylate as comonomer is incorporated into PMMA.