

The Effect of Styrene-4-Vinyl Pyridine Block Copolymer on the Morphological and Mechanical Properties of Immiscible Polystyrene and Polyethylene Ionomer(Surlyn) Blends.

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The addition of a block copolymer into an immiscible polymer blends system has been of great interest because it is located at the interface, reducing the domain size, and giving better properties than those of pure binary blends. Recently the effect of interfacial adhesion on the morphological and mechanical properties of the immiscible blends has also been investigated. In this study, the interfacial activity of a block copolymer poly(styrene-*b*-4-vinyl pyridine) in an immiscible polymer blend system, polystyrene and polyethylene ionomer(Surlyn), was investigated by examining the phase morphology and the mechanical properties. Surlyn, the trade name of ionomer produced by DuPont, is the ethylene-methacrylic acid random copolymer followed by the neutralization of the acid groups. Since the ion-dipole interaction between the ionic moiety of Surlyn and 4-vinyl pyridine of the block copolymer was expected in this system, this block copolymer will act as an efficient compatibilizer for the blends.

The block copolymer was prepared by the sequential anionic polymerization of styrene and 4-vinyl pyridine using *n*-BuLi as an initiator at -78°C. The component polymers were melt blended at 200°C by Mini Max Molder(CSI model CS 183 MMX), then the samples were molded into sheets for SEM and dumbbells for the mechanical test.

Scanning electron micrographs of the fractured surface shows that the domain size of dispersed phase is significantly reduced when a small amount of block copolymer is added. The tensile mechanical test reveals that the modulus, the yield strength, and the elongation at break of the blend samples in the presence of the block copolymer are improved as compared with those of pure binary blends. Therefore, a styrene-4-vinyl pyridine block copolymer is proved to be a proper interfacial agent in the polystyrene and Surlyn blends.