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The Role of Percolation in the Rheological Behavior of Binary and Ternary Blends. NATALIA POGODINA, YOUNG GYU JEONG, SURIYAKALA RAMALINGAM, SHAW LING HSU, Polymer Science and Engineering Department, University of Massachusetts Amherst — The rheological behavior of binary and ternary blends involving polyether [e.g. poly(propylene glycol) (PPG)], crystallizable aliphatic polyester [e.g. poly(hexamethylene adipate) (PHMA)] and acrylic copolymers has been studied. The phase behavior of these polymer mixtures at different temperatures is extremely fascinating depending on the nature of the polymers used. The morphological features formed during cooling from elevated temperatures involve phase separation and polyester crystallization. The existence of a percolating solid was established based on evidence from rheological (oscillatory shear) and morphological studies. Typically the blends form a phase-separated droplet-matrix morphology. The transition from the liquid to the solid state has been explicitly correlated to the crystallization behavior of the polyester poor phase. A step increase in the elastic (storage) modulus is observed at a precisely determined PHMA content. The high elasticity can be explicitly explained in terms of the percolation model. The contributions of the domains, interfacial layer and the matrix to the percolation ability of the blend are also discussed.

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