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How to Place Block Copolymer Molecules at the Interface of a Binary Blend ZHONG-REN CHEN, YUCI XU, SHUO ZHONG, Ningbo University — Block copolymers have been used to reduce the domain size of immiscible polymer blends and thus improve the mechanical and other properties. The effectiveness of this method, however, depends on the percentage of these polymeric surfactants residing at the interface of the blend. In fact, theoretical as well as experimental work indicate that a large percentage of block copolymers form micelles in the bulk of one or both of the component polymers. These micelles may serve as weak spots initiating crack propagation. Previous work have been focused on the design of molecular architecture and synthesis of new block copolymers to address this problem. In this presentation, a simple mixing strategy is applied to make each block copolymer molecule stay at the interface. As one example, when this strategy is used to mix natural rubber (NR) with butadiene rubber (BR), a small amount of low molecular weight block copolymer (LIR) improves both processing characteristics such as melt viscosity and mechanical properties of cured samples, such as crack resistance. AFM micrographs show the much smaller domain size; and an original real-time monitoring system reveals the lowest crack growth rate. Using a model A/B/A-B binary blend, we have witnessed by microscopy that all block copolymer molecules form micelles at the first mixing step, and all of these micelles are disappeared and all block copolymer molecules stay at the interface after the second mixing step.

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