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Diffusion Studies of Compatibilizers in Immiscible Polymer Blends CANDICE HALBERT, JOHN ANKNER, JAMES BROWNING, Oak Ridge National Laboratory, HASKELL BECKHAM, DAVID BUCKNALL, Georgia Institute of Technology — Much is known about how linear polymers and oligomers modify polymer interfaces, and this knowledge forms the basis for some very important commercial processes and products, including impact modifiers and immiscible blend compatibilizers. However, little is known about cyclic polymers at interfaces, despite evidence that indicates that loops are far better at improving interfacial fracture toughness than linear chain entanglements. Generally, polymer films strongly adhere to one another when there is efficient chain interpenetration and entanglement at the interface. When such reinforcement does not exist, as with immiscible polymers, the interfacial fracture toughness is rather weak (< 20 J/m^2), but even in these cases the adhesion strength can be correlated with interfacial entanglements. Neutron reflectivity measurements have been used to correlate the interfacial width of homopolymer interfaces with fracture toughness measurements. We have performed NR experiments to elucidate the interfacial activity of linear versus cyclic poly(oxyethylene). During our experiments at SNS we studied the effect of surface segregation in poly(methyl methacrylate) films as well as the effects of interfacial segregation in PMMA/polystyrene films. The results from these diffusion studies will be presented.

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