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Behavior of gradient copolymers at liquid/liquid interfaces WA YUAN, MICHELLE MOK, JOHN TORKELSON, SONBINH NGUYEN, KENNETH SHULL, Northwestern University — The behavior of styrene/acrylic acid gradient and diblock copolymers at liquid/liquid interfaces was investigated using drop shape analysis. Copolymers were dissolved in chloroform, and pendant drops of these solutions were created in water. Molecular conformations at the interface were inferred by measuring changes in the interfacial tension as the interface was contracted and expanded through the control of drop volume. In our experiments, we find that gradient copolymers are much more effective interfacial modifiers than diblock copolymers with similar molecular weights and overall compositions, a result that is ascribed to the reduction of kinetic barriers associated with the micellar aggregates that form in the chloroform phase. Structural evolution of the adsorbed layer can be characterized by trajectories on an interfacial map that includes two independent parameters, interfacial pressure and the area modulus. The area modulus of the adsorbed layer is dependent on the processing history and not directly related to the interfacial pressure. This result is attributed to a local segmental desorption process where portions of the molecules reversibly desorb while the number of copolymer molecules at the interface remains fixed.

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