236f Self-Consistent Brownian Dynamics Simulations of Ternary Polymer Blends

Bharadwaj Narayanan, Victor Pryamitsyn, and Venkat Ganesan

We present a Brownian dynamics-based simulation study of flow-induced phase transitions in the microemulsion phases of ternary polymer blends. The simulation method combines Brownian dynamics simulations with polymer self-consistent field theory to enable the predictions of flow-induced phase transitions. The results match qualitatively with the experimental observations and suggests that flow transforms the microemulsion phases into a three-phase coexistence (of a lamellar-phase coexisting with phase separated homopolymer phases) at strong shears followed by a macrophase separation of the homopolymers at even stronger shear flows. These transitions are also accompanied by a strong shear-thinning behavior in the rheological response. The results suggest significant differences between ternary polymeric systems and oil-water-surfactant systems, which we rationalize from a molecular viewpoint.