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Molecular Exchange in Ordered Diblock Copolymer Micelles¹ SOO-HYUNG CHOI, TIMOTHY LODGE, FRANK BATES, University of Minnesota — Previously, molecular exchange between spherical micelles in dilute solution (1 vol% polymer) was investigated using time-resolved small-angle neutron scattering (TR-SANS). As the concentration of spherical micelles formed by the diblock copolymers increases, the micelles begin to overlap and eventually pack onto body-centered cubic (BCC) lattice. In this study, concentrated, ordered micelles (15 vol% polymers) prepared by dispersing isotopically labeled poly(styrene-b-ethylenealt-propylene) in an isotopic squalane mixture was investigated to understand the micellar concentration dependence of the molecular exchange. Perfectly random mixing of isotopically labeled micelles on the BCC lattice was confirmed by SANS patterns where the interparticle contribution vanishes, resulting in an intensity that directly relates to the exchange kinetics. The measured molecular exchange process for the concentrated, ordered system is qualitatively consistent with the previous observations, but the rate is more than an order of magnitude slower than that for the dilute, disordered system.

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