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Mechanism of Molecular Exchange in Copolymer Micelles¹ SOO-HYUNG CHOI, TIMOTHY LODGE, FRANK BATES, University of Minnesota — Compared to thermodynamic structure, much less has been known about the kinetics of block copolymer micelles which should underlay the attainment of thermodynamic equilibrium. In this presentation, molecular exchange between spherical micelles formed by isotopically labeled diblock copolymers was investigated using time-resolved small-angle neutron scattering. Two pairs of structurally matched poly(styrene-*b*-ethylene-*alt*-propylene) (PS-PEP) were synthesized and dispersed in isotopic mixture of squalane, highly selective to PEP block. Each pair includes polymers with fully deuterated (dPS-PEP) and a normal (hPS-PEP) PS blocks. Temperature dependence of the micelle exchange rate $R(t)$ is consistent with melt dynamics for the core polymer. Furthermore, $R(t)$ is significantly sensitive to the core block length N due to the thermodynamic penalty associated with ejecting a core block into the solvent. This hypersensitivity, combined with modest polydispersity in N , leads to an approximately logarithmic decay in $R(t)$.

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