Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Chain exchange in block copolymer micelles JIE LU, FRANK BATES, TIMOTHY LODGE, University of Minnesota Twin Cities — Block copolymer micelles are aggregates formed by self-assembly of amphiphilic copolymers dispersed in a selective solvent, driven by unfavorable interactions between the solvent and the core-forming block. Due to the relatively long chains being subject to additional thermodynamic and dynamic constraints (e.g., entanglements, crystallinity, vitrification), block copolymer micelles exhibit significantly slower equilibration kinetics than small molecule surfactants. As a result, details of the mechanism(s) of equilibration in block copolymer micelles remain unclear. This present works focuses on the chain exchange kinetics of poly(styrene-b-ethylenepropylene) block copolymers in squalane (C30H62) using time-resolved small angle neutron scattering (TR-SANS). A mixture of h-squalane and d-squalane is chosen so that it contrast matches a mixed 50/50 h/d polystyrene micelle core. When the temperature is appropriate and isotopically labeled chains undergo mixing, the mean core contrast with respect to the solvent decreases, and the scattering intensity is therefore reduced. This strategy allows direct probing of chain exchange rate from the time dependent scattering intensity I(q, t).

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Date submitted: 13 Nov 2013

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