

Abstract Submitted
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Molecular exchange in block copolymer micelles: when corona chains overlap¹ JIE LU, TIMOTHY LODGE, FRANK BATES, University of Minnesota, Twin Cities, SOOHYUNG CHOI, Hongik University, Seoul, South Korea — The chain exchange kinetics of poly(styrene-*b*-ethylenepropylene) (PS-PEP) diblock copolymer micelles in squalane (C₃₀H₆₂) was investigated using time-resolved small angle neutron scattering (TR-SANS). The solvent is a mixture of h-squalane and d-squalane that contrast-matches a mixed 50/50 h/d PS micelle core. As isotope labeled chains exchange, the core contrast decreases, leading to a reduction in scattering intensity. This strategy therefore allows direct probing of the chain exchange rate. Separate copolymer micellar solutions containing either deuterium labeled (dPS) or normal (hPS) poly(styrene) core blocks were prepared and mixed at room temperature, below the core glass transition temperature. The samples were heated to several temperatures (around 100 °C) and monitored by TR-SANS every 5 min. As polymer concentration was increased from 1% to 15% by volume, we observed a significant slowing down of chain exchange rate. Similar retarded kinetics was found when part of the solvent in the 1% solution was replaced by homopolymer PEP (comparable size as corona block). Furthermore, if all the solvent is replaced with PEP, no exchange was detected for up to 3hr at 200 °C. These results will be discussed in terms of a molecular model for chain exchange

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