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Phase Behavior and Local Dynamics of Concentrated Triblock Copolymer Micelles HASAN YARDIMCI, BRIAN CHUNG, JAMES L. HARDEN, ROBERT L. LEHENY, Johns Hopkins University, Baltimore, MD — We investigate the phase behavior and local dynamics of aqueous solutions of the triblock copolymer polyethylene oxide (PEO) - polypropylene oxide (PPO) - polyethylene oxide (Pluronic F108 and F68) by neutron scattering. In solution the polymer self-associates into spherical micelles with PPO cores and corona of solvated PEO. For sufficiently high concentration the Pluronic evolves on heating from fully solvated polymer to a micellar liquid phase then to a micellar crystal phase. The temperature range of the micellar liquid region increases with decreasing chain length, a feature we attribute to fluctuation effects as predicted by recent theory. The local micellar dynamics probed in neutron spin echo display fast and slow modes that depend systematically on concentration and temperature as the liquid-crystal phase boundary is traversed. However, these dynamics are surprisingly insensitive to phase and macroscopic rheology. Contrast matching the PEO corona to the solvent reveals that the slow mode corresponds to translational motion of the core while the fast mode is related to motion of the corona.

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