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Dynamic Processes in Diblock Copolymer Micelles MEGAN ROBERTSON, AVANTIKA SINGH, University of Houston — Diblock copolymers, which form micelle structures in selective solvents, offer advantages of robustness and tunability of micelle characteristics as compared to small molecule surfactants. Diblock copolymer micelles in water have been a subject of great interest in drug delivery applications based on their high loading capacity and targeted drug delivery. The aim of this work is to understand the dynamic processes which underlie the self-assembly of diblock copolymer micelle systems which have a semi-crystalline core. Due to the large size of the molecules, the self-assembly of block copolymer micelles occurs on significantly longer time scales than small molecule analogues. The present work focuses on amphiphilic diblock copolymers containing blocks of poly(ethylene oxide) (a hydrophilic polymer) and polycaprolactone (a hydrophobic, semi-crystalline polymer), which spontaneously self-assemble into spherical micelles in water. A variety of experimental techniques are used to probe the kinetic processes relevant to micelle self-assembly, including time-resolved neutron scattering, dynamic light scattering, pulsed field gradient nuclear magnetic resonance, and fluorescence resonance energy transfer experiments.

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