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Self-Assembly of Block Copolymers in an Ionic Liquid YIYONG HE, ZHIBO LI, TIMOTHY P. LODGE, Department of Chemistry, and Department of Chemical Engineering and Materials Science, University of Minnesota, 55455 —
Amphiphilic diblock copolymers poly((1,2-butadiene)-*b*-ethylene oxide) (PB-PEO) were shown to aggregate and form well-defined micelles in an ionic liquid, 1-butyl-3-methyl imidazolium hexafluorophosphate ([BMIM][PF6]). The universal sequence of micellar structures (spherical micelle, wormlike micelle, and bilayered vesicle) were all resolved by varying the block copolymer composition. For the first time, the nanostructures of PB-PEO micelles formed in an ionic liquid were directly visualized by cryogenic transmission electron microscopy (cryo-TEM). The detailed micelle structure information was extracted from cryo-TEM and dynamic light scattering (DLS) measurements, and compared to their aqueous counterparts. The work demonstrates the feasibility of controlling micellar nanostructures of amphiphilic block copolymers in ionic liquids, and also provides important knowledge for further applications of copolymers for forming microemulsions and ion gels.

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