

Abstract Submitted
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Structural evolution of polyelectrolyte-complex-core micelles and ordered-phase bulk materials¹ MATTHEW TIRRELL, University of Chicago, DANIEL KROGSTAD, University of Illinois, Urbana-Champaign, EDWARD KRAMER, University of California, Santa Barbara — The kinetics of formation and structural evolution of novel polyelectrolyte complex materials formed by the assembly of water-soluble di- and tri-block copolymers, with one neutral block and one block either cationic or anionic, have been investigated. The mechanism and speed of the assembly process, and the organization of these domains, were probed using dynamic mechanical spectroscopy and small angle X-ray scattering (SAXS). SAXS revealed that the equilibrium morphologies of both the di-block copolymer and the tri-block copolymer materials were generally qualitatively the same with some apparent quantitative differences in phase boundaries, possibly attributable to lack of full equilibration. Slow kinetics and difficulties in reaching equilibrium phase structures, especially in tri-block materials, is a principal message of this article. Detailed analysis of the SAXS data revealed that the tri-block copolymer materials formed ordered phases via a nucleation and growth pathway and that the addition of small amounts (~20%) of corresponding di-block copolymers increased the rate of structure formation and enhanced several key physical properties.

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