

Abstract Submitted
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Helix morphology forced by confinement upon bulk cylinder-forming block copolymers HONGQI XIANG, KYUSOON SHIN, TAEHYUNG KIM, SUNG IN MOON, THOMAS J. MCCARTHY, THOMAS P. RUSSELL, Department of Polymer Science and Engineering, University of Massachusetts, Amherst, Massachusetts 01003 — Confinement can break the symmetry of a structure, forcing a change from bulk equilibrium behavior. This effect is examined here by placing asymmetric diblock copolymers into nanoscopic cylindrical pores, i.e., a two-dimensional confinement. In the bulk the copolymers self-assemble into hexagonally packed cylinders with an equilibrium cylinder-to-cylinder period. Within the pores, the cylinder microdomains were oriented along the pore axis when the pore diameter is large in comparison to the equilibrium period. Their period and packing differed from that observed in the bulk, due to an incommensurability between the pore geometry and the natural period and hexagonal packing of the copolymer. However, as the pore diameter decreases, a helical morphology is found to form under certain conditions. This nanostructured material is interesting for its potential applications in fabricating unique nanostructured materials from diblock copolymers, expanding the types of morphology accessible from these simple molecules.

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