

Abstract Submitted
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Self-assembly of three-dimensional morphologies in a diblock copolymer melt confined in a cylindrical nanopore¹ WEIHUA LI, ROBERT A. WICKHAM, Department of Physics, STFX, Antigonish, NS — The microdomain morphologies of an AB diblock copolymer melt confined in a cylindrical nanopore are investigated using three-dimensional real-space self-consistent mean-field theory. We find that many structures self-assemble in the pore, including cylinders, helices, toroids, disks, and spheres. We compute the relative stability of these structures and locate transitions between phases as the diameter of the pore is varied. We focus on narrow pores for simplicity since it appears that the number and complexity of the structures formed increases as the pore size increases. For each of our morphologies, we measure the inter-domain distance, the degree of chain stretching, the area of A/B interface, and the A/B interfacial curvature. We identify which of these factors are driving the structural transitions. Our results will be compared with recent experiments and simulations.

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