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Confinement induced novel morphologies of block copolymers AN-CHANG SHI, McMaster University, BIN YU, BAOHUI LI, Nankai University — Self-assembly of block copolymers confined in cylindrical nanopores is studied systematically using a simulated annealing method. For diblock copolymers which form two-dimensional hexagonally-packed cylinders with period L_0 in the bulk, novel structures such as helices and stacked toroids spontaneously form inside the cylindrical pores. These confinement induced morphologies have no counterpart in the bulk system and they depend on the pore diameter (D) and the surface-polymer interactions, reflecting the importance of structural frustration and interfacial interactions. On tightening the degree of confinement, transitions from helices to toroids to spheres are observed. Mechanisms of the morphological transitions can be understood based on the degree of structural frustration parametrized by the ratio D/L_0.

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