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Self-Assembly of Diblock Copolymers in Half-Ellipsoid-Shape Confinements[1] SO JUNG PARK, MYONG-HYUN KIM, UNIST, DAGAM LEE, JIN KON KIM, POSTECH, JAEUP KIM, UNIST — AB block copolymers can assemble into various nanoscale morphologies such as lamella, cylinder, sphere and gyroid depending on their composition and the interaction strength. In this work, we theoretically study various block copolymer morphologies in hemispherical and ellipsoidal shape confinements and compare the results with experiments. In the experiment, PS-PMMA block copolymers are physically confined by air and surface of nanobowl which interacts preferentially or randomly depending on the coating of the nanobowl. Our theoretical modeling uses self-consistent field theory (SCFT) which calculates the mean field density distribution of AB block copolymers in this confined geometry. The key parameters for the morphology determination are the size and shape of the container and the surface tension between components. For example, when the container wall is coated with PS polymers, onion-shape lamellar phase with PS at the bottom is observed rather than the parallel lamella r phase. It is also found that preferential air-polymer surface interaction promotes the alignment of domains. Our versatile method allows us to model ellipsoid-shaped confinements, and other interesting morphologies are found depending on the eccentricity of the ellipsoid.

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