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Novel Complex Nanostructures from Directed Assembly of Block Copolymers on Incommensurate Surface Patterns. SANG OUK KIM, BONG HOON KIM, Materials Science and Engineering, KAIST, South Korea, HARUN H. SOLAK, Paul Scherrer Institute, Switzerland, DONG MENG, QIANG WANG, Chemical and Biological Engineering, Colorado State University, USA — Self-assembled nanostructures of block copolymer thin films have attracted enormous attention as useful templates for nanofabrication. We present that a chemically nanopatterned surface prepared by photolithography is able to direct the assembly of a block copolymer thin film to form a novel complex nanostructure. When a cylindrical block copolymer was assembled on a stripe pattern, whose pattern period was twice as large as a natural lattice size of the bulk nanostructure, a new structure was produced, where cylinders were alternately oriented parallel and perpendicularly to the surface. Self-consistent field calculations supported the emergence of the new structure, providing insight into the detailed structure and formation mechanism. Our work suggests that the combining top-down and bottom-up approaches may provide a versatile pathway for fabricating well-registered complex nanostructure, potentially useful in diverse advanced applications. References; S. O. Kim, et al. Nature 424, 411 (2003); M. P. Stoykovich, et al. Science 308, 1442 (2005); S. O. Kim, et al. Macromolecules 39, 5466 (2006); S. O. Kim, et al. Advanced Materials 19, 3271 (2007).

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