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Directing the Assembly of Patterns with Complex Geometries using Block Copolymers and Chemically Nanopatterned Substrates SANG-MIN PARK, PRABU RAVINDRAN, YOUNG-HYE LA, NICOLA FERRIER, PAUL NEALEY — A combinatorial methodology was developed to explore the ultimate complexity of the patterns over which the domain structure of thin films of block copolymer can be directed to assemble. Films of lamellae-forming materials self-assemble into complex "fingerprint" patterns with the domains oriented normal to the plane of the film upon annealing on a surface exhibiting neutral wetting behavior towards the two blocks of the copolymer. Here we transfer the fingerprint pattern into a pattern of different chemical functionality (with little topography) through a series of processing steps. The chemical pattern is subsequently recoated with a block copolymer film and annealed, resulting in replication of the original fingerprint template. Using this methodology we demonstrated that the domains of the block copolymer film can be simultaneously directed to assembly into extraordinarily complex structures including dots, circles, ovals, and a variety of connected structures with very high degrees of curvature. The perfection with which the geometries on the nanopatterned substrates assemble is analyzed statistically using an automatic image processing system that can identify and track the changes of reassembled structures.

Paul Nealey

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