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Self-confinement in Block Copolymer Thin Films Induced by Chemical Patterns Made from Electro-oxidation Nanolithorgraphy JI XU, ANTONIO CHECCO, BENJAMIN OCKO, SOOJIN PARK, SHILIU WANG, THOMAS RUSSELL — The effect of confinement from chemical patterns on the self-assembly of block copolymer and related wetting physics has been studied. A variety of geometries designed in a mesh fashion were chemically patterned on OTS modified silicon wafers by electro-oxidation nanolithography. Thin films of a cylinder-forming PS-b-PEO were spin coated onto these patterned substrates. Thermal annealing of these films showed that the films were pinned on the patterned regions, due to the strong interaction between PEO block and carboxylic acid group on patterned surface while, over the non-patterned areas, dewetting was suppressed. The non-favorable interactions of both blocks with the substrate in the non-patterned areas caused the cylindrical microdomains to orient normal to the surface, being confined geometrically by the patterned regions. Defect-free, hexagonally packed cylindrical microdomains that conformed to hexagonal pattern written onto the surface were obtained. Point defects arose in the hexagonal packing of the microdomains when the dimensions or shape of the pattern were not commensurate with the natural packing of the copolymers.

Ji Xu
Univ of Massachusetts Amherst

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