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Control of microdomain orientations in block copolymer thin films with chemically-patterned substrate MIKIHITO TAKENAKA, SATOSHI AKASAKA, Kyoto University, YASUHIKO TADA, Hitachi Ltd., TOMOHIRO INOUE, Kyoto University, HIROSHI YOSHIDA, Hitachi Ltd., HIROKAZU HASEGAWA, Kyoto University — We demonstrate defect-free and well-aligned self-assembly of cylindrical microdomains in block copolymer thin films on chemically-patterned substrates in arbitrarily large areas. Poly(styrene-*b*-methyl methacrylate) (PS-PMMA) with weight average molecular weight and weight fraction of PS being 6.7×10^3 and 0.69, respectively, was spin coated on chemically nano-patterned substrate and annealed to undergo microphase separation. The chemically patterned substrate was prepared by patterning polystyrene grafted silicon wafer by conventional electron beam lithography, to form hexagonally arranged circular areas having higher affinity to cylindrical microdomain forming blocks. The epitaxially-grown cylinder structures were well aligned with defect-free hexagonal lattice, although the chemically-patterned substrate have some defects in its pattern. This result suggests that self-assembly of PS-PMMA can clean-up and interpolate the defects of patterned substrate while patterned substrate can align the orientation of block copolymer domain structures.

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