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Directed Self-Assembly of Cylinder Forming Block Copolymers over Large Areas Using Minimal Topographic Patterning JAEWON CHOI, KENNETH CARTER, THOMAS RUSSELL, Department of Polymer Science and Engineering, University of Massachusetts Amherst — We demonstrate the directed self-assembly of block copolymers (BCPs) on topographically patterned substrates. Unlike deep trench patterned substrates, which BCPs microdomains are trapped within trenches after self-assembly, we fabricated shallow trench patterned substrates where the depth of trench was smaller than the domain spacing of BCPs. The pitches of patterns were varied to investigate the guiding effect of shallow trenches on the ordering of BCPs. The thin films of cylinder forming poly(styrene-b-ethylene oxide) (PS-b-PEO) were prepared on the shallow trench patterned substrates. Unidirectionally aligned line patterns over large areas were obtained by solvent vapor annealing. The line edge roughness (LER) and line width roughness (LWR) were investigated. When PS-b-PEO was thermally annealed on the shallow trench patterned substrates, hexagonally packed PEO microdomains oriented normal to the surface were maintained over large areas. The shallow trench patterned substrates may provide an easy manner to overcome the limitation of grain size of BCPs owing to deep trench patterns and achieve perfection in the lateral ordering of BCPs.

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