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Combining Graphoepitaxy and Electric Fields towards Uniaxial Alignment of Solvent-annealed Cylinder forming Poly(styrene)-*block*-poly(dimethylsiloxane) block copolymers CHRISTINE KATHREIN, RWTH Aachen University, Leibniz Institut für Interaktive Materialien, WUBIN BAI, Massachusetts Institute of Technology, LARISA TSARKOVA, RWTH Aachen University, Leibniz Institut für Interaktive Materialien, TAO HUANG, Tokyo Institute of Technology, APOSTOLOS AVGEROPOULOS, University of Ioannina, ALEXANDER BOKER, RWTH Aachen University, Leibniz Institut für Interaktive Materialien, CAROLINE ROSS, Massachusetts Institute of Technology — Poly(styrene)-*block*-poly(dimethylsiloxane) (PS-PDMS) is a promising candidate in nanopatterning technologies, since its allows for feature sizes down to 10 nm due to its high chi parameter and good etch selectivity between the blocks. Here we combine the advantages of fast processing of block copolymer films in vapors of selective solvents with orientational guidance of an external electric field and of a graphoepitaxy approach for which we utilize topographic substrates prepared using conventional photolithographic fabrication. Graphoepitaxy was performed between 60 nm high fins composed of SiO_2. The degree of ordering strongly depends on the solvent vapor annealing conditions chosen. Highly uniform structures were obtained in a 2:1 volumetric solvent vapor mixture of toluene and heptane at a swelling ratio of 1.8. We demonstrate and analyze the interplay between the dimensions and orientation of topographic features at the substrate, the applied electric field and the composition of the solvent on the degree of ordering in thin films of cylinder-forming PS-PDMS (53 kg/mol, f(PDMS)=30%).

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