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PS-b-PDMS Block Copolymer Thin Film: Pattern Formation and Phase Behavior I-FAN HSIEH, STEPHEN Z.D. CHENG, FENG CHEN, QIANG FU — Recently, block copolymer thin films are of great interest for their applications in surface patterning, and thin films of diblock copolymers with cylindrical microdomains normal to the surface are more attractive due to the tenability of large aspect ratios of the cylindrical microdomains. Within various kind of block copolymer, PS-b-PDMS is chosen due to an extremely large χ value between PS and PDMS. PS-b-PDMS can be transformed into silicon oxide under UV/O_3 exposure, and a layer of silicon oxide with the self-assembled block copolymer patterns can be made. In our work, utilizing PGMEA as solvent and its vapor as spin casting atmosphere, we found an effective approach to obtain the PDMS cylinders oriented normal to the substrate. Furthermore, during benzene solvent annealing, PDMS cylinders' orientation transfers from perpendicular to parallel and then back to perpendicular again. By changing the cylinders orientation alternatively, the lateral order of cylinder packing gradually improved. By investigating this morphology evolution, the mechanism and free energy pathway for PS-b-PDMS thin film morphology transition during solvent annealing can be constructed.

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