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PS-*b*-PDMS Block Copolymer Thin Film: Pattern Formation and Phase Behavior I-FAN HSIEH, STEPHEN Z.D. CHENG, DEPARTMENT OF POLYMER SCIENCE, THE UNIVERSITY OF AKRON TEAM — Recently, block copolymer thin films attract great attention due to their potential applications in surface nano-lithography. In our work, PS-*b*-PDMS with cylinder morphology is chosen due to extremely large χ value between two blocks. Besides, PS-*b*-PDMS can be transformed into silicon oxide under UV/O₃ exposure and a layer of silicon oxide with the self-assembled block copolymer patterns can be made. By utilizing the PGMEA as solvent, we can easily obtain sphere morphology in cylindrical composition block copolymer by preserved block copolymer solution morphology during film formation. Furthermore, in thermal annealing process, the phase behavior of the PS-*b*-PDMS thin film is strongly affects by molecular weight, film thickness and annealing temperature. In larger-molecular-weight PS-*b*-PDMS, we only observed spherical domains rearrangement and without morphology transition between sphere and cylinder due to high energy barrier, whereas, in the case of smaller-molecular-weight polymer, depending on the film thickness and annealing temperature, its thin film morphology transits between sphere and cylinder alternatively, which is similar to what we found in solvent annealing.

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