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**Rapid microwave annealing for perpendicular oriented cylinders in PS-*b*-PMMA thin films** ZHE QIANG, KEVIN CAVICCHI, BRYAN VOGT, University of Akron, UNIVERSITY OF AKRON TEAM — Self-assembly of block copolymer (BCP) has been extensively studied for decades due to their wide range of potential applications such as lithography. Direct microwave annealing provides rapid ordering kinetics. However, the knowledge regarding the structural and orientation evolution of morphology during microwave annealing without solvents remains sparse. Herein, we report on how microwave-annealing conditions impact the morphology developed in cylinder forming PS-*b*-PMMA films on unmodified silicon wafers. The fraction of perpendicular cylinders developed during microwave annealing is primarily determined by temperature ramp from microwave heating itself. The heating of the substrate during microwave annealing is varied from 0.5 C/s to 2.8 C/s by two factors: (1) the microwave output energy and (2) the local heating position of BCP film in the microwave reaction vessel. A maximum in the fraction of perpendicular cylinders (97 %) occurs at 1.83 C/s and appears independent of the microwave power used. This work demonstrates the importance of controlling conditions of microwave annealing in the morphology developed.

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