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Parametric Conditions for the Directed Self Assembly of Block Copolymers using a Topographically Patterned Angled Substrate and Grafted Brush[1] NATHAN REBELLO, VAIDYANATHAN SETHURAMAN, GREGORY BLACHUT, CHRISTOPHER ELLISON, GRANT WILLSON, VENKAT GANESAN, University of Texas, Austin — Single chain in mean field theory simulations is utilized to study the self-assembly of block copolymers (BCP) in thin films that are guided by a trapezoidal substrate and backfilled with random copolymers. The influence of the sidewall and substrate surface geometry guidelines on the self-assembly of BCPs are explored, and we identify the conditions that lead to the formation of perpendicular lamellar morphologies. We tune the chemical affinity of the substrate sidewall and its angle of inclination in order to obtain optimal conditions for self assembly, and compare these results with the traditional rectangular substrate. We find that when the substrate surface and sidewall are preferential to the same BCP component, lamellar formation occurs with high fidelity across all substrate angular modifications and becomes moderately favorable at a shorter substrate width with upper and lower angular extremities. On the other hand, when the sidewall and substrate surface are preferential to different blocks, high favorability is displayed with intermediate taper angles, and with shallower angles with short or large substrate widths.

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