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Rapid Directed Assembly of Block Copolymer Films on chemically patterned surfaces at Elevated Temperatures ADAM WELANDER, PAUL NEALEY, Department of Chemical and Biological Engineering, University of Wisconsin, Madison — We report on the rapid directed assembly of poly(styrene-b-methyl methacrylate) (PS-b-PMMA) block copolymer thin films at elevated temperatures well above the glass transition temperature (Tg) on chemically patterned surfaces. The time needed for defect free assembly, where the chemical pattern (L_S) closely matches the natural length of the block copolymer (L_0), is strongly dependant on the annealing temperature. Annealing times range from 150 minutes at 180 $^\circ$C to 3 minutes at 230 $^\circ$C. This system behavior is well described as a simple thermally activated process with an apparent activation energy (ΔE_a) of 182 kJ/mol and a polymer diffusion coefficient of 7.5E-15 cm^2s^{-1} at 190 $^\circ$C. Modeling this behavior predicts annealing times of 13.5 seconds at 250 $^\circ$C and 1.9 seconds at 280 $^\circ$C. While these times are difficult to investigate experimentally, a one minute anneal at these elevated temperatures not only shows perfect assembly where $L_S = L_0$, but also where $L_S < L_0$.

Adam Welander
Department of Chemical and Biological Engineering,
University of Wisconsin, Madison

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