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Fabricating Nanoscale Gratings with Gradient Pattern Height by Annealing Imprinted Polymer Patterns YIFU DING, HYUNWOOK RO, JIRUN SUN, JING ZHOU, SHENG LIN-GIBSON, CHRISTOPHER SOLES, Polymer Division, National Institute of Standards and Technology — The evolution of nanoimprinted polymer patterns during isothermal annealing is driven by the interplay of the pattern features, material properties of the polymer, and the polymer/substrate interactions. With proper control of these factors, a range of hierarchical nanostructures can be fabricated through thermal annealing of the imprinted polymer patterns. Here we demonstrate an example of creating polystyrene (PS) gratings with gradient pattern height. This is achieved by annealing the imprinted PS gratings under a temperature gradient. In the simplest case, the pattern decay rate is determined by the viscosity and surface tension of the PS. Consequently, the degree of the gradient pattern height can be well controlled through the "fragility" of the PS, i.e. its temperature dependence of the viscosity. Such a gradient grating is extremely useful in the combinatorial studies of the effect of the surface topology on the cell behaviors and controlled wettability.

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