Block Copolymers composed of chemical constituents that are incompatible can microphase separate. Similar to the way oil and water are immiscible so they phase separate. Since the blocks are covalently bonded to each other they cannot dissociate in a macroscopic way like oil and water instead they form nano-structures which are governed by the size of each block. Polymer scientists use thermodynamics to describe how the different blocks interact. The product of the degree of polymerization, n, and the Flory-Huggins interaction parameter, chi, gives an indication of how incompatible the two blocks are and whether or not they will microphase separate. For example, a diblock copolymer of symmetric composition will microphase separate if the product chi \* N is greater than 10.5. If chi \* N is less than 10.5, the blocks will mix and microphase separation is not observed. The incompatibility between the blocks also affects the solution behavior of these copolymers and their adsorption behavior on various surfaces. The structures formed are called morphologies and the most common are lamella cylinder gyroid and body centered cubic. L0 is the distance which when minimized created the most fine nanostructure, Sub 10 nanometer L0 are optimal. Block copolymer self-assembly is generally limited to forming simple patterns such as arrays of dots or lines, determined by the volume fraction of the blocks and the processing conditions. It is desirable to be able to modify both the period of the patterns and their morphology to form more complex structures useful in devices. The period of well-ordered thin ﬁlms of poly (styreneblock-dimethylsiloxane) (PS-b-PDMS) or poly(styrene-blockmethyl methacrylate) (PS-b-PMMA) can be varied by up to ∼10% by use of an incommensurate template to strain the microdomain array or by changing the annealing conditions.