# Mesoscale Simulations for Directed Self-Assembly of Block Copolymers

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The current block copolymer (BCP) nanopatterning technology has been extended to use "directed self-assembly" (DSA) strategy by combining BCP self-assembly with various external processing factors, such as lithographic patterns, electric fields, solvent or zone annealing, and geometrical confinement, either for fabricating defect-free structure or for creating novel structures with pursuing novel applications. In this talk, we present theory and simulation works on DSA of BCP systems and discuss theoretical perspectives on various DSA approaches toward high patterning capability with sublithographic resolution. The presentation will cover thermodynamic and dynamic behaviors of chemo- and graphoepitaxial assembly of BCP materials with various guiding strategies. The pattern tunability and the dimensional variability will be presented by demonstrating the simulation results for DSA of the linear and nonlinear BCPs, obtained from mesoscale density functional theory or Monte Carlo simulations of bead-spring chains.