Role of thermodynamics on controlling nanostructured thin film

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The self-assembly in various polymeric systems is the core principle to many of advanced nanotechnologies requiring nanostructured thin films. Success of most of these applications utilizing the self-assembly relies on how well one can adjust and switch the shape and size arrangement direction of self-assembly. Hence there have been active research efforts in understanding the underlying physics and controlling the self-assembly, augmented by theoretical and numerical modeling. Complicated interactions, high sensitivity on various system parameters, wide range of length and time scales related with self-assembled structures make finding theoretical modeling very challenging. In this talk, I will introduce how simulations have helped advance research in block copolymer thin films. Moreover, recent efforts to predict and identify the roles of thermodynamics and kinetics on self-assembly will be also discussed along with challenges and vision of the future research.