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Controlled assembly of nanorods in block copolymer thin films HUIKUAN CHAO, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, DONGLIANG WANG, RUSSELL COMPOSTO, Department of Material Science and Engineering, University of Pennsylvania, ROBERT RIGGLEMAN, Department of Chemical and Biomolecular Engineering, University of Pennsylvania — Block copolymers can be used as a template to order nanoparticles to obtain functional polymer nanocomposites. While progress has been made in understanding the distribution of spherical particles in the block copolymer, significantly less work has focused on the distribution of nanorods in block copolymers. Nanocomposites containing anisotropic particles could have enhanced mechanic, electrical and optical properties and become candidates for numerous applications such as conductive membranes or coatings with controlled optical properties. Understanding the thermodynamic origins that regulate the distribution of nanorods in block copolymers is of central importance in obtaining desired structures, and molecular modeling could be a powerful tool to guide experiments. In the talk, I will first introduce our extension of polymer field theory that enables the study of the equilibrium properties of block copolymer thin films containing nanorods. Then I will present how the geometry of the nanorod, including its aspect ratio and size, affects the distribution of nanorods in thin films. Finally, we will examine the role of surface wetting on the distribution of nanorods. We find the rods segregate to defects in the block copolymer structure, which agrees well with ongoing experiment.

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