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Tuning the interactions between nanoparticles in block copolymer domains BEN LINDSAY, University of Pennsylvania, JEFFREY METH, DuPont, RUSSELL COMPOSTO, ROBERT RIGGLEMAN, University of Pennsylvania — Block copolymer nanocomposites have the potential to become a platform for new materials with improved thermal, electrical, or optical properties compared to neat polymers. However, it is critical to control the dispersion of the nanoparticles in the block copolymer matrix, and thus it is important to understand how nanoparticles interact with each other within block copolymer domains. In this work, we use a polymer nanocomposite field theory (PNC-FT) that was recently developed in our group to study the interactions of nanoparticles within both cylindrical and lamellar block copolymer structures. We find that the nanoparticles induce a curvature in the A-B interface in the block copolymer, which plays a significant role in the interparticle interactions, leading to a non-monotonic potential of mean force between the particles. This effect becomes more pronounced as the nanoparticle size increases. Finally, we will also present results showing the effect of nanoparticle surface functionality (polymer grafting) on the interparticle interactions.

Ben Lindsay
University of Pennsylvania

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