

Abstract Submitted
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Polymer Nanocomposite Gyroids¹ CHRIS KNOROWSKI, Virginia Tech, JOSHUA ANDERSON, ALEX TRAVESSET, Iowa State University and Ames Laboratory — Self-assembled polymer phases are increasingly being used in the development of nanocomposite materials. The polymer matrix provides a template for nanoparticles added to the system, transferring the structure of the polymer to the nanoparticles. We perform Molecular Dynamics simulations of these polymer nanocomposite materials and characterize their phase diagrams. Two striking results are found. First, a specific interaction of the polymer and the nanoparticles is required for a successful templating. Second, the presence of nanoparticles can change the pure polymer phase entirely. For instance, a small nanoparticle concentration turns a polymer system from a hexagonal phase into a gyroid phase, both for the polymers and the nanoparticles. In fact, the gyroid is the most prevalent phase over a wide range of interaction strengths and polymer composition.

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Joshua Anderson
Iowa State University and Ames Laboratory

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