

Abstract Submitted
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Using non-thermodynamic mechanisms to create tailored morphologies in polymer nanocomposites RICK BEYER, KRISTOFFER STOKES, MIKE BERG, RANDY MROZEK, JOSEPH LENHART, TANYA CHANTAWANSRI, JAN ANDZELM, Army Research Laboratory, Materials Division, APG, MD — A variety of non-thermodynamic approaches for both dispersion of nanoparticles (NPs) and the creation of organized, NP-rich phases in a polymer template has been investigated. To facilitate materials development, we have focused our preliminary efforts on commodity materials including colloidal silica and a poly(styrene-*b*-ethylenebutylene-*b*-styrene) copolymer (SEBS), processed using twin-screw extrusion and mineral oil as a solvent/diluents. Guidance and a theoretical framework is provided using a field-theoretic approach that combines the self-assembly behavior of the block copolymer matrix, the effects of solvent, and the effect of ligand-functionalized NP miscibility on morphology. The morphological behavior of these materials will be compared with the model predictions, as will the effectiveness of the non-thermodynamic mechanisms for creating controlled, tailored morphologies.

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