Thermodynamic Interactions in Polymer Nanocomposites towards Controlled Nanoparticle Dispersion ALISYN NEDOMA, RAJEEV DATTANI, JOAO CABRAL, Imperial College London, CENTRE FOR PLASTIC ELECTRONICS TEAM — Thermodynamic interactions in polymer/nanoparticle blends can be used to control the dispersion of nanoparticles. Here we introduce the use of polymer blends comprising immiscible A and B homopolymers, an A-B diblock copolymer "surfactant," and nanoparticles. Upon thermal annealing, the composites self-assemble into equilibrium morphologies with well-dispersed nanoparticles.Polystyrene (PS), polymethyl methacrylate (PMMA), and a PS-PMMA diblock were chosen as the model polymers; C_{60} fullerene was the model nanoparticle. Blends were prepared for C_{60} loadings from 0.1 to 2 mass% for blends with symmetric homopolymers and a symmetric diblock copolymer. The molecular weight of the matched homopolymers was varied as 2, 20, and 40 kDa whilst the same 60-60 kDA diblock copolymer was used. Samples were studied using small angle neutron scattering, and the resulting morphologies were found to be lamellar for all C_{60} loadings. Ongoing work is exploring the effects of polymer asymmetry on the nanostructure of the composites.

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