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Effect of Matrix Polydispersity on Morphology of Hybrid Materials Consisting of Homopolymer Grafted Nanoparticles in a Homopolymer Matrix TYLER MARTIN, ARTHI JAYARAMAN, University of Colorado at Boulder — The morphology of materials consisting of homopolymer grafted particles in a homopolymer matrix is driven by the features of the composite, namely graft and matrix chain lengths and grafting density, which drive wetting/dewetting of the grafted layer. In our previous work, we showed that polydisperse grafted polymers stabilize the dispersed morphology of homopolymer grafted nanoparticles in a chemically identical homopolymer matrix, due to improved wetting of the polydisperse grafted layer by the monodisperse matrix. Here, we present our computational work showing the effect of polydispersity in matrix polymers. Specifically, in a bidisperse matrix, the short matrix chains preferentially wet the monodisperse grafted layer (at high grafting density) more than the long matrix chains. Additionally, this preferential wetting of the grafted layer by the short matrix chains is driven by the ratio of the long chain to short chain lengths, or the bidispersity index. Despite improved wetting of the grafted layer by the short matrix chains, the bidisperse matrix only slightly improves grafted particle dispersion in the matrix due to competing depletion-like attractive interactions induced by the long matrix chains.

Tyler Martin
University of Colorado at Boulder

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