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Phase behavior of polymer/nanoparticle blends with attractions near a substrate VENKAT PADMANABHAN, University of Delaware, AMALIE FRISCHKNECHT, Sandia National Laboratories, MICHAEL MACKAY, University of Delaware — We use a fluids density functional theory with mean-field attractions to investigate the phase behavior of polymer/nanoparticle blends near a substrate. The blends are modeled as a mixture of spherical particles and freely jointed chains near a planar wall. The attractive interaction between the nanoparticles and the polymer is given by an exponential form. Earlier studies have shown that for an athermal system, there is a first order transition, where the nanoparticles expel the polymer from the surface to form a monolayer at a certain nanoparticle concentration. This transition has been justified by nanoparticle segregation to the substrate observed in experiments. In the presence of attractions, the first order transition moves to higher nanoparticle concentrations as the strength of attraction is increased. Our preliminary results show that there is a smooth transition at very high attractions. We present results for different nanoparticle concentrations at constant pressure to mimic experimental conditions. This work was performed, in part, at the Center for Integrated Nanotechnologies, a U.S. Department of Energy, Office of Basic Energy Sciences user facility at Los Alamos National Laboratory (Contract DE-AC52-06NA25396) and Sandia National Laboratories (Contract DE-AC04-94AL85000).

Venkat Padmanabhan
University of Delaware

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