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Entropically Driven Layering Near a Substrate: A Fluids DFT Study ERIN MCGARRITY, Michigan State University, AMALIE FRISCHKNECHT, Sandia National Laboratory, MICHAEL MACKAY, Michigan State University — We employ a fluids density functional theory to study the phase behavior of athermal polymer/nanoparticle blends near a hard substrate. These blends exhibit two types of first order, entropically driven layering transitions. In the first type of transition, the nanoparticles order to form a layer which is a fixed distance from the surface. The structure and location of this layer depends on nanoparticle radius. In the second type of transition, which occurs at melt-like densities, the nanoparticles and polymers form laminar structures which resemble colloidal crystals. We examine the effects of packing density, chain length and nanoparticle radius on the system and show that the transitions are first order. In addition we show that the crystalline phase is nucleated by the presence of the surface. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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