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Computational study of a nanoparticle-rich domain formation in a nematic liquid crystal CHARLES MELTON, SHEIDA RIAHINASAB, University of California Merced, ROBIN SELINGER, Kent State University, LINDA HIRST, University of California Merced — Past work has shown that when functionalized quantum dots are introduced into a nematic liquid crystal host and then cooled through the isotropic-nematic phase transition, structures of numerous sizes and morphologies are formed via self-assembly. The sizes of these structures are controlled by tuning the cooling rate of the liquid crystal. During the transition, the segregation of isotropic and nematic domains behaves as a classic phase separation phenomenon. We study this phenomenon by using the Cahn-Hilliard equation in conjunction with the nematic liquid crystal order parameter. By combining these two systems, we successfully model phase domain separation that follows the lower order parameter of the liquid crystal, as seen in experiments. We calculate isotropic domain size as a function of cooling rate, and find a power law relation that is differs from experimental observations, yet shows similar behavior.

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