

28b Field Theoretic Study of Surface-Modified Nanoparticles in Block Copolymer Melts

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The selective incorporation of metallic/inorganic nanoparticles into particular domains within block copolymer mesophases can be used to tune the properties of the polymer (e.g. conductivity, mechanical properties, barrier properties, etc...). Conversely, the self-assembly of the block copolymer naturally templates the organization of the nanoparticles, providing a mechanism by which finely structured metallic/inorganic materials with applications ranging from catalysis to photonic crystals may be obtained. The realization of such applications will require a thorough understanding of the relationships between the particle geometry and surface interactions with the block copolymer matrix. The self-consistent field theory of block copolymers provides a flexible theoretical framework with which these relationships may be evaluated. Here we discuss the influence of spherical nanoparticle size and concentration on the equilibrium block copolymer morphology, particle dispersion, and domain selectivity.