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Design and organization of nanoparticles in thin film copolymer/homopolymer hosts JUNNAN ZHAO, PETER GREEN, University of Michigan, Ann Arbor — The organization of polystyrene (PS) grafted gold (Au) nanoparticles (NPs) in supported thin film mixtures of polystyrene-*b*-poly(2-vinylpyridine) (PS-b-P2VP) diblock copolymers (BCP) with PS homopolymers was examined. The copolymer chains formed micelles, composed of inner cores of P2VP blocks and outer coronae of PS blocks, within the PS hosts. The spatial distribution of nanoparticles within this thin film BCP/homopolymer system is characterized by a morphological diagram of the curvature of the Au cores, $1/R_C$, vs. the degree of polymerization N of the grafted PS-chains. The distribution is quantified by five basic regimes, largely dictated by competing entropic and enthalpic intermolecular interactions. The NP distributions range from predominantly residing at external interfaces (free surface and substrate) to primarily "decorating" the surface of micelles. The phase behavior of PS-Au/BCP/homopolymer (PS) systems is necessarily more intriguing than PS-Au/homopolymer (PS) systems, as the relative roles of specific intermolecular interactions on local NP distributions become more apparent.

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