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Nanocomposites Consisting of Nanoparticles with Multidentate PS Brushes Mixed with PS Matrices HYEMIN LEE, SANGHYUK WOOH, JAEHOON LIM, Seoul National University, MATTHIAS ZORN, RUDOLF ZENTEL, Johannes Gutenberg University of Mainz, KOOKHEON CHAR, Seoul National University — In order to prevent massive phase separation of nanoparticles (NP) in a polymer matrix, the relevant hybridization of NPs with polymer matrices has proven to be an effective method for the high performance of nanocomposites in applications. The surface of inorganic (gold or QD) NPs of various size was modified with polystyrene (PS) polymer brushes, poly(styrene)-block-poly(cysteamine methyl disulfide), by the ligand exchange procedure. The disulfide groups in the PS brushes act as anchoring blocks for NPs. Different PS brushes were prepared with different total molecular weights and mole fractions of disulfide moieties. Compared with NPs dispersed in PS without disulfide anchoring groups, NPs anchored with PS brushes through disulfide groups were uniformly distributed within PS matrices. The dispersion of NPs within a polymer matrix was found to be influenced by the total molecular weight of PS brushes as well as the number of anchoring disulfide groups. Furthermore, the effect of the ratio between relative size of NP and the radius of gyration of a polymer brush as well as the grafting density of PS brushes anchored onto NPs on the NP distribution within a polymer matrix is discussed.

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