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Localization of Individual Nanoparticle in the Perforated Lamellar Phase of Self-assembled Block Copolymer Driven by Entropy Minimization TAE WON NAM, Korea Adv Inst of Sci Tech — Although precisely controlled microdomains of block copolymers (BCP) provide an excellent guiding matrix for multiple nanoparticles (NPs) to be controllably segregated into a desired polymer block, localization and positioning of individual NPs have not been demonstrated. Here, we report a unique one-to-one positioning phenomenon of guest Au NPs in the host BCP microdomains; each of polystyrene-functionalized Au NPs is embedded within the perforation domain of hexagonally perforated lamellar (HPL) morphology of poly(dimethylsiloxane-*b*-styrene) BCP. The local minimization of free energy achieved by the placement of Au NPs into the center of the perforation domain is theoretically supported by the self-consistent field theory (SCFT) simulation. We propose a novel design principle for more precisely controllable nanocomposites by developing a new route of NP arrangement within a polymer matrix.

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