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Tartaric Acid-Assisted Self-Assembly of Hybrid Block Copolymer Composites[1] LI YAO, YING LIN, JAMES WATKINS, Department of Polymer Science and Engineering, University of Massachusetts Amherst — Enantiopure tartaric acid was used as an additive to increase the segregation strength of poly(ethylene oxide-block-tert-butyl acrylate) (PEO-b-PtBA) copolymers through strong, selective interactions with one of the polymer chain segments. Addition of tartaric acid to PEO-b-PtBA exhibiting cylindrical morphologies resulted in the formation of helical superstructures as observed by transmission electron microscopy. It was also found that this small acid additive can also enable phase-selective ultra-high loading of nanoparticles (NPs) into target domains of the block copolymer composites. The loading of tartaric acid can increase enthalpically favorable interactions between the nanoparticle ligands and the host domain and mitigate entropic penalties associated with NP incorporation into the target domain. A metal content of over 40 weight percent by mass of the resulting well ordered composites was achieved as measured by thermal gravimetric analysis in PEO-b-PtBA/tartaric acid/4-hydroxythiophenol functionalized Au NP hybrid system.

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Li Yao
Department of Polymer Science and Engineering,
University of Massachusetts Amherst

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