

Abstract Submitted
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Large nanoparticle assembly in block copolymer-based supramolecules¹ YIHAN XIAO, TING XU, University of California - Berkeley, Lawrence Berkeley National Lab — Self-assembly of nanoparticles into 1-D, 2-D and 3-D nanostructures is promising for exploiting their collective properties. A significant challenge to realize their potential is to fabricate 3-D assembly of nanoparticles with designed structures and functionalities. Top-down approaches such as lithography are insufficient to generate hierarchical 3-D assemblies. Block copolymer (BCP) directed self-assembly, provides an alternative avenue to address these limitations, but is restrictive to nanoparticle size (d) to be below a fraction of BCP periodicity (D). The restriction in particle size prohibits the application of the method to nanoparticles with exciting size-dependent properties. We show that nanocomposites composed of block copolymer-based supramolecules and nanoparticles offer a platform to obtain nanostructured composites with single particle precision using nanoparticles in the size range of tens of nanometer. Excess small molecules are critical in preventing macrophase separation and achieving a d/D ratio up to 1.6. The supramolecular approach opens up a new route to overcome present challenges toward designer nanocomposites.

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Yihan Xiao
University of California - Berkeley, Lawrence Berkeley National Lab

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