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The Assembly of Nanorods in Comb Polymer Supramolecules ALEXANDER MASTROIANNI, KARI THORKELSSON, JOSEPH LUTHER, PAUL ALIVISATOS, TING XU, UC Berkeley — Inorganic nanoparticles exhibit a wide range of size-dependent properties and present great promise in technological applications. Fully harnessing this potential requires developing bottom-up strategies to assemble nanoparticles over multiple length scales simultaneously. Nanoparticles have been co-assembled with block copolymers (BCPs). Often this approach requires delicate balance between particle-polymer interactions and entropic penalty associated with polymer chain deformation upon particle incorporation. Recently, we showed that a coil-comb supramolecule formed by non- covalent attachment of small molecule amphiphiles to one block of a BCP can be used to direct nanoparticle assemblies with high precision. The alkyl tail of the small molecules chosen interacts favorably with the native alkyl ligands of a wide variety of inorganic nanoparticles and eliminates the need for particle surface modification. Upon attaching small molecule to one BCP block, the polymer chain stiffens, providing entropic driving force to further direct nanoparticle organization within BCP microdomains. Here, the co-assembly of these supramolecules with nanorods was systematically investigated as a function of small molecule loading, supramolecular morphology, nanorod diameter, and aspect ratio. The presented fundamental studies pave a path toward nanorod-based device fabrication.

Alexander Mastroianni
UC Berkeley

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