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Nanoparticle-Loaded Multifunctional Block Copolymer Micelles JINHYE BAE, JIMMY LAWRENCE, CAROLINE MIESCH, ALEXANDER RIBBE, Polymer Science and Engineering Department at University of Massachusetts Amherst, WEIKUN LI, School of Chemistry and Chemical Engineering at Huazhong University of Science and Technology, TODD EMRICK, Polymer Science and Engineering Department at University of Massachusetts Amherst, JIN-TAO ZHU, School of Chemistry and Chemical Engineering at Huazhong University of Science and Technology, RYAN HAYWARD, Polymer Science and Engineering Department at University of Massachusetts Amherst — We have studied the incorporation of pre-synthesized hydrophobic inorganic nanoparticles within the cores of amphiphilic polystyrene-block-poly(ethylene oxide) (PS-PEO) diblock copolymer micelles formed through solvent-evaporation-induced interfacial instabilities of emulsion droplets. Using iron oxide, gold, and cadmium selenide nanoparticles coated with native alkane ligands, highly uniform encapsulation is obtained for cylindrical micelles, while spherical micelles can be enriched to ~ 90 % of loaded micelles through simple magnetic or centrifugal purification steps. Multiple different types of nanoparticles can easily be incorporated into each micelle, yielding multi-functional micelles. The ability to encapsulate both spherical and rod-like particles of different core chemistries and sizes ranging from ~ 1 to 20 nm, without the necessity of coating particles with specially designed ligands, makes this a versatile route to prepare hybrid micelle structures.

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