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Recent Advances in Solution-state Assembly of Synthetic Polymers into Well-defined Nanostructures.

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The solution-state assembly of synthetic amphiphilic block copolymers has emerged as a powerful tool to conveniently and rapidly afford discrete, well-defined nanoscale materials for study and application to advance nanoscience and nanotechnology. One of the key challenges has been the identification of appropriate polymer components and conditions to control the assembly mechanisms and produce complex materials of uniform size, narrow size distribution and having interesting morphologies. In addition, developing systems that are capable of undergoing assembly directly from aqueous solution and also those that contain complex internal phase segregated domains (*i.e.* multicompartment micelles) are significant interests. This presentation will provide an update on our work to control the micelle morphologies and will describe recent di- and tri-block copolymer designs that allow for pH-triggered self assembly into amphiphilic core-shell micelles, without the use of organic solvents. Moreover, the aqueous solution-state assembly of novel amphiphilic hyperbranched copolymers will be discussed.