

# **Controlling Intra- and Inter- Micellar Structure in Block Copolymer Solutions**

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There are many interesting strategies for extending the utility of micellar aggregates beyond the canonical "dilute solution of spheres". I will describe some of our recent results on two such approaches. In one, we utilize ABC triblock copolymers in an attempt to make "structured micelles", i.e., micelles in which the A and B blocks are segregated within the core, surrounded by a well-solvated C corona. In this case the C block is the water-soluble polyethylene oxide, while B and A are hydrocarbon and fluorocarbon blocks, respectively. Novel micellar structures including an internally-segregated "hockey puck" will be described, and the important role of chain architecture (i.e., ABC vs ACB vs ABC star) will be highlighted. In the second instance, we examine concentrated solutions of spherical micelles, where intermicellar interactions drive the system to crystallize on a micellar superlattice. In particular, the thermotropic transition between fcc and bcc packings has been examined in detail. The temperature dependence of micellar parameters, especially the aggregation number, is shown to drive the fcc to bcc transition, in excellent agreement with recent simulations on highly branched star polymers.