Superlattice Assembly in Binary Charged Block Copolymer Micelles

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During past decades superlattices of nanoparticles have been received great attention due to their applications such as photonic crystals and templates for advanced patterning. Inorganic nanocrystals and polymeric latex particles which have rigid shape and boundary are considered as materials formulating superlattices so far. Herein, we report novel superlattices self-assembled from block copolymer micelles which serve as deformable and stimuli-responsive building units. Micelle types with opposite surface charges are prepared from block copolymers in aqueous media. These micelles behave as assembly unit with controllable size and surface charge which are varied by solution conditions. When mixed together, crystal-like aggregates are formed via assembly between complementary micelles.

We will present some of results showing aggregates with well-known crystal habits and key parameters to obtain diverse superlattices. Subsequently, characteristics of micelle-based mesocrystal assembly will be compared with inorganic nanocrystals and other colloidal crystals. We believe this study will contribute to development of our understanding for novelty of the polymeric nanomaterials.