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Mesoscale Lattices Assembled from Charge-Tunable Block Copolymer Blends in Selective Solvents SEYOUNG KIM, JEWON CHOI, Seoul Natl Univ, SOO-HYUNG CHOI, Hongik Univ, KOOKHEON CHAR, Seoul Natl Univ — Recent studies revealed that block copolymer (BCP) microdomains are capable of being organized into unusual symmetries such as the Frank-Casper phases. These unique structures result from a compromise between domain geometry and space-filling constraint; in other words, the deformability of soft matter. Our mesoscale micellar lattices co-assembled from the blends of oppositely charged BCPs demonstrate the nature of deformable soft materials in a distinctive way. The micellar structures and interactions of BCPs in selective solvents can be finely tuned by controlling the charge density such that the spherical micelles further assemble into hexagonal arrays. The micellar lattices show unconventional symmetry and sub-10 nm clean facet formation compared to hard-sphere counterparts reported so far. We attribute these novel phenomena to multi-compartment intrastructure of the micelles assembled and their strong interactions, since the crystalline symmetry disappears with a subtle control of solvency, mixing ratio of BCP blends, and micellar interactions. Analysis on the nucleation condition reveals that such deviation in the micellar lattices arises from the soft nature of BCP assemblies which can be readily deformed upon swelling.

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