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Evaporation-Rate-Dependent Morphological Evolution of Uniform-Sized Block Copolymer Particles JAEMAN SHIN, Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, 305-701 Republic of Korea, YONGJOO KIM, KAIST Institute for NanoCentury, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, 305-701 Republic of Korea, BUMJOON KIM, Department of Chemical and Biomolecular Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, 305-701 Republic of Korea, PNEL TEAM — Block copolymer (BCP) self-assembly in evaporative emulsions can lead to non-spherical particle with unique nanostructure when the emulsion surface is neutralized to the surrounding. In this work, we demonstrate that kinetic parameter, solvent evaporation rate, can also control the shape of the polystyrene-*b*-polybutadiene (PS-*b*-PB) BCP particle. A distinct morphological transition of the particles from ellipsoids with striped lamellae to onion-like spheres was observed as the evaporation rate was decreased, and the critical evaporation rate for the transition was dependent on the molecular weights of PS-*b*-PB. Furthermore, the evaporation rate was found to affect the self-assembly orientation of BCPs at the particle surface, which eventually determined the final structure of BCP particles. In the case of rapid evaporation, large differences between the toluene diffusivity in PS and in PB induced BCP to align perpendicular to the particle surface. By contrast, thermodynamic effects lead BCP to assemble parallel to the particle surface at slow evaporation.

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