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Self-Assemble Behavior of Polystyrene-tethered Hydrophilic POSS Nanoparticle in Thin Film I-FAN HSIEH, XINFEI YU, KAN YUE, STEPHEN CHENG, The University of Akron, DEPARTMENT OF POLYMER SCIENCE, THE UNIVERSITY OF AKRON TEAM — Recently, block copolymer thin films are of great interest in their applications of surface patterning. However, due to the restriction of the polymer material properties, the etch contrast between two phases is usually low and the smallest pattern block copolymer can create is around 10 nm. By taking the advantage of the hybrid property of POSS nanoparticle, we can produce the thin film pattern with great etch contrast with only a few nanometers in size. PS-tethered hydrophilic POSS can self assemble to form nano-pattern in both bulk and thin film state. As the PS molecular weight increases, the thin film morphology can transfer from lamella to cylinder then to sphere as block copolymer does. But because of the nature of the POSS particle, we discover a new packing symmetry in the cylinder phase that has not been discovered in block copolymer thin film system. Unlike block copolymer which has higher order-disorder transition temperature in thin film, PS-POSS thin film also shows some unique phase transition behavior during heating, and this transition behavior also affected by the different functional group attached on POSS particles.

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