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Multiple Replicas of Block Copolymer Thin Films from a Brushless Organosilicate Substrate HYO SEON SUH, HYUNSIK YOON, KOOKHEON CHAR, Seoul National University — The chain end-grafted polymer brushes or cross-linked polymer mats have typically been utilized as the surface modification layers to induce the perpendicular orientation of block copolymer (BCP) thin films. Instead of such polymer-based approaches, we have recently introduced a new concept to control the BCP orientation using the brushless organosilicate (OS) substrates, whose surface energy can be finely tuned with thermal treatment. In this brushless case, the BCP chains do not penetrate into the underlying hard OS substrates during thermal annealing of BCP films, therefore, the BCP chains at the interface have no entangled structure with fairly weak adhesion of BCP films against the substrate. Owing to such weak adhesion of BCP films against the OS substrate, the perpendicularly oriented BCP film on a neutral OS substrate could be easily peeled off and transferred to a UV-curable resin applied onto the BCP film. The OS substrate after the peel-off process of a BCP film could regenerate the perpendicularly oriented BCP films since the surface energy of the OS substrate remains intact during the peel-off process. Furthermore, the direct-assembled BCP films on chemically patterned OS substrates could also be peeled off and transferred on to a UV-curable resin, allowing us to produce multiple replicas of direct-assembled BCP thin films from a single chemically patterned OS substrate.

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