Hexagonally ordered block copolymer template using self-assembled monolayer (SAM)

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It is very difficult and expensive to fabricate sub-100nm scale pattern by using photo-lithograpic process because of diffraction and scattering of light. Therefore, there have been needs to find new ways to fabricate self-assembled large-area nanostructures by nonconventional lithography, and block copolymer template has been spotlighted for decades because it is simple and low cost. For block copolymers, it is possible to control the hole size and spacing by changing the molar mass (or fraction fA) and segment-segment interaction parameter (χ). However, hole arrays of block copolymer in large area without any special treatments have many defects. So, there have been substantial efforts to make defect-free structure. It has been found that the groove on wafer with confined geometry for better ordering and hydrophilicity for selective block copolymer coating can be used to fabricate the long-range ordered block copolymer patterns. In our experiment, we used the SAMs (Self-Assembled Monolayer) and soft PDMS mold for the patterning of block copolymer with long-range order. Well-ordered patterns of 20nm size were obtained on confined regions of SAMs.