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**Morphology evolution of PS-*b*-PDMS block copolymer and its hierarchical directed self-assembly on block copolymer templates**

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**Abstract:**

Cylinder-forming polystyrene-*block*-polydimethylsiloxane (PS-*b*-PDMS, 27.2k-*b*-11.7k, SD39) block copolymer having a total molecular weight of 39 kg mol<sup>-1</sup> was exploited to achieve in-plane morphologies of lines, dots and antidots. Brush-free self-assembly of the SD39 on silicon substrates was investigated using solvents that were PS or PDMS selective, neutral and non-solvents based on their Hansen solubility parameters. The different morphologies were achieved with annealing times ranging from 10 min to 1 h at room temperature. The SD39 patterns were used as an etch mask for transferring the pattern into the underlying substrate. Directed self-assembly and hierarchical directed self-assembly on block copolymer templates for confinement of dots was successfully demonstrated. The strategy for achieving multiple morphologies using one BCP by mere choice of the annealing

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