

Abstract Submitted
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Using Functional Small Molecules to Control Self-Assembly and Patterning in Block Copolymer Thin Films¹ C. GERALDINE BAZUIN, DAVID GASPARD, XIMIN CHEN, DAMIEN MAURAN, ROBERT E. PRUD'HOMME, CHRISTIAN PELLERIN, University of Montreal — Self-assembled thin films of block copolymers constitute an elegant means to obtain nanopatterns and nanotemplates on surfaces. Here, we demonstrate how interacting small molecules can be used to control the morphology of dip-coated block copolymer films. Such films obtained from THF solutions of styrene-4-vinylpyridine block copolymers (PS-*b*-PVP, ca. 29 wt percent VP) and naphthol (NOH), which hydrogen bonds to PVP, yield nanopatterns of quasi-hexagonally ordered nodules of PVP+NOH in a PS matrix. Washing in methanol removes the small molecules, leaving functional P4VP-lined nanopores in the film. These nanopores are receptor sites for molecules with desired properties. In contrast, naphthoic acid (NCOOH), which differs from NOH only by the hydrogen-bonding group, leads to fingerprint morphology under the same initial dip-coating conditions. By changing the conditions, in particular reducing the dip-coating speed sufficiently, the fingerprint morphology can be converted to quasi-hexagonal. Reflection-absorption infrared spectroscopy indicates that the proportion of small molecule incorporated into the dip-coated film is about half that found in solution for both NOH and NCOOH.

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