

Abstract Submitted
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Hierarchical

Assemblies of Block Copolymer-Based Supramolecules in Thin Films¹

SHIH-HUANG TUNG, NISHA C. KALARICKAL, THOMAS SCHILLING, TING XU, Department of Materials Science and Engineering, University of California at Berkeley — Diblock copolymer-based supramolecules can be constructed by associating small molecules to the side chain of one block. In bulk, supramolecules self-assemble into a rich library of hierarchical structures. However, the phase behaviors of such systems in thin films have been rarely studied. Here, we present a structural investigation of polystyrene-*b*-poly(4-vinylpyridine) (PS-*b*-P4VP) with hydrogen-bonded 3-pentadecylphenol (PDP) to P4VP block in thin films. We show that using the same diblock copolymer, a variety of hierarchical structures can be obtained by varying the stoichiometry of P4VP to PDP. More importantly, the lamellar and cylindrical microdomains can be orientated normally to the substrates after annealed under chloroform atmosphere. The assembly of P4VP/PDP complex, ca. 4nm in size, is oriented within the microdomain as confirmed by GISAXS and AFM. Thus, control over the supramolecular assemblies at two length scales, i.e. tens of nanometers and a few nanometers, can be simultaneously achieved in thin films.

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