

Abstract Submitted
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**Phase Behavior and Magnetic Alignment of Hydrogen Bonded
Side Chain**

Liquid Crystalline Block Copolymers¹ MANESH GOPINADHAN², PAWEL MAJEWSKI³, EVAN BEACH⁴, PAUL ANASTAS⁵, CHINEDUM OSUJI⁶, Yale University, OSUJI LAB TEAM, ANASTAS LAB COLLABORATION — Hydrogen bonding between a poly(styrene-*b*-acrylic acid) backbone and an imidazole terminated biphenyl mesogen results in the formation of a side-group liquid crystalline block copolymer (LC BCP). We use a combination of FTIR, X-ray scattering and DSC to characterize the phase behavior of the PAA-LC system, which is largely dominated by the sub-stoichiometric saturation of the binding capacity of the chain. In the melt, the self assembled materials exhibited composition and temperature dependent smectic LC phases along with characteristic birefringence and multiple thermal transitions associated with LC polymers. The diblock copolymers (LC BCP) microphase separated into lamellar microdomains with homeotropic anchoring at the IMDS. Alignment of a hierarchically ordered lamellar BCP was performed using a 5 T magnetic field at elevated temperature in the melt state and characterized by SAXS. The system exhibits a tilted smectic structure, which on alignment by the field displays scattering patterns akin to those observed in bookshelf or chevron-type structures. These results demonstrate that simple non-covalent interactions can be used to generate LC order and thus provide a convenient handle for subsequent alignment of BCP structures by magnetic fields.

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