

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Consequences of Switchable Solvent Quality on the Self-Assembly of Block Copolymers in a Nematic Liquid Crystal Solvent JULIA KORNFIELD — The microstructure of a diblock copolymer having a coil and liquid crystalline blocks dissolved in liquid crystal (LC) solvent is exceptionally sensitive to changes in the LC order; the quality of the solvent changes discontinuously across the LC phase transitions. This “switchable solvent quality” manifests itself in the nanostructure and rheology of solutions of AB diblocks with a polystyrene (PS) block (“coil” type) and a side-group liquid crystalline polymer block (SGLCP) dissolved in the LC solvent 5CB. The nematic order of the solvent presents a large entropic penalty to solvation of the PS block, but in the isotropic phase it is a good solvent for PS. The SGLCP is soluble in both the nematic and isotropic phases. In these block copolymers, the LC solvent switches from being strongly selective toward the SGLCP block to being a good solvent for both blocks at the isotropization point. Pairwise thermodynamic interactions between the LC solvent, PS, and the SGLCP are inferred from the ternary phase diagram of homopolymer solutions in 5CB. In the nematic phase, unfavorable 5CB-PS interactions dominate at all concentrations. In the isotropic phase, segregation occurs even though 5CB is a good solvent for both blocks driven by either the slight preference of isotropic 5CB for SGLCP at $c < c^*$ or SGLCP-PS interactions at $c > c^*$.

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Date submitted: 09 Dec 2005

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