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Rod-Coil Block Copolymer Self-Assembly in Thin Films B.D. OLSEN, University of California Berkeley, V. GANESAN, University of Texas Austin, R.A. SEGALMAN, University of California Berkeley — The phase behavior of rod-coil block copolymers differs from that of traditional block copolymers due to the interplay between liquid crystallinity of the rod blocks and microphase separation of the rods and coils. A universal phase diagram for rod-coil diblock copolymers is prepared using experimental measurements of both the rod aligning interaction and the rod-coil repulsive interaction to transform the temperature-dependent phase transitions of a model-rod coil system into dimensionless parameter space. The rod aligning interaction, parameterized by the Maier-Saupe parameter, may be estimated from the dependence of the nematic-isotropic transition temperature on the molecular weight of the rod homopolymer. The rod-coil interaction, parameterized by the Flory-Huggins parameter, is calculated from the temperature-dependent interfacial segregation of block copolymer to a rod/coil homopolymer interface. The Flory-Huggins parameter is extracted by using it as a fitting parameter in self-consistent field theory to match simulated block copolymer surface excesses to experimental values.

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