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Hexagonal Phases in Rod Coil Block Copolymers RACHEL SEGALMAN, BRADLEY OLSEN, UC Berkeley and Lawrence Berkeley Labs — The thermodynamics of rod containing block copolymers is distinct from classical block copolymers due to the conformational asymmetry between the blocks and liquid crystalline interactions between the rods. Understanding the self-assembly of rod containing block copolymers is potentially useful for organic electronics and biopolymers. In the weak segregation limit, a model rod-coil block copolymer shows only lamellar ordered structures, with nematic and isotropic phases observed on heating above the order-disorder transition. As both the strength of segregation and the asymmetry between the rod and coil are increased, new hexagonal phases are observed. Self-assembly of these hexagonal phases requires both high asymmetry in volume fraction of the blocks and high asymmetry between the interfacial area occupied by coil and rod such that there is a strong driving force to break lamellae. Heating of hexagonal polymers with a comparatively low coil fraction can result in an order-order transition to the lamellar phase.

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