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Field-Theoretic Models for Supramolecular Polymers EDWARD FENG, Miller Institute, UC Berkeley, WON BO LEE, UC Santa Barbara, GLENN FREDRICKSON, UC Santa Barbara — Supramolecular polymer systems consist of polymers with bonding groups that can form reversible inter-polymer linkages. These materials have great technological potential since one can use temperature to tune the material properties such as viscosity. Moreover, new methods in synthesizing bonding groups point the way to making supramolecular polymer systems that self-assemble into inhomogeneous phases. To understand these materials, we develop a field-theoretic model for a system in which an A and B homopolymer can reversibly bond to form a diblock copolymer. An energy of bonding governs the strength of this reversible bond. Using computational methods, we calculate a mean-field phase diagram for the symmetric case in which the A and B parts of the system consist of polymers of the same length and occupy the same volume. At low temperatures, we find either a lamellar phase or macrophase separation depending on the strength of the bonding reaction. We are collaborating with experimental groups interested in synthesizing and characterizing these systems.

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