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Macro- and microphase separation in multifunctional supramolecular polymer networks ZOLTAN MESTER, University of California Santa Barbara, ARUNA MOHAN, Exxon-Mobil, GLENN FREDRICKSON, University of California Santa Barbara — We develop a field-based model for a binary melt of multifunctional polymers that can reversibly bond to form copolymer networks. The mean-field phase separation behavior of several model networks with heterogeneous bonding is calculated via the random phase approximation (RPA). The extent of bonding between polymers is controlled by specified bond energies. The phase boundary calculated via RPA is the stability limit of the homogeneous disordered phase to coexisting homogeneous macrophases, for low bond strengths, and to microphases, for high bond strengths. An isotropic Lifshitz point separates these two regions along the spindodal boundary. It is demonstrated that higher functionality and higher bond strength suppresses macrophase separation due to greater connectivity between unlike species. Gelation first occurs at a bond strength higher than the Lifshitz point for tri- or higher functional polymer components.

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