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Glassy states and microphase separation in crosslinked homopolymer blends PAUL GOLDBART, University of Illinois at Urbana-Champaign, CHRISTIAN WALD, ANNETTE ZIPPELIUS, Universitaet Goettingen — We address the physical properties of blends of distinct homopolymers, crosslinked beyond the gelation point, via a Landau approach involving a pair of coupled order-parameter fields: one describing vulcanization, the other describing local phase separation [1]. Thermal concentration fluctuations, present at the time of crosslinking, are “frozen in” to the gel network. The resulting glassy fluctuations are analyzed at the Gaussian level in various regimes, determined by the relative values of certain physical length-scales. We also analyze the enhancement, due to crosslinking, of the stability of the blend with respect to demixing. Beyond the corresponding stability limit, complete phase separation is prevented by gelation and replaced by microphase separation, which occurs up to a length-scale set by the mesh size of the network, as a simple variational scheme reveals. [1] C. Wald, A. Zippelius and P. M. Goldbart, cond-mat/0411056.

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