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Structure and elasticity of crosslinked polymer blends BING LU, University of Illinois at Urbana-Champaign, XIANGJUN XING, Shanghai Jiao Tong University, PAUL GOLDBART, Georgia Institute of Technology — We consider a blend of mutually incompatible homopolymer species, A and B, that are randomly crosslinked to form a network. In such a network there is a competition between the repulsion of the A and B polymers (which favors the demixing of the two species) and the crosslinking (which prohibits complete demixing) [1,2]. We treat the system by means of a model of flexible polymers, which are permanently crosslinked (with statistics modeled by the Deam-Edwards distribution) and have species-dependent excluded-volume interactions [3]. As expected, the model shows that at sufficiently low temperatures the demixing tendency drives microphase separation, with a characteristic scale set by the network localization length. It also shows that if the system is strained after crosslinking, correspondingly anisotropic microdomains are generated in the pattern of A-B polymer concentration fluctuations trapped in by the network and, furthermore, allows the impact of microphase separation on the elastic properties of the network to be determined.

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