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Chemical gels and their structural and elastic heterogeneity: A simple, Landau-type picture

Abstract:
Randomly-bonded media, such as chemical gels and vulcanized polymers, give rise to unusual, utterly random, solids, provided enough bonds are introduced between their constituents. Perhaps surprisingly, given the randomness of their architectures, solids formed via random bonding exhibit some rather universal features -- structural and elastic – that are not exhibited by the apparently-simpler crystalline solids. In this talk, I shall give an overview of a simple, Landau-type approach to chemical gels and other randomly-bonded solids. This approach gives a unified view of the percolative, structural and elastic characteristics of randomly-bonded solids, and, in particular, the intrinsic spatial heterogeneity of these characteristics. It also allows for extensions that describe the microphase separation of vulcanized polymer blends and elastomeric liquid crystallinity.