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Prediction of Gel Modulus using the Gel-Tensile Blob (GTB) Model for Network Structure GREGORY BEAUCAGE, University of Cincinnati, SATHISH K. SUKUMARAN, Yamagata University — Network structure in gels, as determined by small-angle scattering, bears little resemblance to the structure expected from the Flory-Rehner, c* or other models for gel properties. Scattering shows a universal excess in scattering intensity at moderate-q that displays a size larger than that of a chain between network crosslinks. Further, a substructural size, often associated with the chain-coil of the network mesh, deviates from linear chain scattering. In this presentation, recent developments in the understanding of branch topology (Beaucage 2004, Ramachandran 2008,2009) are applied to networks in order to predict mechanical properties, particularly the modulus of swollen networks. The approach is based on quantification of the minimum dimension and connectivity dimension for gels and coupling of these descriptions with the gel-tensile blob (GTB) model previously described by Sukumaran (2001,2005). Beaucage G, *Phys. Rev. E* **70** 031401 (2004).; Ramachandran R, et al. *Macromolecules* **41** 9802-9806 (2008).; Ramachandran R, et al. *Macromolecules*, **42** 4746-4750 (2009).; Sukumaran SK & Beaucage G *Europhys. Lett.* **59** 714-720 (2002).; Sukumaran SK & Beaucage G, et al. *Eur. Phys. J. E* **18** 29-36 (2005).

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