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Structure and mechanical properties of supramolecular random copolymer hydrogels cross linked by hydrophobic aggregates.[1] BRYAN VOGT, CLINTON WIENER, CHAO WANG, University of Akron, BOB WEISS, Retired — Stress dissipation mechanisms are critical to improving the toughness of hydrogels. The use of reversible hydrophobic associations for crosslnking of hydrogels provides such a mechanism for toughening, but can also lead to the creep of the hydrogel as the crosslinks break and reform. The morphology of the hydrophobic aggregates thus is critical to the mechanical properties of the hydrogels. In this work, we will demonstrate how the processing of these copolymers impacts the hydrogel structure and this structure is correlated with the mechanical properties through a combination of small angle scattering, rheology, and tensile measurements. The hydrophilic and hydrophobic chemistries in the copolymer can be used to tune the water content and strength of the crosslinks, while the copolymer composition provides the number density of crosslinks and also acts to modulate the swelling of the hydrogel. These copolymers as well as their hydrogels can in general use traditional polymer processing, but the details of this processing impacts both the nanoscale morphology and the resultant mechanical properties of the hydrogels.

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Bryan Vogt
University of Akron

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