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Structural Relaxation in Supramolecular Hydrogels After Uniaxial Elongation Probed by SANS CLINTON WIENER, CHAO WANG, Department of Polymer Engineering, University of Akron, YUN LIU, Center for Neutron Research, NIST, R.A. WEISS, BRYAN VOGT, Department of Polymer Engineering, University of Akron — The relationship between stress relaxation and the microstructure of a supramolecular random amphiphilic copolymer-based hydrogel was probed using small angle neutron scattering (SANS). The amphiphilic random copolymer separates into microphases and in water forms a highly swollen hydrogel that is physically crosslinked by domains of *2-(N-ethylperfluorooctanesulfonamido)ethyl acrylate (FOSA)*. SANS with contrast matching enables the size of the FOSA crosslinks and the distance between crosslinks to be probed. The hydrogel was uniaxially stretched to determine the stress relaxation and monitor the structural changes. In the first 5 min, approximately 60% of the stress decays, followed by a slow decay in the stress over multiple hours. From SANS the hydrogels were found to exhibit significant anisotropy in their scattering profiles after stretching, which is attributed chain stretching and deformation of the FOSA domains during elongation. The decay of this structural anisotropy correlates well with the long relaxation times associated with the stress relaxation. These measurements provide insight into the stress-driven microstructure changes in reversible physical associations in swollen networks.

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