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Amphiphile-modified supramolecular hydrogels: optimized network structure and enhanced stiffness at "Goldilocks" amphiphile content CHAO WANG, BRYAN VOGT, R.A. WEISS, University of Akron — Hydrogels formed by hydrophobic physical crosslinks have high mechanical strength (larger than 100kPa).1 Surfactants, such as sodium dodecyl sulfate (SDS), can be used to control the mechanical strength and modulus of these hydrogels. Here we describe the change in the viscoelastic behavior of physically crosslinked copolymer hydrogels synthesized from N,N-dimethylacrylamide (DMA) and 2-(N-ethylperfluoro-octane sulfonamido) ethyl methacrylate (FOSM) by the addition of a SDS solution. Without confinement, SDS dissociates the FOSM micelle-like microstructure and facilitates swelling, which decreases the crosslink density of the hydrogel and reduces the modulus and strength of the hydrogel. With 1-dimensional macroscopic confinement, similar behavior was observed, but only for soaking times in the salt solution smaller than 15 h. For longer times (larger than 15 h), SDS improved the mechanical strength and modulus of the hydrogel presumably by reducing the imperfections in the hydrogel network and forming complexes with FOSM. 1. Hao, J.; Weiss, R. a. Mechanical Behavior of Hybrid Hydrogels Composed of a Physical and a Chemical Network. Polymer 2013, 54, 21742182.

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