Abstract Submitted
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Tough hydrogels from hydrophobically associating polymers[1] ROBERT WEISS, JINKUN HAO, University of Akron — Physical gels can be formed by interchain associations involving hydrophobic interactions. The viscoelastic and mechanical behavior of physically crosslinked copolymer hydrogels synthesized from *N*, *N*-dimethylacrylamide (DMA) and 2-(N-ethylperfluorooctane sulfonamido) ethyl acrylate (FOSA), with varying FOSA content, were studied by rheology and static tensile testing. The strong hydrophobic association of the FOSA moieties in an aqueous environment produced core-shell nanodomains (6 nm diameter) that provided the physical crosslinks. The PDMA-FOSA hydrogels exhibited excellent mechanical properties: modulus of 80 – 130 kPa, elongation at break of 1000 – 1600 %, tensile strength of 500 kPa, and toughness of 4 –6 MPa, depending on the FOSA concentration. The physical hydrogels were much more efficient at dissipating stress than the chemical hydrogels. Dynamic viscoelastic and stress relaxation experiments of the physical hydrogels and a chemically crosslinked PDMA hydrogel showed that the physical gel was more viscous than chemical gel and displayed much greater stress relaxation. That result was attributed to the extra energy dissipation mechanism provided by the reversible, hydrophobic crosslinks.

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