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Tough Stretchable Physically-Crosslinked Hydrogel Fiber Mats from Electrospun Statistical Copolymers. YIMING YANG, R.A. WEISS, BRYAN VOGT, University of Akron — Nature uses supramolecular interactions combined with hierarchical structures to produce water-laden materials with combination of properties that are challenging to obtain in synthetic systems. Here we describe a simple method based on electrospinning of a self-associating amphiphilic copolymer. Immersion of the copolymer mats in water generates supramolecular hydrogels that are crosslinked by association of the fluorinated hydrophobic moieties in the copolymer. These robust hydrogel fiber mats exhibit extensibility greater than 225 % and the elastic modulus can be comparable to the bulk hydrogel despite the porous structure of the as-spun mat. Moreover, the stress dissipation by rearrangement of the physically associated network leads to coalescence of the fibers that propagates from the surfaces to the interior of the mat. Both the mechanical properties and this fiber coalescence behavior can be tuned by selection of the copolymer composition and the initial fiber dimensions. These tough, stretchable hydrogel fiber mats could find utility in a variety of biomedical applications due to their unique properties.

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