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Neutron scattering from double-network hydrogels subjected to uniaxial extension VIJAY TIRUMALA, TAIKI TOMINAGA, STEVEN HUDSON, ERIC LIN, WEN-LI WU, JIAN PING GONG, HIDEMITSU FURUKAWA, YOSHIHITO OSADA, POLYMERS DIVISION, NIST TEAM, LABORATORY OF SOFT AND WET MATTER, HOKKAIDO UNIVERSITY TEAM — Double-network hydrogels (DN-gels) are water swollen polymer networks with load bearing abilities similar to that of an articular cartilage. Our neutron scattering measurements offered important insights into the molecular origins for the superior toughness of DN-gels. Here, we discuss recent neutron scattering results from DN-gels subjected to uniaxial extension. These results are further supported by flow birefringence measurements on the solution equivalents of DN-gels subjected to uniaxial extension. The deformation behavior of DN-gels is contrasted with that of complex hydrogels containing nanosized inorganic fillers or figure-of-eight crosslinkers.

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