

Abstract Submitted
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Molecular Origins for the Superior Toughness of Double-Network Hydrogels TAIKI TOMINAGA, VIJAY TIRUMALA, 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 the toughest of crosslinked polymer networks which contain water at more than 90% water by volume. The order-of-magnitude increase in the fracture toughness of a highly swollen but brittle polyelectrolyte network obtained from the addition of a linear polymer is non-intuitive and intriguing. Here, we present insights into the change in the total and the individual molecular structures of DN-gels obtained from recent neutron scattering measurements. The structure of individual components within the DN-gels was obtained by using a deuterium-labeled monomer in conjunction with contrast-matching methods. A working hypothesis for the toughening mechanism has been proposed based on the scattering data and other supporting measurements.

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