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Study on requirements of the first network for tough double network gels TASUKU NAKAJIMA, TAKAYUKI KUROKAWA, JIAN PING GONG, Hokkaido University — Double network (DN) hydrogels have attracted much attention as extremely tough interpenetrating network (IPN) hydrogels. Tough DN gels satisfy the following two physical conditions; 1. the 1st network is much more brittle than the 2nd network; 2. the 1st network is weaker than the 2nd network. Brittleness of gels is related to maximum extensibility of their network strands, while strength is related to concentration of the network strands. When a DN gel having such contrasting double network is deformed, much energy is dissipated owing to internal fracture of the brittle 1st network prior to breakage of the stretchable 2nd network. This process leads high toughness (energy for fracture) of DN gels. In this presentation, we introduce the two strategies to obtain such brittle and weak 1st network, which is required for synthesis of tough DN gels. One is pre-stretching strategy which has been always adopted. The other is using gels having very short network strands prepared at very dilute concentration, which has been newly established by us.

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