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Pure shear deformation of the chemical gels with precisely tuned network structure TAKUYA KATASHIMA, Univ of Tokyo, KENJI URAYAMA, Kyoto Inst. of Tech., UNG-IL CHUNG, TAKAMASA SAKAI, Univ of Tokyo —
We investigate the effects of the structural parameters on the cross effect of the strains under the pure shear deformation. The cross effect is the strength of the influence of the strain in one direction on the stress in the other direction. To clarify the molecular origin of this effect, we performed the biaxial stretching for the Tetra-PEG gels with various network strands, tuned connectivity and the unattached guest chains. We found that the cross effect of the strains increased with an increase in the network fraction including the elastically effect strands and dangling chains, regardless of the network strand length and the amount of guest chains. These results suggest that the cross effect of the strains may reflect the mutual interference between the neighboring chains like the nematic interaction or the topological effect. These findings will help the fundamental understanding of the rubber elasticity.

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