Synopsis of Original Research Paper

Viscoelastic analysis of biopolymer microgel prepared from emulsion polymerization

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Although biopolymer microgels are used in a variety of applications, their viscoelastic properties have been difficult to determine due to their difficulty in analysis. In this study, the surface viscoelasticity of gelatin microgels prepared in lipid droplets were investigated using cyclic micropipette aspiration. It was found that the gelatin gel gelled inside the small droplets with a radius of about 50 μm or less covered with a lipid membrane was about 10 times harder than the bulk gel. By changing the aspiration pressure cyclically, we also evaluated their storage modulus E' (reflecting elasticity) and loss modulus *E*'' (reflecting viscosity). Then, the microgels have a smaller *E*''/*E*' ratio than the corresponding bulk gels, meaning the microgels have a distinct nanostructure from bulk gels. Nanostructure analysis showed that small microgels contained more beta sheets in their structures than bulk gels. Our findings indicate that the confinement of gelling polymers in lipid membranes contributes to the variation in viscoelasticity of protein-based microgels through changes in secondary structure.