

Effect of added salts on the food-processing properties of silk fibroin

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Summary

We investigated the effect of added salts on the solution properties of silk fibroin solution and on the mechanical properties of silk fibroin gel. A silk fibroin was extracted from sericin-removed yarn in 35 % calcium chloride at 98 °C for 6 hrs, and then the filtered silk fibroin solution was dialyzed.

The present state in the solution of the silk fibroin depends on the valence of the ion. In case of the ion of a valence such as NaCl and KCl, a fractal structure has been formed by the aggregation. On the other hand, a phase separation structure has been formed in case of the ion of the divalence. Salts weaken the electrostatic interaction between molecules. The phase separation seemed to occur, since the bridge effect by the salt of the divalence stimulates the intermolecular interaction.

The relative viscosity of 6 % silk fibroin solution did not depend on the valence of the ion. From this result, it was indicated that both the fractal structure in the solution of the ion of a valence and the phase separation structure in the solution of the ion of the divalence were the structure in the micro-region in colloidal particle. The rupture stress of silk fibroin gel added NaCl was higher than that of salt-free silk fibroin gel. On the contrary, the rupture stress of silk fibroin gel added MgCl₂ was lower than that of salt-free silk fibroin gel.