

## SUMMARY OF Ph.D. DISSERTATION

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<p>Title</p> <p>Study on the behaviors of sugar-based surfactant and water mixture system under low-temperature</p>		
<p>(Abstract)</p> <p>It has been claimed that the sugar-based surfactants are used in the engineering at low temperature. For example, they are applied as the stabilizer for the water-soluble proteins in the freeze-thawing and freeze-drying processes, the anti-aggregating agent of ice and the solubilizer for the preparation of the liposome, etc. In spite of these wide aspects in their application, the behavior of them, especially at low temperature, including the mechanism of anti-freezing ability of sugar-based surfactants remains ambiguous and unknown to us. Therefore, it is necessary to answer the questions for the development of the knowledge and technology. The author tried to clarify these questions through this study.</p> <p>This thesis describes the behavior of the sugar-based surfactant and water mixture under lower temperature circumstances. The basic properties relating to the glass transition and the aggregating behavior accompanying the ice freezing were investigated. At the same time, the ice nucleation behavior of the aqueous solution of polyvinyl alcohol was studied using the sugar-based surfactant emulsion.</p> <p>In Chapter 1, the purpose of this study and the conventional information and general concept on the aggregates made from amphiphiles are explained as the introduction of this thesis.</p> <p>In Chapter 2, the inhibition effects of sugar-based surfactants on the eutectic formation in the freeze-thawing process of aqueous electrolyte solutions were investigated.</p> <p>In Chapter 3, the glass transition behavior of the supercooled smectic phase formed from the anhydrous alkyl-<math>\beta</math>-D-glucosides was studied and the influences of hydrocarbon chain lengths were also discussed.</p> <p>In Chapter 4 the glass transition behavior of two types of octyl glucoside/water systems was investigated over a wide concentration range and the relationship between glass transition behavior and liquid crystalline was discussed.</p> <p>In Chapter 5, the anomalous ice nucleation behavior of the aqueous polyvinyl alcohol solution was studied using a W/O emulsion with a diameter of 5<math>\mu</math>m.</p> <p>In Chapter 6, the syntheses of a series of sugar-based surfactants used in this study were described.</p> <p>In Chapter 7, the findings and information obtained in this study were summarized as the conclusion.</p>		