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(書込厳禁)

## Effect of Sucrose Esters on Crystallization Behavior of Cocoa Butter in Oil-in-Water Nanoemulsion

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### [Purpose]

Adding hydrophobic emulsifiers in the oil-in-water emulsion can modify the physical properties, especially the crystallization process which can lead to better stability and production process. In this study, the crystallization and melting behavior of cocoa butter (CB) dispersed in nanometer-size oil-in-water emulsion with the addition of hydrophobic sucrose fatty acid esters (L-195, P-170, and S-170) were observed.

### [Method]

Aqueous phase containing pure water and hydrophilic emulsifier was mixed with oil phase containing melted CB and sucrose fatty acid ester for pre-emulsification process, then continued with nano-emulsification process by using Nanomizer (Yoshida-Kogyo Co., Osaka) at 150 MPa. The particle size of crystallized nanoemulsion was characterized by using laser diffraction method and the crystallization and melting behavior were characterized by using differential scanning calorimetry (DSC) method.

### [Results]

The average particle size was between 72.67–75.83 nm. DSC result showed the addition of P-170 and S-170 in the nanoemulsion system accelerated the crystallization rate of CB as shown by increased T<sub>c</sub>. However, the melting temperature (T<sub>m</sub>) was not affected. The increasing of T<sub>c</sub> are correlated with the chain length of the fatty acid moieties in sucrose ester and the similarity with the major TAGs in CB. The increased rate of crystallization is caused by the interfacial heterogeneous nucleation mechanism, in which the nucleation occurs at the oil-water interface after the additive molecules are adsorbed and crystallized during cooling and act as a template for nucleation.