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題名 ; A novel approach to the solubility measurement of triacylglycerol crystals

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Measurement of the solubility of triacylglycerol (TAG) in various fats or organic solvents is one of the key elements of the controlling TAG crystallization and fractionation. However, in general, it takes long time until TAG and solvent reach to the equilibrium states, and the quantitative analysis of TAG is also complicated. Polymorphic behavior of TAG makes the measurement more difficult. Here we demonstrate a novel approach to the solubility measurements of TAG in liquid TAG by a two-beam interferometry and differential scanning calorimetry (DSC) (1, 2).

1) DSC measurement: Aliquot of SOS/OOO melt was put into an aluminum pan and stored at certain temperature to make it crystallized. The dissolving temperature was determined by DSC with heating rate of 2°C/min. This method requires small amount of samples, and is convenient to determine the solubility. In addition, the solubility meta-stable form also could be determined.

2) Two-beam interferometry measurement: The crystallization or dissolution behavior was observed with the two-beam interferometry. The gradient of the concentration field of solution, which is affected when crystals grow or dissolve, can be visualized with this method. Interference fringes are bent if the gradient of concentration field is formed because the refractive index of solution depends on the concentration of solution. We determined the temperature which SOS crystals did not grow and dissolve by observing the interference fringe pattern. Melt of SOS was crystallized in beta2 form. The SOS crystal was transferred into an observation cell which was filled with the SOS/OOO solution of certain concentration. The temperature of the cell was controlled with Peltier units. This method could perform more precise measurement compare to the DSC measurement, and distinguish the solubility of beta1 and beta2.

1. Theeuwes, F. et al., (1974) J. Pharm. Sci. 63, 427–429.

2. Sazaki, G. et al., (1996) J. Crystal Growth 169, 355-360.