No. 0743

Salt Effect on the Emulsion Film Formation with Food Emulsifiers

Norihiro Ikeda

Faculty of Human Environmental Science, Fukuoka Women's University

Summary

In this study, the stable single emulsion film has been investigated to understand the effect of salt on the emulsion system such as food emulsion. At first, the fundamental effect of added salt on the emulsion film formation has been investigated by using ionic surfactant of tetradecyltrimethylammonium bromide (C14TAB) and NaBr. The change in the film tension caused by the interaction between the thin film interfaces ($\Delta\gamma^f$) has been measured as a function of salt concentration. The result shows that, as observed for foam films, the transition of the structure of emulsion film takes place from the common black film (CBF) to the Newton black film (NBF), which is attributable to the decrease in the electrostatic interaction by shielding effect of added salt ions. By comparing the result with the one of foam film system, it is also confirmed that the decrease in the total interaction energy of thin film formation caused by added salt is smaller in the emulsion film than in the foam film. Furthermore, the detailed thermodynamic analysis for the transition of film structure from CBF to NBF has been performed by measuring $\Delta\gamma^f$ at various temperatures around the salt concentration of transition. From the analysis of the results it is shown that the interfacial excess entropy and energy decrease slightly but discontinuously with the transition. This suggests that the structure of the interfacial bilayer of C14TAB formed with NaBr becomes more condensed one together with the decrease in the film thickness. Secondly, the emulsion film of oil stabilized by dipalmytoylphosphatigilcoline (DMPC), which is practically used in some food emulsions, has been investigated. The $\left|\Delta\gamma^f\right|$ value has been roughly estimated and is clarified to be much larger than the corresponding one of the aqueous film of C14TAB system. However the emulsion film of DMPC is not so stable to investigate the concentration and temperature dependences of $\Delta\gamma^f$.