

第157回化学コロキウムのお知らせ

日時：平成22年9月27日(月) 14:00~16:00

場所：首都大学東京 8号館301室

演者：Michael Gradzielski 教授

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演題：Mesodynamics – Morphological Transitions of Self-Aggregating Systems Followed by Highly Time-Resolved SAXS and SANS Experiments

Abstract: Self-aggregating systems (surfactants, amphiphilic copolymer, ...) can occur in form of different structures and morphologies that depend mainly on molecular structure and concentration of the amphiphile, as well as on external parameters such as temperature, pH or ionic strength. Typically self-aggregating structures are highly dynamic species where the characteristic times for structural reorganisations may range from μs to weeks. Therefore a comprehensive understanding of amphiphilic systems requires not only the investigation of the static phase behaviour but also of their dynamics. This even more so as in many circumstances self-aggregating systems are not in equilibrium under application conditions.

Morphological changes in amphiphilic systems can often be triggered by mixing with other surfactants, additives, or solubilisates. In our experiments rapid mixing was done by the stopped-flow technique and coupling it to high-flux SANS/SAXS instruments which allows then to obtain detailed structural information with a time-resolution of 5-50 ms. Using this method a variety of different structural transitions has been investigated. As particular examples we will discuss the formation of unilamellar vesicles by admixing oppositely charged surfactant or a cosurfactant and solubilisation processes in microemulsions,. These processes were followed in structural detail and especially with respect to intermediate, non-equilibrium structures involved. Based on the knowledge of the intermediate disk structure in the process of vesicle formation we were able to modify this process by admixture of suitable amphiphilic copolymers, thereby allowing to control the kinetics of formation and thereby the size and stability of the formed vesicles. Another interesting aspect is the dynamics of solubilisates in amphiphilic systems that can also be studied by this method.

In general it is to be expected that investigations of the dynamics of structural transitions in amphiphilic systems will become of increasing importance as in many of their applications they are not present under equilibrium conditions and since dynamical aspects of self-aggregating systems are often not considered in thorough detail.

Gradzielski 教授は中性子およびX線小角散乱を用いた界面活性剤集合体の構造および転移過程に関する先駆的な研究で著名な方で、9月19日~22日に幕張で開催される International Conference on Nanoscopic Colloid and Surface Science (NCSS2010) の招待講演者として来日されます。

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