セミナーのご案内

Prof. Marie Pierre Krafft を迎えて，下記の要領でセミナーを開催いたします。興味のある方は，ぜひ，ご参加ください。

問い合わせ先
理工学部化学システム創成工学科　塩井章久 (6839)
生命医科学部医情報学科　吉川研一 (6243)

講　師　: Prof. Marie Pierre Krafft
SOFFT, Institut Charles Sadron (ICS, UPR CNRS 22),
Université de Strasbourg, Strasbourg (France)

タイトル　: **Magnetic Nanoparticle-decorated Microbubbles: New Bimodal Contrast Agents for Echosonography and MRI**

日時：2012 年 8 月 3 日（金）10:30-11:30

場所：至心館（SC）622 号室

Abstract

New multi-scale hybrid organic/inorganic constructs consisting of small gas microbubbles (MBs, 1-5 µm) decorated with magnetic Fe_3O_4 or $CoFe_2O_4$ nanoparticles (NPs, 10 or 20 nm) in suspension in aqueous media have been engineered and characterized. In a first approach, we have exploited our recent discovery that exceptionally stable MBs can be obtained by using (perfluoroalkyl)alkyl phosphates $C_nF_{2n+1}(CH_2)_mOP(O)(OH)_2$ (n = 6 and 8; m = 2, 5, 11; *FnHm*Phos) to form the bubbles' wall and a fluorocarbon gas as an osmotic stabilizer.[1-5]

In a second approach, MBs have been prepared by dispersing NPs that had previously been grafted with *FnHm*Phos. Both mono- and bilayered NPs were obtained and characterized by thermogravimetric analysis, FT-IR and cryoTEM. The monolayered NPs are dispersible in organic solvents and perfluorocarbons, as assessed by dynamic light scattering, while the bilayered NPs are dispersible in aqueous solutions.

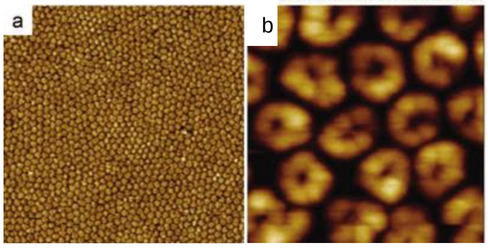

Fig. *F8H16 on silicon wafers (a : 1 × 1µm, b : 150 × 150 nm,).*[2]

Morphology and size and stability characteristics of the decorated MBs obtained from the bilayered NPs were determined by static light scattering, optical microscopy, transmission electron microscopy and AFM. An acoustical method that measures the attenuation coefficient of an ultrasound wave propagating in the dispersion of the MBs was also used. These small and well-defined hybrid micro-objects have potential as bimodal contrast agents for the early detection of cancers by echosonography and IRM.

1. Szijjarto, C.; Rossi, S.; Waton, G.; Krafft, M. P. *Langmuir* **2012,** *28,* 1182-1189.
2. Rossi, S.; Waton, G.; Krafft, M. P. *ChemPhysChem* **2008,** *9,* 1982-1985.
3. Rossi, S.; Waton, G.; Krafft, M. P. *Langmuir* **2010,** *26,* 1649-1655.
4. Rossi, S.; Szíjjártó, C.; Gerber, F.; Waton, G.; Krafft, M. P. *J. Fluorine Chem. Special Issue* **2011,** *132,* 1102-1109.
5. Nguyen, P. N.; Trinh Dang, T. T.; Waton, G.; Vandamme, T.; Krafft, M. P. *ChemPhysChem* **2011,** *12,* 2646-2652.

セミナーのご案内

Paul Brown さんを迎えて，下記の要領でセミナーを開催いたします。
興味のある方は，ぜひ，ご参加ください。

理工学部化学システム創成工学科 分子化学工学研究室
生命医科学部医情報学科 生命物理科学研究室

講　師： **Mr. Paul Brown**　(PhD student in Julian Eastoe's group in Bristol)
School of Chemistry, University of Bristol
Cantock’s Close, Bristol BS8 1TS, U.K
タイトル : **Magneto-responsive surfactants: characteristics and applications**
日時：2012 年 10 月 9 日（火）10:45 ― 11:45
場所：至心館（SC）512 号室

Abstract

"Recently, a new class of surfactants have been discovered that respond to a magnetic field. These magneto-responsive surfactants are based on common cationic surfactants with metal complex anions, which, because they contain high effective concentations of metal centres, allows their physico-chemical properties (hydrophbicity, electrical conductivity, etc) to be controlled non-invasively and reversibly by external magnetic fields. It has been shown that the controlled conjugation of these surfactants to DNA (and other biomolecules) is possible, allowing for manipulation in solution simply by switching "on" and "off" a magnetic field. Further to this it has been demonstrated that magnetic emulsions and microemulsions can be readily generated with suggested applications from environmental cleanup to targeted drug delivery. Finally, a cobination of small-angle neutron scattering and SQUID magnetometry has shown that magnetic microemulsions (nanoparticle-free ferrofluids) can act as tuneable nanomagnets, providing a new method to bridge the gap in our understanding of magnetic behaviour on an intermediate scale between molecular and solid-state bulk objects."

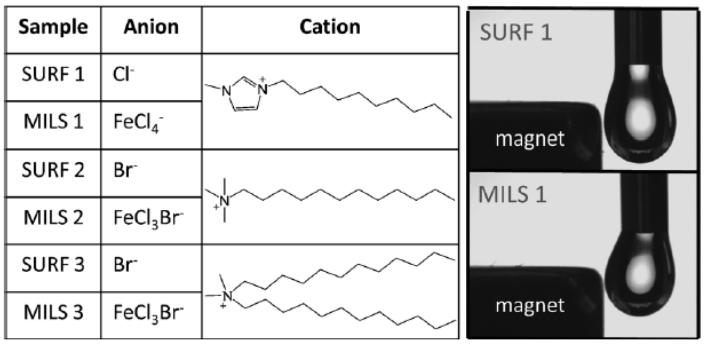

Figure 1. Left: Inert (SURFs) and magnetic surfactants (MILSs) studied. Right: Response of liquid droplets to the field from a 0.4 T NdFeB magnet. [SURF 1] = 20 wt %, [MILS 1] = 20 wt %.

セミナーのご案内

下記の要領でセミナーを開催いたします。興味のある方は，ぜひご参加ください。

講　師

Prof. Valentina Vasilevskaya

Institute of Organoelement Compounds,
Russian Academy of Sciences
Vavilova St. 28, Moscow 117813, Russia

タイトル

Unusual structures of amphiphlic macromolecules: computer modelling

日時

2012 年 11 月 22 日（木）15:00 ― 16:00

場所

TC1-308 号室

参考文献

・Large Discrete Transition in a Single DNA Molecule Appears Continuous in the Ensemble, Physical Review Letters, 76, 3029-3031 (1996)

・DNA Compaction in a Crowded Environment with Negatively Charged Proteins, Physical Review Letters, 105, 128302 (2010)

理工学部化学システム創成工学科 分子化学工学研究室
生命医科学部医情報学科 生命物理科学研究室

セミナーのご案内

下記の要領でセミナーを開催いたします。興味のある方はご参加ください。

講　師

Mr. Jens Paasche

タイトル

Characterization of photosensitive surfactants

日時

2012 年 12 月 17 日（月）18:00 － 18:40

場所

SC302 号室

Abstract

First we introduced the notion of Critical Micelle Aggregation (CMC) and explained it quantitavely and qualitatively. Photosensitive surfactant azobenzene-containing trimethyl-ammoniumbromide surfactants (C4-Azo-OCnTMAB) were analysed with absorption spectra. This is a totally new approach in measuring this CMC quantity. Spacer lengths were variied and for each length we contributed different (salt concentrations) in the aqueous environment. The conclusions are that CMC goes down with increasing chain length and ionic strengths of salts solved!

We had the opportunity to compare our results from absorption experiments with that of Isothermal titration calorimetry (ITC, at Max Planck Institut für Grenzflächen und Kolloide in Potsdam/Golm) measurements. The values from both experiments are almost identical, so this supports the correctness of the measurements. In addition calculations have been done to appoint the counter ions bond to micelle/aggregates going back to Corrin-Harkins equation (log10[CMC] = constant- f log10[counter ion]). Furthermore we derived the free energy and saw that it is an exergonic reaction (negative Gibbs Free energy).

Secondly, we experimented with Dynamic Light Scattering (DLS) at TU Berlin to find out how the samples behave above CMC. We could find that there are certain peculiar aggregation structures, such as vesicles.

理工学部化学システム創成工学科 分子化学工学研究室

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