



Polymer- & Soft-Matter-Seminar

Prof. Jinfeng Dong

College of Chemistry and Molecular Sciences,
Wuhan University, Wuhan 430072, PR China.
jfdong@whu.edu.cn

**Tuesday,
1ST July 2014**

at: 5.15 pm

VSP1 1.26,
Von-
Seckendorff-
Platz 1,
06120 Halle

“Multiple stimuli responsive novel surfactant systems: molecular design, synthesis and characterization”

Surfactant systems have the ability to sense and respond to the polarity of surface/interface and adsorb or aggregate into self-assembly structures, namely micelles, vesicles and liquid crystals. There are a few surfactants which can respond to external stimuli or changes in the environment by readjusting their morphology. For example, the stimuli-responsive shear thickening fluids have been employed to make liquid body armor. However, nearly all of those fluids can be triggered only by one type of environmental factors such as pH, heat, CO₂, light, and electric. Multiple stimuli-responsive fluids have realized by employing polymeric surfactants, whereas it remains a challenge for low molecular weight surfactants. We have been concentrating on the development of novel structured Gemini surfactants with pyrrolidone head groups (Di-C_nNP) that showed excellent surface activity and interesting pH-responsive aggregation behaviors^[1, 2]. Interestingly, compared to their dimmer partners, single-tailed surfactants (C_mNPs,) showed richer aggregation behaviour and exhibit pH, CO₂ and Cu²⁺ multiple stimuli-sensitivity. In another very simple surfactant systems thermo-sensitivity was found in a series of pH sensitive single-tailed molecules, N-alkyl-1,2-ethylenediamine (C_mN₂N, where m= 8, 10, 12, 14, 16)^[3]. Furthermore, some simple mixtures such as sodium oleate (NaOA) and a cationic azobenzene dye, 1-[2-(4-phenylazo-phenoxy)-ethyl]-3-methylimidazolium bromide (C₀AZOC₂IMB), have strong light response^[4]. Our recent research finds that multiple stimuli responsive ability such as pH, temperature and light can be achieved by varying the chain length in the cationic dye and hydrotropes. In this presentation I would like to show some of our new findings and research ideas which lead to the multiple stimuli responsive ability of very simple surfactant systems.

[1] Jiang Z.; Li X.F.; Yang G.; Cheng L.; Cai B.; Yang Y.; Dong J.F., *Langmuir* **2012**, 28, 7174-7181.

[2] Jiang Z.; Liu J.; Sun K.; Dong J.F.; Li X.F.; Mao S.Z.; Du Y.R.; Liu M.L., *Colloid Polym. Sci.* **2014**, Doi: 10.1007/s00396-013-3145-0.

[3] Yang Y.; Dong J.F.; Cai B.; Jiang Z.; Cheng L.; and Li X.F., *Soft Matter*, 2013, 9, 1458-1467.

[4] Lu Y.C.; Zhou T.F.; Fan Q.; Dong J.F.; Li X.F., *J. Colloid Interface Sci.* **2013**, 412, 107-111.

