



Research Team name: **Unilever R&D Port Sunlight (HPC)**
Presenter name: **Jordan Petkov**

Unilever is a FMCG Company

Team Presentation – Annual Workshop, COST Action MP1106
Dublin, September, 2012



Research Team Name: [Unilever R&D Port Sunlight](#)

Number of team members: 15

Brief description of team: [Colloid and Interface Science Area](#)
surfactant dynamics and phase behaviour, interfacial rheology and foamability, emulsification, dispersions' stability, polymer-surfactant interactions, deposition

Team leader: [Jordan Petkov, Chemical Physicist](#)

- 8 PhD
- 5 M. Sc.
- 2 B.Sc.

- ❖ 9 Chemists
- ❖ 2 Chemical Engineers
- ❖ 4 Physicists





Research interests related to MP1106:

- Foams generated from novel surfactants – biosurfactants, e.g. glucolipids, APG, etc.; (WG1)

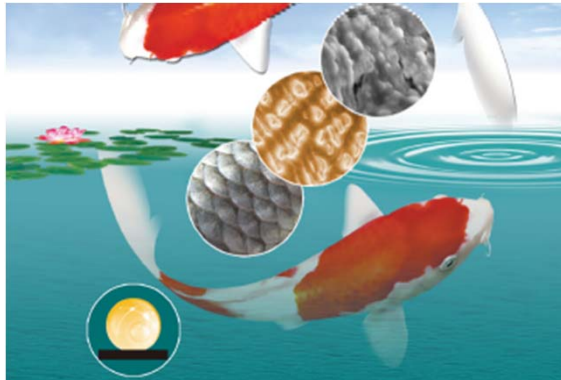
Int. J. Mol. Sci. 2011, 12 - **Environmental Applications of Biosurfactants: Recent Advances**

“In comparison to their chemically synthesized equivalents they have many advantages. They are environmentally friendly, biodegradable, less toxic and non-hazardous. [They have better foaming properties and higher selectivity.](#) They are active at extreme temperatures, pH and salinity as well, and can be produced from industrial wastes and from by-products.”

- Particles’ role in foam generation in the presence of conventional surfactants and polymers; (WG1)

Effect of size, shape and chemical composition for prolonged resistance of particulates adsorbed at interfaces against displacement by surfactants.

•Next Generation Surface Modification (WG2)



Hydrophilic coating

- Water loving – affinity for water
- Water sheets on surface
- Reduces water residues & spotting
- Anti fogging
- Reduced interaction with oils & fats to achieve Easier cleaning benefits



Super hydrophobic coating

- Water hating – repels water
- Water/ water based soils do not spread on surfaces
- Reduced interactions with fats
- Horizontal surfaces – easier wipe off
- Vertical surfaces – water based soils roll off to achieve “Self Clean”



Omniphobic coating

- Ultimate non-stick surface
- Repels water and oil based soils
- Nothing can stick & stain
- Horizontal surfaces - ultimate easy cleaning
- Vertical surfaces – all soils roll off to achieve “self clean”

Next Generation Benefits Inspired by Nature



Basic facilities, equipment, devices etc:

- synthetic capabilities at the Centre for Materials Discovery (CMD) at Liverpool University;
- strong links with Rutherford–Appleton Laboratory (RAL);
- interface characterisation: dynamic and static surface tension;
- spinning drop (for extremely low interfacial tension);
- dynamic contact angle;
- dynamic and static light scattering;
- zetasiser;
- ellipsometer linked with quartz crystal microbalance for simultaneous measurement of adsorption/deposition;
- access to Daresbury computational facility.

#1 project :



Title: Effect of multivalent counterions onto anionic micelles growth.

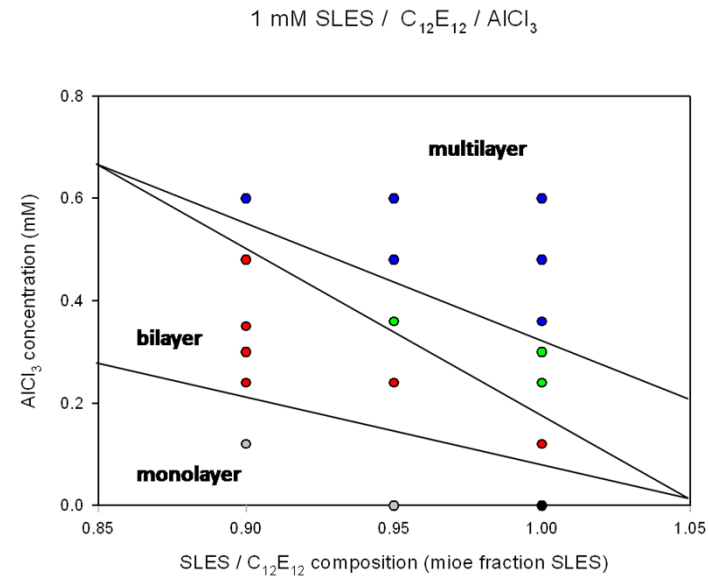
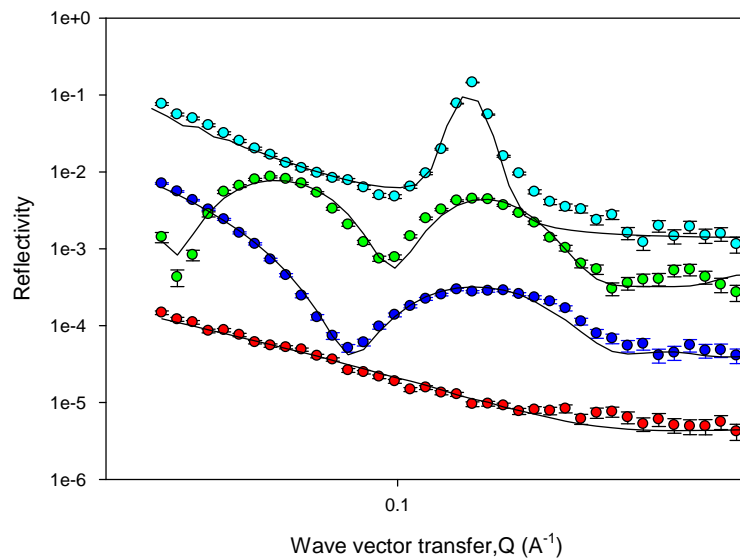
Duration: 3.5 years

Funding organization: Engineering and Physical Science Research Council (EPSRC) – UK

People involved and their function: 1PhD; 4 Scientists – supervisors

Facilities/equipment: synthesis of deuterated samples

Most interesting results:



Reflectivity for 1 mM 95/5 mole ratio SLES / C₁₂E₁₂ / AlCl₃ / NaCl, (●) 0.0 / 3.0 mM AlCl₃ / NaCl, (●) 0.24 / 1.8 mM, (●) 0.36 / 1.2 mM and (●) 0.6 / 0.0 mM. The different data are shifted vertically for clarity.

Surface phase diagram for 1 mM SLES / C₁₂E₁₂ / AlCl₃ / NaCl

#2 project :

Title: **Effect of different additives (electrolyte, fatty alcohols, oils, etc.) on surfactant dynamics**

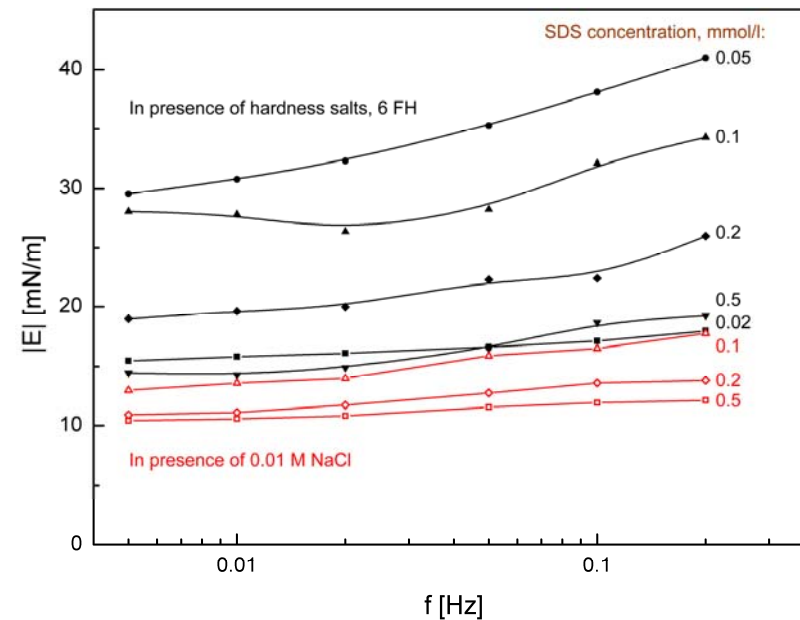
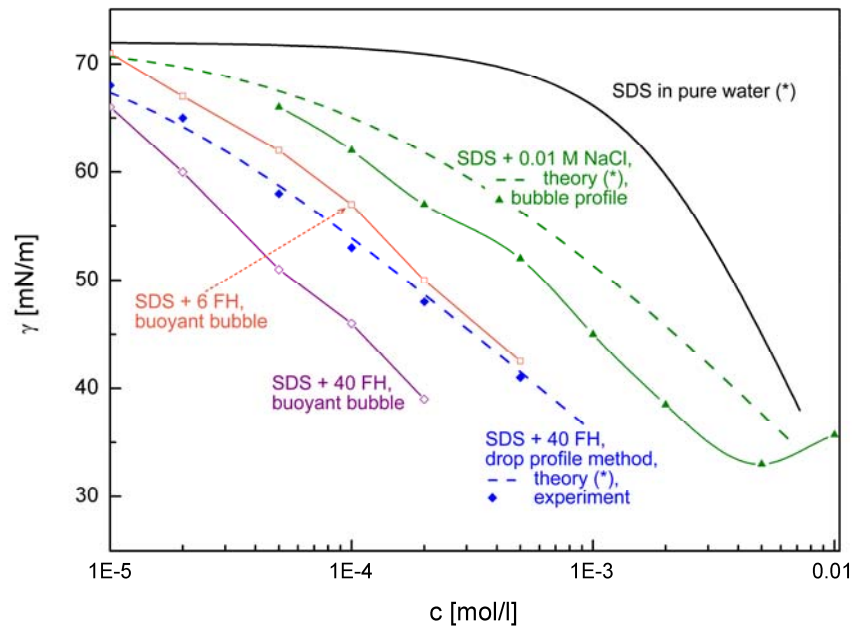
Duration: **2 years**

Funding organization: **Unilever R&D**

People involved and their function: **1 Post Doc, 3 Scientists**

Facilities/equipment:

Most interesting results:



Topics for Research Proposal



#1 Topic (*use a single slide*)

Title: **Stability and rheology of foams generated from a mixture of particles and surfactants (including biosurfactants)**

Promotion images & text : **Particles face challenge to stabilise an interface in the presence of surfactants**

Duration: **3 years**

Expertise required: **surfactant dynamics, wettability, dynamic contact angle**

Facilities/equipment required: **dynamic surface tension, drop/bubble shape analysis, established foam generation protocol**

Topics for Research Proposal



#2 Topic

Title: Creation of “smart” surfaces for improved solid surfaces cleaning

Promotion images & text: Create morphology that would deliver interfaces with extreme wetting/dewetting for improved solid surface treatment with regard to cleaning.

Duration: 3 years

Expertise required: synthesis of inorganic/polymeric particles; surface and particle characterisation, thin film formation

Facilities/equipment required: contact angle measurements; DLS and SLS, zetasizer; neutron/x-ray reflectivity



Thank you for your attention

