Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Department of Chemical Engineering

Faculty of Chemistry and Pharmacy
Sofia University, Sofia, Bulgaria

Presenter name: Nikolai Denkov

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

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Full Professors	**N. Denkov, Dr. Sc. (Head)**
	P. Kralchevsky, Dr. Sc.
	K. Danov, Dr. Sc.
Associate Professors	**Dr. S. Tcholakova**
	Dr. T. Gurkov
	Dr. K. Marinova
Assistant Professors	**N. Alexandrov**
Postdocs: 4	**Research Assistants: 16**
Ph. D. Students: 13	**Total staff: 40 people**

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Staff of Department of Chemical Engineering

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Research interests related to COST MP 1106

1. Relation between surface and foam properties.
2. Natural surfactants - properties and applications.
3. Emulsions – formation, stability and applications.
4. Biophysics of fat lipolysis.
5. Methods/techniques for characterization of surface properties.
6. Aggregation in dispersions, involving micelles, particles, bubbles

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Teams related to COST Action MP 1106

Smart foams and natural surfactants
Team leader: Prof. Nikolai Denkov

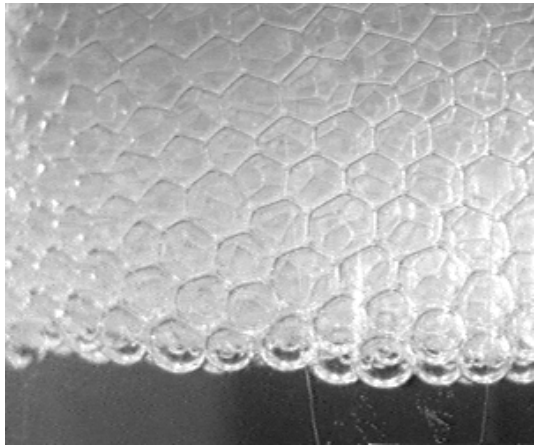
Emulsions and biophysics of fat lypolisis
Team leader: Assoc. Prof. Slavka Tcholakova

Methods for characterization of surface properties
Team leader: Assoc. Prof. Krastanka Marinova

Aggregation in dispersions
Team leader: Assoc. Prof. Theodor Gurkov

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

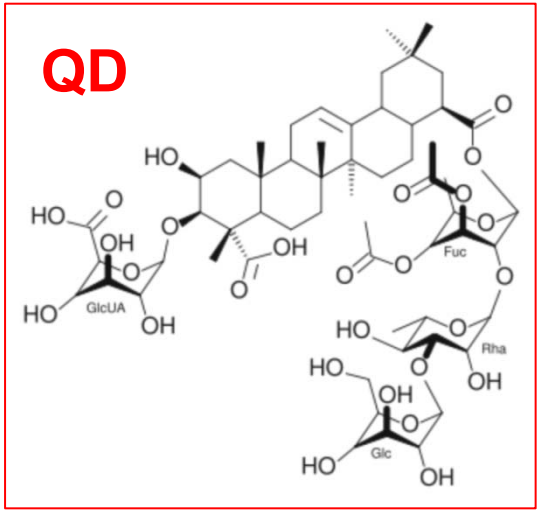
Smart foams and natural surfactants



Number of Team Member: 14
Team leader: Prof. Nikolai Denkov

- **2 Professors**
- **1 Post Doc**
- **3 Ph.D. students**
- **5 M.S. students**
- **1 Undergraduate student**

❖ **14 Chemists**



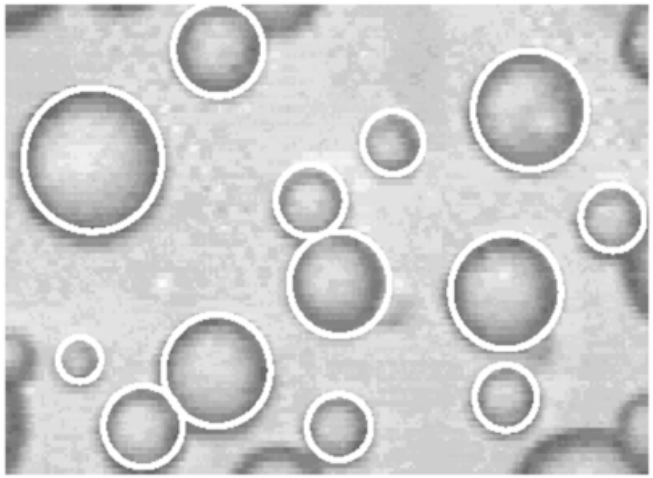
Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Emulsions and biophysics of fat lypolisis

Number of Team Member: 11

Team leader: Assoc. Prof. S. Tcholakova

- **2 Professors**
- **4 Ph.D. students**
- **2 M.S. students**
- **2 Undergraduate students**
- **1 Technician**



- **10 Chemists**
- **1 Pharmacist**

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Methods for characterization of surface properties

Number of Team Member: 9

Team leader: Assoc. Prof. K. Marinova

- **2 Professors**
- **1 Post-doc**
- **2 PhD Students**
- **2 M.S. students**
- **2 Undergraduate students**

- ❖ **6 Chemists**
- ❖ **1 Mathematician**
- ❖ **1 Physicist**
- ❖ **1 Chemical Engineer**

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Aggregation in dispersions

Number of Team Member: 9
Team leader: Assoc. Prof. T. Gurkov

- **2 Professors**
- **1 Post-doc**
- **2 PhD Students**
- **2 M.S. students**
- **2 Undergraduate students**

- ❖ **8 Chemists**
- ❖ **1 Physicist**

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Basic facilities, equipment, devices

1. Foam formation:

- ✓ Ross-Miles test;
- ✓ Foam rise method
- ✓ Automatic Bartsch test
- ✓ Shake test
- ✓ Foam scan (bubbling)
- ✓ Planetary mixer;

2. Emulsion formation:

- ✓ Narrow gap homogenizer
- ✓ Magic lab (rotor-stator)
- ✓ Ultra Turrax
- ✓ Ultrasound
- ✓ Membrane emulsification

3. Foam and emulsion rheology

- ✓ Rheometer Gemini (Bohlin Instruments, Malvern, UK)
- ✓ Brookfield Programmable Viscometer (Brookfield, USA)
- ✓ Bulk viscometer Brookfield RHEOSET (Brookfield, USA)

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

4. Surface forces and stability of thin films

- ✓ Capillary cell, Mysels cell, Vertical films
- ✓ AFM Veeco (Multimode V) with liquid cell

5. Surfactant adsorption and surface rheology

- ✓ Equilibrium and dynamic surface tension - 5 instruments
- ✓ Surface dilatational rheology – oscillating drop method (developed with Kruess)
- ✓ Surface shear rheology: Rheometer Gemini (Malvern)
- ✓ 2 Langmuir troughs (NIMA, KSV)
- ✓ 2 ellipsometers with active antivibration table
- ✓ Quartz Crystal Microbalance QCM-Z500 (KSV)
- ✓ Streeming potential EKA (Anton Paar)

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

6. Light scattering, microscopy, NMR, centrifuges

- ✓ Zetasizer Nano ZS; Malvern 4700C; (Malvern Instruments, UK)
- ✓ 4 Optical microscopes (Zeiss, Nikon);
- ✓ 2 centrifuges (20,000×*g*)
- ✓ SEM with ion beam
- ✓ New TEM and new NMR (500 MHz) are expected by end of 2012

7. Enzyme action, analytical methods

- ✓ Gel electrophoresis setup – Mini-PROTEAN Tetra cell (BioRad)
- ✓ Gas chromatograph Trace-GC (ThermoQuest, Italy)
- ✓ HPLC - Prominence LC-20AD (Shimadzu, Japan)
- ✓ pH stat – Titrando 842 (Metrohm, Switzerland)
- ✓ Centrifuges 3-16PK (Sigma)
- ✓ TLC
- ✓ + access to AAS, element analysis, X-ray, AFM, …

Department of Chemical Engineering
Faculty of Chemistry and Pharmacy
Sofia University, Bulgaria

Projects

National Science Fund (Bulgaria) – 2 projects

Unilever (UK, Netherlands, USA) – 7 projects

BASF (Germany) – 3 projects

Saint Gobain (France) – 1 project

Prodalysa (Chile) – 1 project

Isconova (Sweden) – 1 project