

Team Presentation – Annual Workshop, COST Action MP1106
Dublin, September 13, 2012

Research Team name: UNINA
Presenter name: Stefano GUIDO



LABORATORY OF
CHEMICAL ENGINEERING @ μ -SCALE



DIPARTIMENTO DI INGEGNERIA CHIMICA
UNIVERSITA' DI NAPOLI FEDERICO II
ITALY

CEINGE biotecnologie avanzate, Napoli, ITALY





Team's general info

Research Team Name: UNINA

Number of team members: 11

Team leader: Stefano GUIDO

- 1 Assistant Professor
- 3 post doctoral fellows
- 6 Ph.D. students
- ❖ 7 Chemical Engineers
- ❖ 3 Biotechnological scientists
- ❖ 1 Materials Engineer

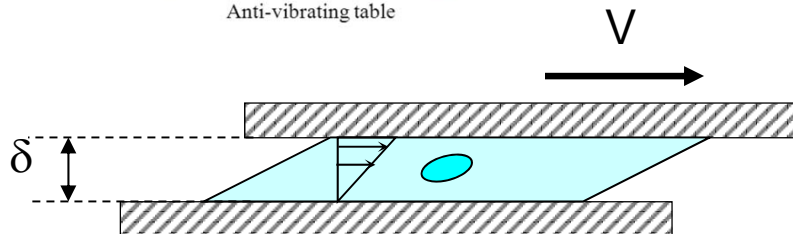
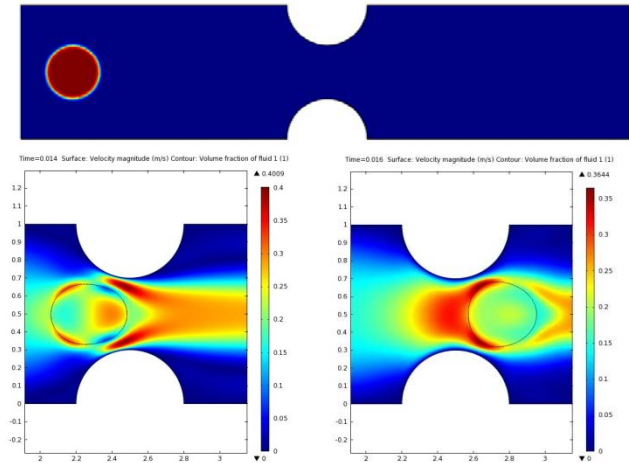
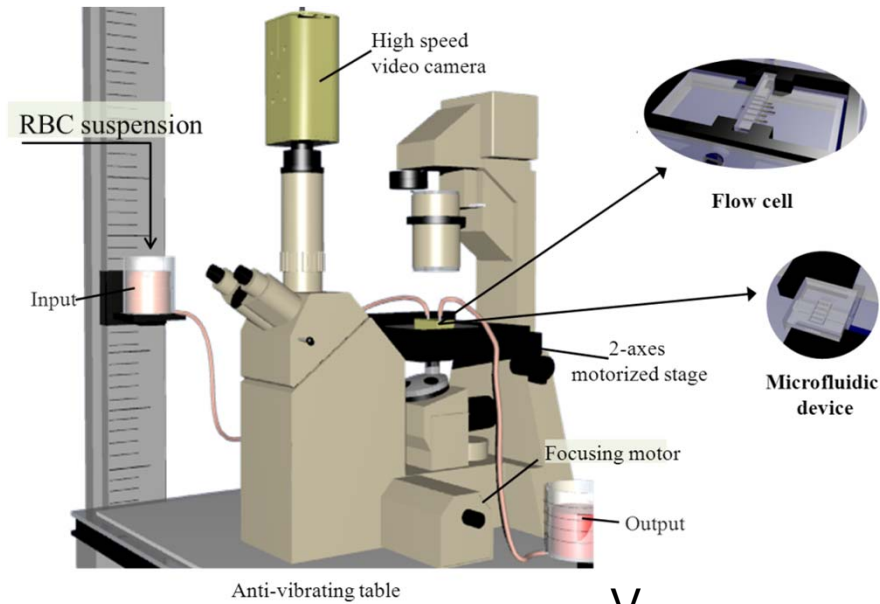
20 undergraduate students in Chemical Engineering, Biomedical Engineering and Biotechnological Sciences



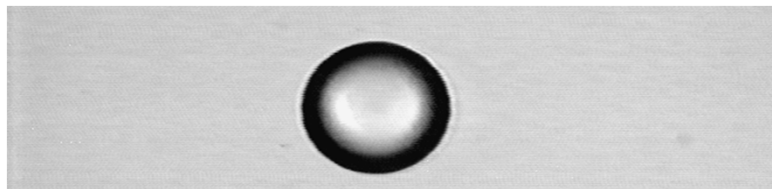
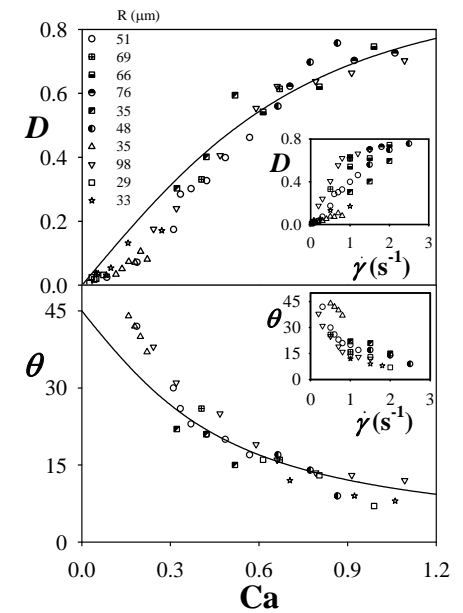
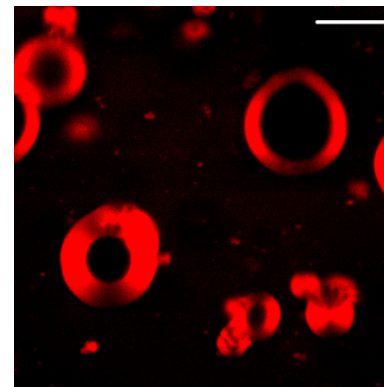


Relevance to MP1106

- Research interests related to MP1106:
 - Flow-induced morphology of liquid-liquid systems
 - Droplet deformation and breakup
 - Droplet coalescence
 - Droplet microfluidics
 - Confined flow (porous media)
 - Flow behavior of surfactant vesicles
 - Biological flow: deformation and clustering of red blood cells in microchannels, collective migration



$$\dot{\gamma} = \frac{V}{\delta}$$





Lab description

Basic facilities, equipment, devices etc :

- Optical microscopy techniques, including polarized light, epifluorescence and confocal microscopy, time-lapse imaging coupled with microenvironmental control.
- Digital image analysis
- Scanning electron microscopy
- Environmental scanning electron microscopy
- Rheometry
- High-speed imaging
- Interfacial tensiometry
- Advanced flow visualization techniques
- Computational tools for modeling of transport and physico-chemical phenomena
- Continuous flow reactor system
- Cell culture facilities
- General lab facilities



Projects

#1 project : Synflow

Title: Continuous-Flow Processes for Sustainable Chemical Production

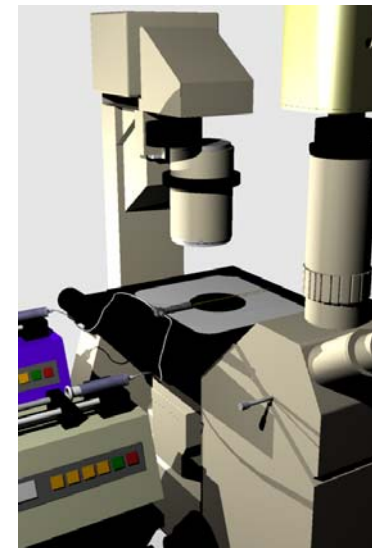
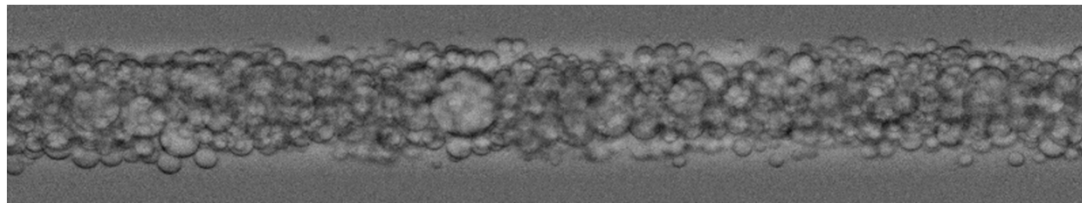
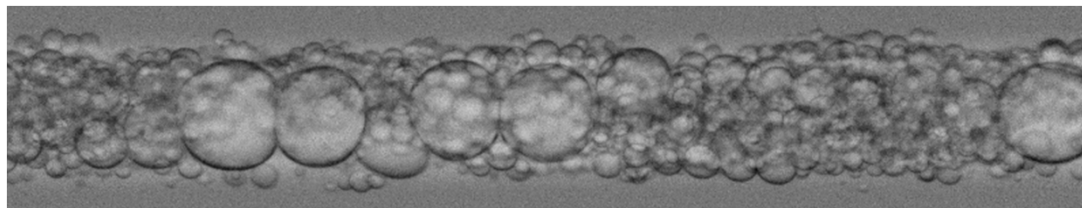
Duration: 48 months

Funding organization: EU-FP7-NMP

People involved and their function: Stefano Guido, Sergio Caserta, Giovanna Tomaiuolo (Post-doc), 1 PhD student

Facilities/equipment : Gas chromatography, Glovebox, Batch reactors

Most interesting results: flow chemistry of complex reactions traditionally run under batch conditions





Projects

#2 project : Microhema



Title: Microfluidic analysis of hemorheological parameters

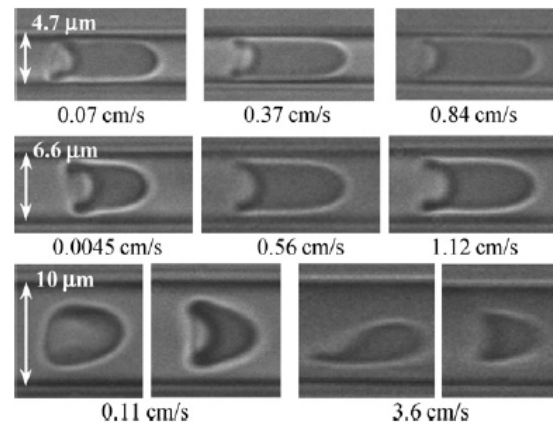
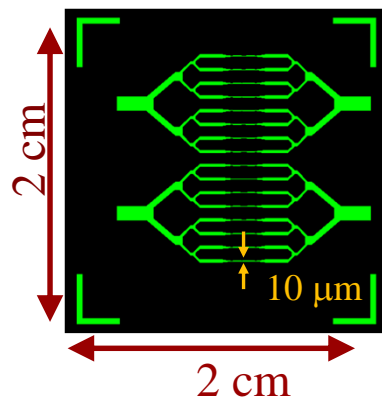
Duration: 24 months

Funding organization: Regione Campania

People involved and their function: Stefano Guido, Sergio Caserta, Giovanna Tomaiuolo (Post-doc), 1 PhD student

Facilities/equipment: soft-lithography, microfluidics setup

Most interesting results: quantitative investigation of red blood cell deformability and aggregability





Projects

#3 project :

Title: Characterization of mucus secretions from cystic fibrosis

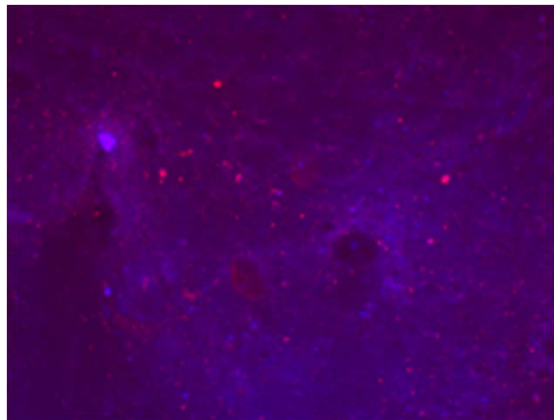
Duration: 30 months

Funding organization: Italian Ministry of University and Research

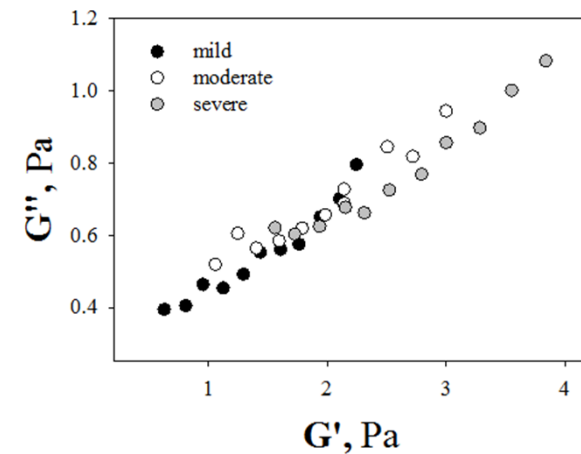
People involved and their function: Stefano Guido, Sergio Caserta,
Giovanna Tomaiuolo (Post-doc), 1 PhD student

Facilities/equipment: Western blot analysis

Most interesting results: Rheological characterization of pathological mucus samples



Blue: DNA, Red: actin





Projects

#4 project :

Title: Dissection of the role of NG2 transmembrane proteoglycan in the control of cell growth and migration

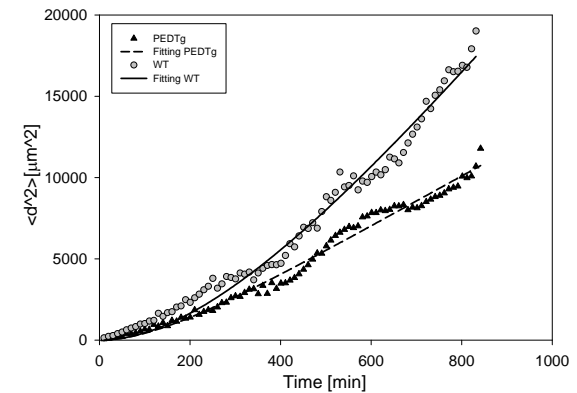
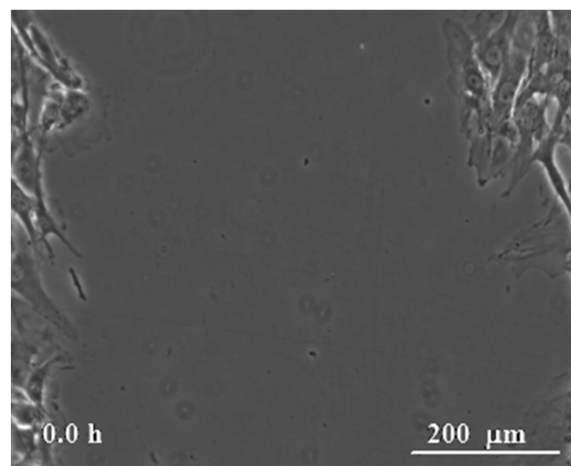
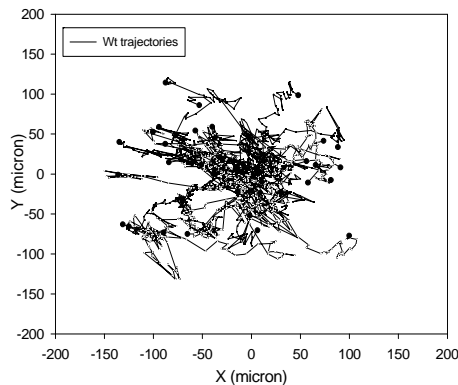
Duration: 30 months

Funding organization: Italian Ministry of University and Research

People involved and their function: Stefano Guido, Sergio Caserta, Giovanna Tomaiuolo (Post-doc), 1 PhD student

Facilities/equipment: Time-lapse microscopy workstation

Most interesting results: quantitative analysis of cell collective migration

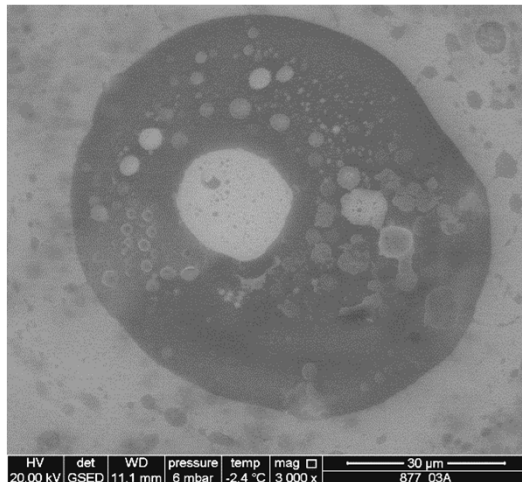




Topics for Research Proposal

Biotechnological applications of smart interfaces (e.g., drug delivery, sensor development)

Routes towards preparation of stable emulsions



Schmid-Schönbein, Holger (Aachen)



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Thank you for your attention