



*Università degli Studi di Genova*

*Dipartimento di Chimica e  
Chimica Industriale*



## 9<sup>th</sup> EUROPEAN INTENSIVE PROGRAMME

SOCRATES N° 210377-IC-1-2004-1-FR-ERASMUS- IPUC-7

## PHYSICS AND CHEMISTRY OF MULTIFUNCTIONAL MATERIALS

Università di Genova

25<sup>th</sup> June—09<sup>th</sup> July 2006



*Université Joseph Fourier, Grenoble*



# **MEMS-BASED DEVICES FOR POWER SENSING AND SWITCHING**

Jaap Flokstra

University of Twente, Netherlands

j.flokstra@utwente.nl

Capacitive Micro electro-mechanical systems (MEMS) have been developed or are under development for many applications, like e.g. accelerometers, switches, gravity gradiometers, power sensors. One of the electrodes of the capacitor is a flexible membrane that can move down to the base electrode by applying a voltage across the capacitor introducing an electrical force. This force is counterbalanced by the mechanical force of the spring.

In the lecture I will present the theoretical background, the design, fabrication and test of capacitive MEMS-devices. The C-V measurements exhibit the pull-in voltage and the built-in voltage. Charge trapping turns out to be an important factor to deteriorate the stability of the devices. Also the proper operation of switching devices is hampered. Measurements have been performed on the temperature dependence of the capacitance as a function of voltage and time. The application of MEMS-based systems for gravity gradiometry for future planetary missions will be discussed.

4

## **BIOMATERIALS- BIOPOLYMERS**

Kim Kusk Mortensen,

Aarhus University, Denmark

kkm@mb.au.dk

Since antiquity fibrous natural products has been used for the manufacturing of clothing, building materials, strings and ropes, paper etc. Our present knowledge of the molecular details of biopolymers such as DNA, protein and carbohydrates open new possibilities for the design of novel materials with improved and exiting new characteristics. The lecture will cover an historic backdrop to the use of biopolymers before and now, a brief presentation of the biosynthesis of biopolymers and their physical-chemical characteristics. Finally, a presentation is given of examples on future designed self-assembling biopolymer products aimed for nano-technological applications.