

PAYMENT

Do not pay before we confirmed your participation. Due to the hands-on nature of the course, the number of participants is limited. The course will be re-scheduled, depending on demand.

REGISTRATION FORM

Return this form on fax to + 32 16 28 15 84.

NAME:

AFFILIATION:

VAT No.:

ADDRESS:

TELEPHONE:

FAX:

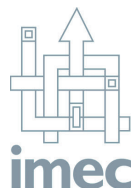
E-MAIL:

Wishes to register for the hands-on Seminar "Biosensor Technology for Scientists and Engineers". Tick your selection:

SESSION 06-01: OCTOBER 4-6, 2006

DATE:

SIGNATURE:



www.imec.be

BIOSENSOR TECHNOLOGY FOR SCIENTISTS AND ENGINEERS



OCTOBER 4-6, 2006

**Organized by IMEC's Microelectronics Training Center (MTC)
and Marc Madou – University of California – Irvine
At IMEC, Leuven, Belgium**

Miniaturization applications (micro electro-mechanical systems (MEMS)) have shifted from mechanical and optical devices to biomedical sensors and instruments. At the same time it has become clear that miniaturization can only succeed in the market when consumer products are targeted. This has put biosensor and molecular diagnostics development at the forefront of R&D objectives in both academia and industry.

This trend in MEMS has forced a closer collaboration between biological scientists and engineers, bringing together wet (biology, electrochemistry, analytical chemistry, etc.) and dry sciences/engineering (mechanical engineering, electrical engineering, etc.). In this tutorial we are reviewing biosensor and molecular diagnostic fundamentals, how to build them and their current and future applications. Most of all we are trying to bridge the gap between wet and dry sciences/engineering to ensure a more fruitful path to commercially successful biosensors.

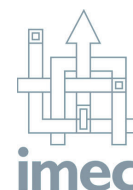
WHO SHOULD ATTEND?

This tutorial is targeted at a broad audience ranging from scientists and engineers to financial and managerial decision makers. Who also will benefit from attending this short course are patent officers, R&D managers looking for new outlets for their manufacturing skills, marketeers looking for new goods to sell and the CEO with a vision for the next product.

The material is made very accessible so that even the layman will be comfortable with all of the lectures.

To prepare for this course an introduction on "Basics of Biology" will be organized on Monday afternoon and Tuesday. Refer to the specific leaflet for more details.

TRAINING



IMEC

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COURSE OBJECTIVES

This introductory course on biosensors is meant to get the interested parties informed on what biosensors are, how they are made, where they are already used and what their future applications are. We want to bridge the gap between wet and dry sciences/engineering to ensure a more fruitful path to commercially successful biosensors and molecular diagnostics.

FACULTY

Carmen Bartic, IMEC - Eric Beyne, IMEC - Wim Laureyn, IMEC - Marc Madou, UC Irvine - Herc Neves, IMEC - Robert Puers, K.U.Leuven - Jeannette van Loon, Qserve

DAY 1 - 4 OCTOBER 2006

BIOSENSOR FUNDAMENTALS

Measurands and transduction principles, by M. Madou.

A description of the main measurands of interest for in-vitro systems (lab-on-a-chip) and medical devices. Discussion and comparison of transduction methods. Transducer characteristics (linearity, hysteresis, etc).

Micro- and Nanofluidics, by M. Madou.

Basic concepts of fluid mechanics; types of flow; capillary forces. Electrokinetic flow theory. Filtration/separation, mechanical propulsion, electrokinetic's devices, mixing, rectification. Micro reactors, micro dispensers, micro separators(chromatography devices). Flow and viscosity sensors. Particle image velocimetry.

Packaging related to Bio-Medical systems, by E. Beyne.

Specifically related to Bio-Medical systems.

Non-silicon materials for micro machining, by H. Neves.

Material characteristics and process com-

patibility. Specific fabrication issues: patterning, bonding, functionalization, priming.

DAY 2 - 5 OCTOBER 2006

BUILDING THE COMPONENTS

Micro- and nanofabrication techniques for biosensors, by M. Madou.

Silicon-based fabrication techniques; bulk and surface micro machining. Moulding processes. Bonding techniques.

Bridging technology and biology, by W. Laureyn.

A key aspect in the realisation of biosensors is the integration of the inorganic (*i.e.* transducer surface) and organic (*i.e.* biological element) components of the biosensor. In this presentation, various approaches for the realisation of adequate biosensor interfaces will be discussed. One of the most promising methodologies, *i.e.* the use of Self-Assembled Monolayers (SAMs) and crosslinkers to covalently attach the biomolecules onto the sensor surface, will be elaborated into detail.

Biocompatibility and biostability, by XXX.

The US and EU regulations on Medical Devices biocompatibility refer to standard documents providing indications on the biological hazard associated to materials.

The concept of biocompatibility will be defined. Possible strategies for the evaluation of biomaterials and final devices will be covered. Several examples will illustrate the possibilities to combine safety with performance biological evaluation.

Drug delivery, by Marc Madou.

Nanotechnology solutions (micelles, dendrimers), responsive systems, iontophoresis.

Interfacing between electronics and biomedical systems, by C. Bartic.

Overview of the fundamental aspects involved in the interfacing of individual neurons with

electronic devices and the steps that have to be taken towards the connection of silicon chips with neuronal networks.

DAY 3 - 6 OCTOBER 2006

PRESENT AND FUTURE APPLICATIONS

DNA and Protein Arrays, by M. Madou.

Physical sensors, by H. Neves.

Accelerometers, pressure sensors, haptic interfaces.

Communication with biosensor systems by R. Puers.

This presentation focuses on the specific extra requirements needed when designing electronic circuits that need to communicate with biosensors, more specifically in an isolated environment, such as implants. The additional requirements are miniaturisation and power consumption. The requirements for bi-directional wireless communication will be highlighted and solutions are given.

Affinity devices (from molecules to microorganisms) by W. Laureyn.

Affinity chromatography, cantilever-based detection, impedimetric and acoustic wave devices.

Legal Issues, by J. van Loon

Electric safety of biomedical instrumentation. Ethical issues in the development of medical devices.

Total analysis systems, by M. Madou.

Miniaturized platforms for lysing of cells, amplification and separation.

COURSE LOCATION

The course will take place at IMEC. IMEC is the largest independent microelectronics R&D center in Europe, with an annual budget over 200 million EURO and a staff of over 1300 people. R&D ranges from design of complex single-chip and single-package systems for telecommunications and multimedia, over new process technologies to non-volatile memories, optoelectronics, photo-voltaics, area-array packaging, etc.

The 8000m² clean room contains a 200mm CMOS silicon pilot line for full process integration, a 300mm pilot line for sub-45nm research, and MCM and solar cell pilot lines.

IMEC is located in Leuven, famous for its 575-years old University, the headquarters of the world largest brewery and today center of one of the high-tech corridors of Europe.

FEES AND REGULATIONS

The fee of **1200 EURO** (+21% VAT) includes all lectures, a complete set of course notes, 3 lunches, refreshment breaks, and a social evening. Hotel accommodations and meals other than lunches are not included in the course fee. A limited number of seats is available at 50% discount for participants from Flemish universities.

IMEC reserves the right to cancel the program up to two weeks before the start of the course. Its liability is limited to a full refund of the course fee.

The following administration fees will be charged in case of cancellation:

- Between 2-14 days: 200 EURO
- Within 48 hours: 400 EURO
- No show: subject to full fee forfeiture.