

IMT-BUCHAREST: BIOMEDICAL & ENVIRONMENTAL APPLICATIONS

Centre for Microstructures and microsystems for bio-medical and environmental applications
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Mission of the Center

- Scientific research and technological development in chemosensors and biosensors and microsystems for environment monitoring and biomedical applications;
- Design, simulation and technology consulting for microstructures and microsystems realisation;
- Scientific and technological services, training for students and postgraduate.

Technical facilities:

MEMS design and simulation tools - CoventorWare 2000
Clean room facility for MEMS dedicated processes on 3", 4" wafers:

- 1 Bulk micromachining, Surface micromachining
- 1 Metal deposition, Ion implantation, Oxidation, Diffusion, Lithography
- 1 SEM, AFM, optical microscopy
- 1 Masks fabrication
- 1 Electrical characterization

Clean room facility, class 100, for CMOS processes by cooperation with MICROELECTRONICA S.A. in the Frame of the MICROFABRICATION CENTER, packaging, 1 mm resolution lithography.

Partners:

Politehnica University Bucharest, Faculty of Physics, Medical Military Research Center, Faculty of Medicine and Pharmacy, Romanian Institute of Geology, Institute for Macromolecular Chemistry "Petru Poni", MICROELECTRONICA S.A., IPEE Company for the Industry of Electronic and Electrotechnical Products, Romanian Academy

International cooperation:

- REASON project - Research and Training Action for System on Chip Design, IST - 2000 - 30193
- European Networks: NEXUS (Network of Excellence on Multifunctional Microsystems), NOSE (Network of Excellence on Artificial Olfactory Sensing)
- EoI for FP VI Networks of Excellence - partner to proposals of NEXUS Medical Devices USC and NMRC Ireland (High-k and ferroelectric thin films as active materials in electronics applications)

MAIN PROJECTS AND RESULTS

Integrated gas sensor, CMOS compatible

Partnership project between IMT and Microelectronica S.A

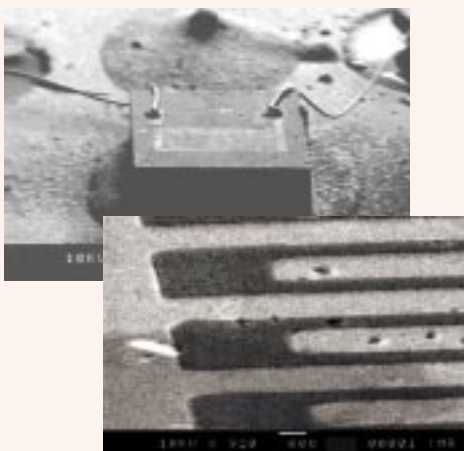


Modelling and simulation of the integrated silicon sensor for gas detection

Layout of the microstructure and the electronic circuit integrated on the same chip

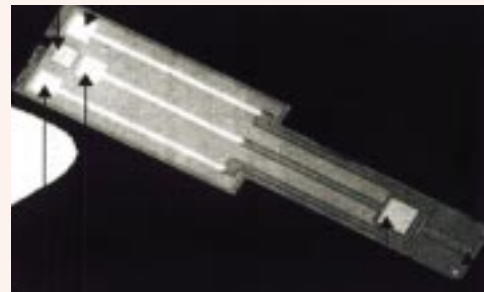
Fabrication and packaging of the sensor

Phtalocyanine based gas sensor for NO₂ detection



SEM picture of the electrodes covered with CuPc

- ISFET based biosensors for monitoring of the Ca²⁺, Mg²⁺, Na⁺, K⁺ ions and pH, in vitro and in vivo



Development of new sensing materials as superlattices of SiO₂/Si₃N₄ or silicon oxynitride with variable compositions (for Na⁺ and K⁺ ions) and photosensible modified polymers with ionophore phases (for Ca²⁺, Mg²⁺ ions)

Compatibilization of all technological processes with CMOS technologies and development of new packaging methods

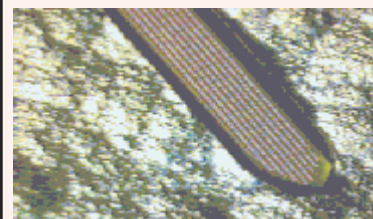
BIONANOTECHNOLOGY NETWORK - BIONANONET

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The BIONANONET Project developed in the framework of the Research, Development and Innovation National Plan, the 'Intefacing Living Matter MEMS and Biomimetic MEMS' Action: 'Development of CDI Facilities and Services for New Materials, Micro and Nanotechnology'. Its main task is to promote co-operation among different professional groups (R&D, academics, clinics, SMEs) owing competences in basic and engineering sciences, in order to support multidisciplinary research in the biomedical area. The network focuses on synergistically catalyzing different competences (microengineering, physics, biology, chemistry) in Romania, with a view to integrate the 'science without borders' initiative, according to European science policy.

The practical goals of the network are accomplished by mean of theoretical courses and practical training through researcher's mobility. The 2002 main activities are a Summer School dedicated to bioactive and bio-compatible thin layers and an international workshop aiming on the P-systems and the computational models of the living cell. Both actions gathered over 90 people interested on the domains interfacing basic sciences and engineering into revolutionary developments. These actions reflected the particular attention paid to broadening of multidisciplinary information and training of younger researchers, as well as support for researchers mobility and encouraging the participation in common scientific activities and the knowledge transfer. As a result, many common research projects have been conceived both for the national programs and FP6.

Multichannel microprobe for recording of cells and tissues electrical activity



A multichannel microprobe for recording of cells and tissues electrical activity has been realised and tested in-vivo and in-vitro

The compatibility between the materials used in the semiconductor fabrication and the human body was analyzed.