

Organisation: *National Institute for Research and Development in Microtechnologies (IMT-Bucharest)*

Web Page: *www.imt.ro*

Country: *Romania*

Main Activity: *Research*

Department/Laboratory/Group: *Laboratory of Nanotechnology*

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Profile:

- The research activities carried on in Laboratory of Nanotechnology can be divided into three areas which are: Functional nanomaterials, Nanobiosystems, and Microelectromechanical Systems. The main research direction in Functional nanomaterials area is study of nanostructured silicon based or composite materials, from preparation to surface functionalisation and integration in

complex systems. The Nanobiosystems area focuses on utilizing the various technologies developed in nanofabrication

and MEMS to study and solve biological issues. Biomolecular patterns in microarrays, integration of sensing

elements onto biochips for study of bioreactions, and implantation of active device elements in cells to study

cellular biochemistry are examples of research activities being carried out. The Bio-Microelectromechanical Systems

(Bio-MEMS) area focuses on the design, modeling/simulation and fabrication of new complex devices on silicon for applications in many interdisciplinary areas, and recently results in biochips, or microfluidic systems as laboratory-on-a-

chip were obtained with applications in biomedicine and environmental monitoring.

Participation to European Projects:

- Laboratory of Nanotechnologies was involved in international projects and networks in the area of nanoscience and nanotechnology:

- S-E Europe Regional Network of Excellence Nanosciences and Multifunctional Materials (COSENT)(2002-2005)
- FP6-NoE: Nanostructured and Functional Polymer-Based Materials and Nanocomposites (NANOFUN-POLY) (2004-2008)
- FP6 - RIMDAC programme - Research Infrastructure for Microelectronics Development, Analysis and Characterisation, Project Porous silicon matrix for biomedical applications (2003 – 2004);
- FP5 - Network of Excellence on Nano-electronics (PHANTOMS) (2002-2004)
- Fp5 - EMERGE Programme Enhancing Microtechnological Education of young Researchers through Guest Experiments, Improving Human Potential Transnational Access To Research Infrastructures, Project Metallics - Fabrication of nanoelectrodes (2000 – 2002);
- Bilateral Romanian – Greek project , Porous silicon for biological and pharmaceutical applications (2006-2008);
- Bilateral Romanian –Italian Project , Nanostructured silicon for optical biosensors (2006-2008);
- Bilateral Romanian – Franch (Brancusi) Project , Selective growth of carbon nanotubes on silicon nanoelectrode array (2003-2005).

ICT-2007.3.6: Micro/nanosystems

competence / resources

MICRO/NANO TECHNOLOGY FOR BIOMEDICAL DEVICES

The compatibility of the fabrication process of biochips with other standard processes from semiconductor technology allows us to integrate them in miniaturized complex devices. In our group are working 4 experienced researchers and 4 Ph. D students.

We have full access to IMT technological and characterisation facilities.

proposal / interest

- Nanostructured silicon, due to its reactive surface area, can be used as sensitive element to investigate the interaction mechanisms between inorganic/ organic materials as optical changes in material properties and can be easy integrated in silicon MEMS
- Micro and nanoelectrode arrays for cell monitoring (cells and tissues); single nanoelectrode to investigate single cells/receptors -as in patch clamp experiments.
- Biomedical device for rapid diagnosis based on micro fluidic systems for two important health applications: (i) CELL-Lab-on-a-chip for in-vitro drug testing and (ii) DNA - Lab-on-a-chip for genetic diagnosis.

Advanced research issues, such as nanoelectronics and nanophotonics will be used for biological material detection and monitoring.

- Protein/DNA microarray technology (functionalisation; biochip fabrication and data analyses).
- Biosensors (optical, electrochemical; chemical; plasmon resonance).
- Integrated microfluidic devices for biomedical applications (cell DNA sorting; in vitro neurite growth and synapse formation)