

MISSION

Integrating R&D with education and support for industry (services, technology transfer); networking at national and international level, innovation, in the field of micro-nano-bio technologies and microsystems (RF- MEMS, photonics devices and circuits, sensors, bio-nano-info technologies, CNT and graphene based sensors and nanodevices, (bio)sensors, integrated nano-bio systems, microfluidics, microactuators).

ORGANIZATION

Department for Scientific and Technological Research

4 centers, grouping 10 R&D laboratories

► **MIMOMEMS:** European Research Centre of Excellence “Micro- and nano systems for radiofrequency and photonics”

► **CNT- IMT:** Centre of “Nanotechnologies” (under the aegis of the Romanian Academy)

► **CINTECH:** Research Centre for integration of technologies” (micro-nano-biotechnologies)

► **CENASIC:** Research Centre for nanotechnologies and carbon – based nanomaterials

Technological Department

● **Clean rooms – class 1000, and 10 000**

● **Mask shop including:** pattern generator – DWL 66fs Laser Lithography System from Heidelberg Instruments Mikrotechnik GmbH

● **EBL:** Electron Beam Nanolithography from RAITH-nanoengineering work station

IMT- Bucharest is supervised by Ministry of National Education and is acting autonomously, like a scientific company having the status of a public institution.

MAIN RESEARCH TOPICS

► **RF-MEMS** devices and circuits: design, modelling and manufacturing of dielectric membrane supported inductors, capacitors, filters and antennae based on silicon and GaAs micromachining; micromachined millimetre and sub millimetre wave receiver modules, SAW interdigitated traducers; **nanoelectronic devices**

► **Photonic devices and MOEMS** (waveguides, optical couplers, pring filters and resonators; grating-based microstructures, tuneable interferometers based on movable micromirrors, optical sensors), photonic circuits for optical interconnections

► **MEMS based microsensors and actuators** for bio-medical, environmental applications and robotics: pressure sensors, accelerometers, microgrippers

The research laboratories of **IMT-Bucharest** are also developing:

► **CNT** and **graphene** based micro-nanostructures for sensing and interconnections

► **microfluidic** devices

► **biochips** for biological materials investigation and detection (proteins, DNA, enzymes) on various substrates (silicon, glass, polymers), **microarrays**, **biosensors**

► **silicon nanoelectrode arrays**, porous silicon layers (EI, PL and bio-active properties); field emission nanostructures;

► **magnetic nanostructures**

IMT Bucharest



National Institute for R&D in Microtechnologies



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Main targeted applications:

communications, biomedical, health, environment, energy, automotive, robotics, space applications.

Training activities: master courses, internships, hands-on labs for students, PhD supervising and post-doc programs.

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Ministry of National Education



MAIN FACILITIES

- A class 1000 clean room (220 sqm) for the **mask shop** and the most demanding technological processes (in use since September 2008);
- A class 100,000 clean room, the so called “**Grey Area**” (200 sqm), mostly for the **characterization equipments** (in use since September 2008);
- A class 10,000 clean room (105 sqm) for thin layer deposition by CVD techniques: LPCVD, PECVD; DRIE; RTP etc. (totally in use since early 2012);

Photolithography (chrome, maskless, wafer double-side alignment and exposure)

Pattern generator - DWL 66fs Laser Lithography System (Heidelberg Instruments Mikrotechnik, Germany)
Double Side Mask Aligner - MA6/BA6 (Suss MicroTec, Germany)

Nanolithography (EBL, EBID, EBIE, Dip-pen) and SEM

Electron Beam Lithography and nanoengineering workstation - e_Line (Raith, Germany)
Dip Pen Nanolithography - NSCRIPTOR (NanoInk, Inc., USA)
Field Emission Gun Scanning Electron Microscope (FEG-SEM) - Nova NanoSEM 630 (FEI Company, USA)

Physical depositions of materials in high-vacuum

Electron Beam Evaporation - TEMESCAL FC-2000 (Temescal, USA)
Electron Beam Evaporation and DC sputtering system-AUTO 500 (BOC Edwards, UK)

Chemical depositions, thermal processing

PECVD - LPX-CVD, with LDS module (SPTS, UK)
LPCVD - LC100 (AnnealSys, France)
Rapid thermal processing/annealing - AS-One (AnnealSys, France)



MAIN FACILITIES

Precision etching of materials (plasma reactive ion, humid, shallow and deep)

DRIE- Plasmalab System 100- ICP Deep Reactive Ion Etching System (Oxford Instruments, UK)
RIE Plasma Etcher - Etchlab 200 (SENTECH Instruments, Germany)



X-Ray diffractometry

X-ray Diffraction System (triple axis rotating anode) - SmartLab - 9kW rotating anode, in-plane arm (Rigaku Corporation, Japan)



Scanning probe microscopy: AFM, STM, SNOM, confocal, Raman mapping

Scanning Probe Microscope - NTEGRA Aura (NT-MDT Co., Russia)
Scanning Near-field Optical Microscope - Witec alpha 300S (Witec, Germany)



Nanomechanical characterization

Nanomechanical Characterization equipment - Nano Indenter G200 - (Agilent Technologies, USA)

Microarray spotting/scanning

Micro-Nano Plotter - OmniGrid (Genomic Solutions Ltd., UK)
Microarray Scanner - GeneTAC UC4 (Genomic Solutions Ltd., UK)



Analytical characterization tools

Scanning Electrochemical Microscope - ElProScan (HEKA, Germany)
Zeta Potential and Submicron Particle Size Analyzer - DelsaNano (Beckman Coulter, USA)
Fluorescence Spectrometer - FLS920P (Edinburgh Instruments, UK)

MAIN FACILITIES

Interferometry/profilometry; Spectroscopy

High Resolution Raman Spectrometer - LabRAM HR 800 (HORIBA Jobin Yvon, Japan)
White Light Interferometer - Photomap 3D (FOGALE nanotech, France)
Electrochemical Impedance Spectrometer - PARSTAT 2273 (Princeton Applied Research, USA)
Fourier-Transform Infrared Spectrometer - Tensor 27 (Bruker Optics, Germany)
UV-Vis-NIR Thermo-Electric Cooled Fiber Optic Spectrometer - AvaSpec-2048 TEC (Avantes, The Netherlands)
Refractometer for layer thickness measurements - NanoCalc-XR (Oceanoptics, USA)



Probers, on-wafer; electrical characterization

Semiconductor Characterization System (DC) with Wafer Probing Station - 4200-SCS/C/Keithley
Easyprobe EP6/ Suss MicroTec (Keithley Instruments, USA; Suss MicroTec, Germany)
Semiconductor Characterization System - 4200-SCS, C-V 3532-50, DMM 2700-7700, 2002, 6211-2182 (Keithley Instruments, USA)
Microwave network analyzer (0.1-110GHz) with Manual Probing Station (Anritsu, Japan; Suss MicroTec, Germany)
Frequency Synthesizer up to 110 GHz (Agilent, USA)
Spectrum Analyzer up to 110 GHz (Anritsu, Japan)

