



PARTNER PRESENTATION AND INTEREST IN HORIZON EUROPE PARTICIPATION

Name of the organisation	National Institute for R&D in Microtechnologies- IMT Bucharest
Country	Romania
Type of organisation	Research Organization
Short description	<p>IMT-Bucharest (www.imt.ro) is an important actor in Romania and Eastern Europe in its field of activity. The research is oriented to: micro and nanoelectronic devices; micro and nanophotonics; nanotechnologies; advanced materials.</p> <p>At European level, in this moment (2023) IMT run as partner 6 Horizon Europe Projects and 1 as coordinator. IMT was involved in 11 H2020 projects.</p> <p>IMT infrastructure IMT-MINAFAB is a facility for design, simulation, Micro-nanofabrication of electronic devices, sensors and systems, nanotechnologies and Carbon based nanomaterials).</p> <p>IMT_MINAFAB addresses the whole value chain starting with design and simulation to micro-nanofabrication, microphysical characterization and reliability tests, with relevance to ICT, Space, Health, Environment and Energy areas.</p>
Laboratory/ Faculty Department	Simulation, Modelling and Computer-Aided Design Laboratory
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Short description of Laboratory involved

The lab is involved in research, development and applications of simulation, modelling and design techniques of micro-electro-mechanical MEMS and microfluidic systems focused to collaborative research projects, education (labs, thesis coordination), services (specific design solutions, models, enabling access to hardware and software tools) and consultancy (design/ optimization) in the field of micro-nanobio/info technologies. Furthermore, the laboratory is developing techniques for rapid prototyping from micro- to macro scale, micro-sensors and MOEMS and MEMS actuators and investigate new classes of advanced materials with applications in nanodevices (thin films and nanostructures of oxide semiconductor materials).

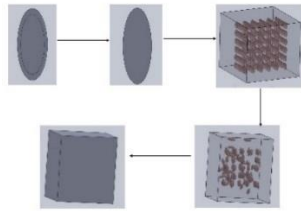
Main software facilities: ANSYS Multiphysics 2022 R2., COMSOL M 6.1, COVENTOR 2014, Materialise Magics 26.0; Quantum ESPRESSO, SIESTA, FPLO

Acces to Server: High Performance Computing cluster consisting of one Windows node with two Intel(R) Xeon(R) E5-2670 v3 processors, 24 cores, 256 GB RAM, and 10 Linux nodes 10 x 2 CPUs Intel(R) Xeon(R) CPU E5-2670 v3, 240 cores, 256 GB RAM/node).

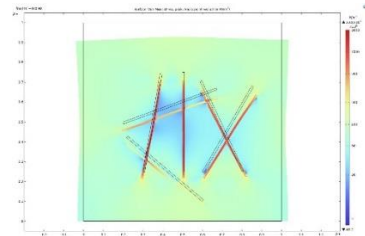
Expertise:

- **Design, simulation and development/ optimization of MEMS/MOEMS** devices and components (cantilevers, membranes, micro-grippers) and **microfluidics** (microchannels, mixers, filters, handling and monitoring systems) for biologic, microelectronics, environmental, security and biomedical applications;
- **Modelling and simulation for multiphysics phenomena;** mechanical, thermal, electrical, electromagnetic, piezoelectric, **coupled field analysis** (static and transient); **microfluidic analyses: CFD, diffusion, mixing, electrokinetics, fluid-structure interaction, particle dynamics.**
- **Modelling and simulations of nanocomposite materials for different applications;**
- **Design and manufacturing** of MOEMS and MEMS microsystems/actuators and microsensors;
- **Design and microfabrication of microfluidic and micro-electro-fluidic systems, electrical and contact profilometry characterization;**
- **Analysis of the physical phenomena at surfaces and interfaces** in metal-oxide-semiconductor heterostructures. **Modeling** their properties for multifunctional devices.

Modelling and simulation of nanocomposite materials properties:

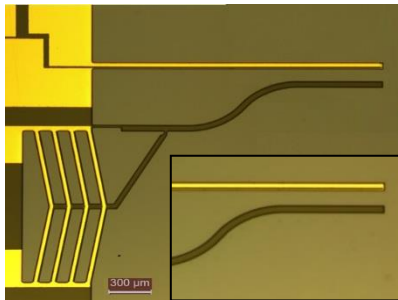


Schematic diagram of the whole homogenization process for modeling thermal conductivity of graphene-based nanocomposites

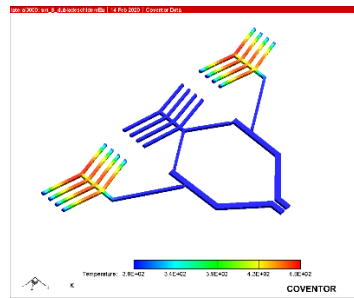


Mechanical simulation in frequency domain results of a nanocomposite: polymer matrix with inclusions-Von Mises stress (Comsol Multiphysics)

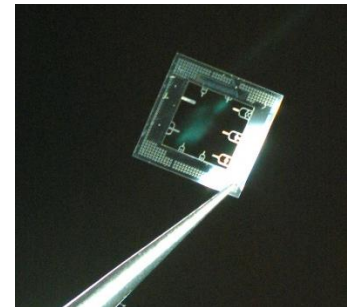
Sensors, actuators and microgrippers integrated with sensors for bio-micromanipulation and bio-medical applications:



Optical image of a fabricated SU-8 and Gold micro-tweezer with integrated displacement sensor



Temperature distribution in a microgripper with double action-Simulations of the closing arms for 120 mA (Coventorware)



Released microgripper structures fabricated using SU-8 and gold on a chip

Involved persons. Short CV

Dr. Rodica-Cristina Voicu (F): M.Sc and PhD in Mathematics from University of Bucharest, Senior Researcher II at IMT Bucharest, Simulation, Modelling and Computer-Aided Design Laboratory. Expertise in mathematical modelling and optimization analysis/algorithms, design, FEM simulations and fabrication of MEMS/MOEMS. She was involved in national and international projects (PATENT-FP6, FlexPAET-FP7, Leonardo da Vinci Projects, ERANET, H2020) and she coordinated an ERA-MANUNET project. She is author of more than 24 scientific papers in ISI Journals, over 50 Conference Proceedings and 2 Patents (OSIM).

If you are interested in a particular call, please indicate the Reference of the call/ Topic of interest. Potential contribution.

► Adaptive multi-scale modelling and characterisation suites from lab to production (RIA)

HORIZON-CL4-2023-DIGITAL-EMERGING-01-12

- Modelling and simulations, modelling methods for complex structure-property correlations in advanced materials, nanocomposites.

► 2D materials of tomorrow (RIA)

HORIZON-CL4-2023-DIGITAL-EMERGING-01-33

- Modelling and simulation of 2D materials and hetero-structures/systems

► Smart sensors for the Electronic Appliances market (RIA)

HORIZON-CL4-2023-RESILIENCE-01-33

- Sensors to be integrated with actuators and tweezers for bio-medical applications and body sensors using nonconventional material such as nanocomposites.

Have you already participated in an EU funded project? If so, provide some references/ results.

- **H2020: BIONANOPOLYS** -Open Innovation Test Bed for Developing Safe Nano-Enabled Bio-Based Materials and Polymer Bionanocomposites for Multifunctional And New Advanced Applications, Call: H2020-NMBP-TO-IND-2020-two stage, Contract nr. 953206, 2021–2024, Coordinator: ITENE, Spain; IMT responsabil: *Dr. Oana Tatiana Nedelcu*
- **MANUNET ERA-NET - ROBOGRIP** Contract no. 22/2016 „Microgrippers as end-effectors with integrated sensors for microrobotic applications”, 2016-2017, European Commission, ERA-NET Co fund, Project Director: *Dr. Rodica-Cristina Voicu*
- **EraNet Project 3SMVIB**, 3 Scale modeling for robust -design of vibrating micro-sensors (3SMVIB), 2012-2015, Coordinator: Open-Engineering S.A.
- **European Project FP7 FlexPAET**, Flexible Patterning of complex Micro Structures using Adaptive Embossing Technology, 2008-2011, Coordinator: FRAUNHOFER