Research laboratories

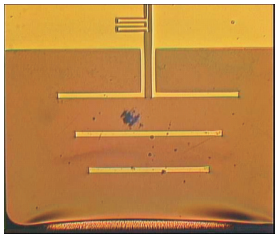
L4.Laboratory of Microsystems and Micromachined Microwave Components - with research activity focused on the development of microwave devices, circuits and RF MEMS based on silicon and GaAs micromachining ; design, modelling and manufacturing of micromachined millimeter and sub millimeter wave receiver modules based on silicon as well as on GaAs technology. Head: **Dr. Alexandru Muller, alexm@imt.ro**.

L4 is recognized at national level, and funded between 2001 and 2005, as a Centre of Excellence in Radio Frequency (RF) MEMS. **Expertise in**: research and development of microwave devices, circuits and RF MEMS based on silicon and GaAs micromachining; design, modelling and manufacturing of micromachined millimetre and sub millimetre wave receiver modules based on silicon as well as on GaAs technology.

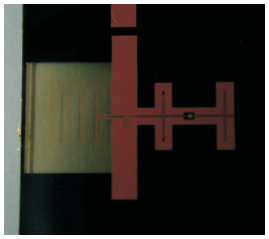
Results: GaAs membrane supported millimeter wave filters (in cooperation with FORTH Heraklion and Uppsala Univ); fully monolithically integrated receiver module with the antenna and the Schottky diode supported on a thin GaAs membrane (in cooperation with FORTH Heraklion); silicon micromachined filtrers as well as a hybrid receiver module for millimeter wave applications in cooperation with ITC Trento, CNR Roma and Tor Vergata Univ).

Specific facilities: Computers and software (IE3D and Fidelity from ZELAND for simulation and design; access (by international cooperation) to millimetre wave on wafer measurements. National Projects- over 10 projects in national programmes. International projects: "Micromachined circuits for microwave and millimeter wave applications" MEMSWAVE (1998-2001 -FP 4-nominated for Descartes Prize competition of the EC-2002); bilateral cooperation with FORTH Heraklion, Greece; CNR Roma, Italy; LAAS-CNRS, Toulouse, France; AMICOM (NoE/IST, FP6).

Development in the "**AMICOM**" Project
"Advanced MEMS for RF and Millimeter Wave Communications" NoE in FP6

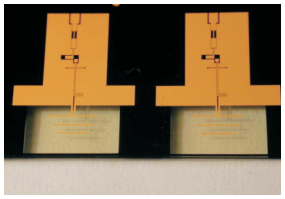


Bottom view of "quasi three edges" Yagi Uda membrane supported antenna structure

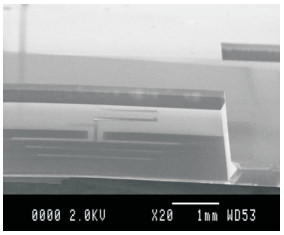


45 GHz receiver structure with a membrane supported Yagi Uda antenna and dual voltage Schottky diodes detector

15 to 45 GHz multiplier structure with a membrane supported Yagi Uda antenna



Manufactured in cooperation with LAAS Toulouse, France



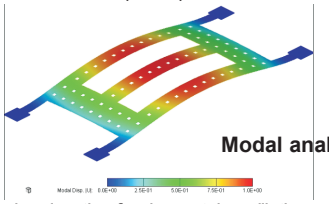
SEM Photo of the "quasi three edges" membrane supported antenna

L5. Simulation, Modelling and Computer Aided Design Laboratory - with research, education and training activities in simulation, modeling and CAD for micro- nano structures and materials, microsystems, microfluidics. Head: **Dr. Raluca Muller, ralucam@imt.ro**.

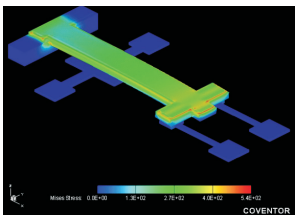
Mission: research, education and training in simulation, modelling and CAD for micro- nano structures and materials, microsystems, microfluidics.

Expertise in: structural analysis, mechanical, thermal analysis, electric and magnetic field analysis, coupled field analysis of MEMS and MOEMS; simulation and design of microfluidic components for biomedical applications, neural networks, cellular automata.

Specific facilities: Coventorware 2004 (simulation and design of Microsystems) and ANSYS software, powerful computer network for CAD and simulation. International projects: FP6: PATENT (NoE/IST) - 2 grants in WP2-Modelling and Simulation, MI-lab-on chip (STREP/NMP), ASSEMIC (RTN)- WP 2- Microhandling

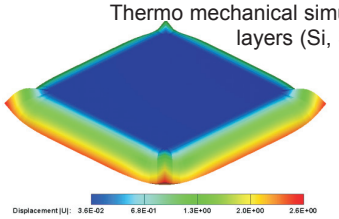


showing the fundamental oscillation mode of an electrostatically actuated RF switch

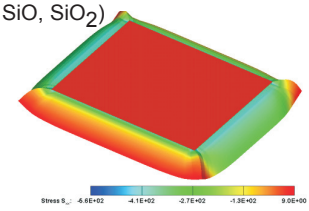


Map of the von Mises stress induced in a piezoelectrical RF switch during the actuation

Thermo mechanical simulation for a structure with four layers (Si, SiO_2, SiO, SiO_2)



Mechanical deformation due to dilatation (for 1000^0C)

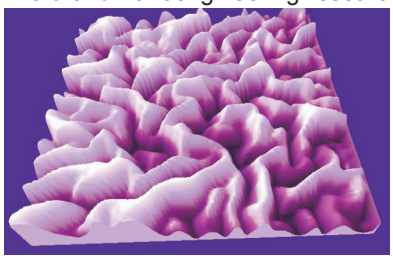


Stress distribution σ_{xx}

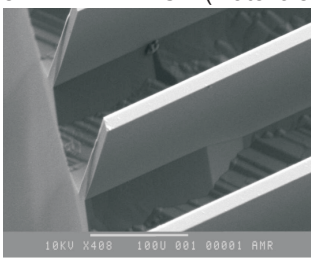
L6. Microphysical Characterization Laboratory is performing micro- and nanoscale characterization of materials and processes to explore manufacturing processes - structure and structure-function (properties) relationships. Acting head: **Phys. Adrian Dinescu, adriand@imt.ro**.

Mission and expertize: micro and nanoscale characterization of materials and processes using Atomic Force Microscopy techniques, X-Ray diffraction, X-Ray diffraction studies of materials, elipsometry, scanning probe image processor software - SPI, IR spectrophotometry to explore manufacturing process - structure and structure-function (properties).

Facilities: Atomic force microscope, SEM, spectroellipsometer, infrared and UV- VIS spectrophotometer, low noise preamplifier and electrometer (Keithley), X-ray difractometer. Coordinator of national network MINAMATNET (Caracterization of materials and structures for micro and nanoengineering research laboratories network.Projects: 6 projects in national research programmes: MATNANTECH (Materials and Micro- nano technologies) ,CERES (fundamental research), RELANSIN and in a FP6 project - PATENT-DfMM. Partner in FP5 Network of Excellence on Nanoelectronics (PHANTOMS).



AFM image of propil amino trimercaptosilan/Au, for cells substrate. Scan size: 10μmX10μm



SEM photomicrograph of deep vertical-wall grooves anisotropically-etched in a (110)-oriented silicon wafer

L7. Reliability Laboratory, head: **Dr. Marius Bazu, mbazu@imt.ro**.

Mission: Providing tools to improve the technology and design of sensors, actuators and microsystems, by the establishment and improvement of quality and reliability in a Concurrent Engineering approach.

Expertise in the quality and reliability of microelectronic devices: reliability building, reliability evaluation and standardization. National projects: 6 projects in national research programmes (MATNANTECH, CALIST). International projects: FP6: PATENT (NoE/IST) - WP3 Design for Reliability.