

IntegramPlus and μ Builder joint training event

In the period 3rd to 5th of December 2007 , a course presenting two EC-funded projects on microfluidics will be offered at IMT-Bucharest . The two projects have set out to increase knowledge in microfluidics and provide scientists and engineers with little or no knowledge in microfluidics and microsystem technology, an introduction and kick start. During the course you will learn about potential applications, the technologies offered by the project partners and how to design in these technologies. By the end of the course, you should be able to make simple designs in the technologies presented and make use of the dedicated software that will be used in two separate hands-on sessions offering introduction to design and simulation using state-of-the-art software.

Please see description below for brief description of the projects presented at this training event and for agenda for the course.

To sign up, please provide to following information to : CMoldovan@IMT.RO or BogdanF@IMT.RO

Name

Title:

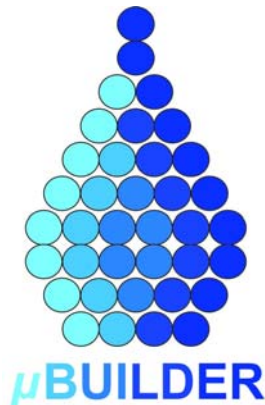
Affiliation:

E-mail:

Valid postal address:

All participants who provide a valid postal address will receive a course certificate from the μ Builder project stating the course syllabus and duration of the course.

Questions on the μ Builder sessions can be directed to christopher.grinde@hive.no.



The easy and low-cost road to advanced microsystems

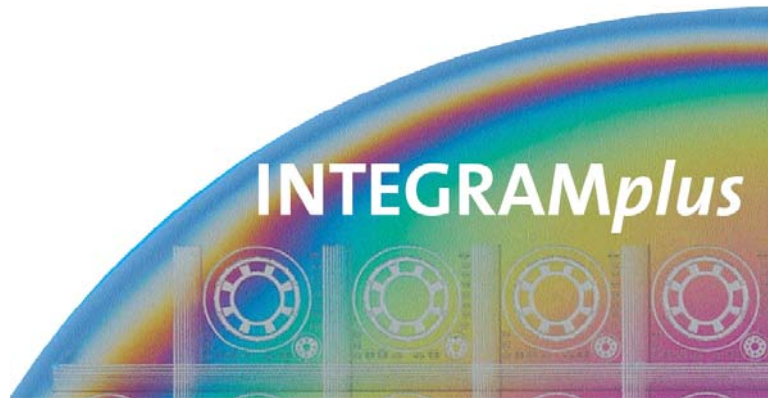
The goal of microBUILDER is to increase the commercial success and competitiveness of European industry by facilitating the introduction of new microtechnology to key components in products. microBUILDER provides industry with a simple and cost-effective access to mixed technology development and manufacturing and supports customers from the first idea to a final product. SMEs, but also academic research groups, are the target user group.

microBUILDER offers a full service from design through prototype manufacturing to high-volume production of mixed technology devices mainly made from a combination of silicon, glass and plastics with functional surface layers. The microBUILDER services are focused on microfluidic devices like:

- Lab-on-a-chip systems
- Valves and pumps
- Biomedical devices
- Chemical micro-reactors
- Sensors for instrumentation
- Gas and flow sensors

The microBUILDER consortium represent an outstanding pool of Europe's leading silicon microsystem and high precision plastic system manufacturing and design players. This unique combination of expertise gives easy access to complete solutions for development and production of mixed microtechnology devices.

More information can be found on <http://microbuilder.org>



INTEGRAMplus: a customer-responsive design and prototyping service with a route to volume for integrated microsystems.

The main focus of *INTEGRAMplus* is on integrating silicon-based MEMS (micro-electro-mechanical systems) components, which provide smart functionality, with polymer backplanes and platforms for additional functions, packaging and interfacing to the macro-world.

Through *INTEGRAMplus* you can access the expertise from major European players with world leading competencies in micro and nanotechnologies including:-

- Silicon, polymer, glass and hybrid solutions
- Multi-domain technologies (optics, fluidics, MEMS, biological, chemical and electronics)
- Multi-level integration (material, electronics, functions and systems)
- Design, development and production along the supply chain

For micro and nano-based products *INTEGRAMplus* offers customised solutions including consultancy, feasibility studies, design, development, prototyping and a route to production. Standardised tried and tested modules provide an accelerated route to market whilst minimising risk and cost.

INTEGRAMplus provides a unique combination of world leading competencies to provide you with smart mixed technology components and solutions. More information can be found on <http://www.integramplus.com/>



INTEGRAMplus hands-on course

Design, Technology and Simulation of Microfluidic Structures

National Institute for R&D in Microtechnologies (IMT),

Bucharest, Romania, 5th December, 2007

INTEGRAMplus offers a comprehensive consultancy and design service for designing discrete or integrated MEMS, microfluidic and optical systems. This is underpinned by using proven design kits and CAD tools - including process and material information as well as layout templates and design rules. They can be used to evaluate performance in the surrounding system, and to optimise design for manufacturability.

Smart Silicon MEMS - Prototyping and Manufacture

Within INTEGRAMplus (QinetiQ), a user can select from **3 core MEMS process technologies**:

- ✚ Polysilicon surface micromachining (PPK);
- ✚ Metal-nitride surface micromachining (MPK) (CMOS compatible);
- ✚ DRIE - based high aspect ratio micromachining of SOI (silicon on insulator).

Each process is supported by a design handbook containing information to enable design and simulation of devices, which has also been encoded into CAD support files for L-Edit™ and CoventorWare™.

Microfluidics and Bio-integration

From microneedles, through microfluidic and Lab-on-a-chip systems to bio-integration and instrumentation, draw on a wealth of experience within INTEGRAMplus to meet your requirements.

- ✚ **Polymer Microfluidics Prototyping and Manufacture:** The Fluence™ Microfluidic Tool Kit provides an effective decision-making tool for product and process developers working on microchemical and microbiological applications;
- ✚ **Rapid Lab-on-chip Prototyping:** Use this capability for developing Lab-on-a-Chip systems, focusing on bioanalytical and microfluidics, including design, simulation and prototyping using laser ablation and ultra-precision milling;
- ✚ **Functionalisation of Surfaces for Bio-integration:** Design, fabrication, deposition and characterisation of bio-materials and microelectrodes on silicon, glass or polymer substrates for bio-sensing applications.



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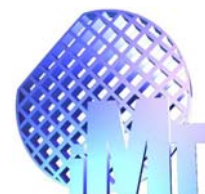
The course will be organized by the National Institute for R&D in Microtechnologies (IMT), as an **INTEGRAMplus** partner, in association with the **µBuilder** project (www.microbuilder.org).

Target Groups:

The course is primarily aimed at students, PhD students, postgraduates engineers and physicians from European universities and research institutes interested in developing MEMS design skills and accessing low-cost fabrication services, who may participate free of charge. In addition, engineers and researchers from industry and other organisations are invited to participate for a 50 € - fee.

Objectives:

- ✚ Introduce the INTEGRAMplus project and services offer;
- ✚ Introduce MEMS and the key-concepts of microfluidics;
- ✚ Provide familiarity with CoventorWare tools for MEMS (design, modelling and simulations)
- ✚ Explain methods to help students design and analyse MEMS microfluidic devices;
- ✚ Reinforce learning through practical case studies and worked examples based on simple devices, using hands-on training for microfluidics simulations;
- ✚ Support participants to develop their own design ideas and practical implementations in INTEGRAMplus processes.



INTEGRAMplus hands-on course

Design, Technology and Simulation of Microfluidic Structures

National Institute for R&D in Microtechnologies (IMT),

Bucharest, Romania, 5th December, 2007

Course topics and programme:

HOURL	TOPIC
10:00 – 10:30	Generic introduction to the INTEGRAMplus project , <i>Carmen Moldovan, IMT-Bucharest, Romania</i>
10:30 – 11:00	Technology for microfluidics , <i>Carmen Moldovan, IMT-Bucharest, Romania</i>
11:00 – 12:00	Tools for design and simulation: CoventorWare 2006 – Layout Designer, Process Editor, Microfluidics Mesh Generator, Microfluidic modules, <i>Bogdan Firtat, Oana Nedelcu, IMT-Bucharest, Romania</i>
12:00 – 13:00	Lunch
13:00 – 14:00	Hands-on training: Design of a microfluidic structure (microchannels with variable transversal area), <i>Bogdan Firtat, Oana Nedelcu, IMT-Bucharest, Romania</i>
14:00 – 17:00	Simulation of a microfluidic structure (flow through microchannels with variable transversal area), <i>Bogdan Firtat, Oana Nedelcu, IMT-Bucharest, Romania</i>

Course venue:

National Institute for R&D in Microtechnologies,
126A Erou Iancu Nicolae Street,
077190 Bucharest,
Romania

For more information, please contact:

Dr. Carmen Moldovan,
email: cmoldovan@imt.ro
tel: 0040 21 490.84.12

μBuilder event invitation

Design your own microsystem



The μBuilder project is a cooperation between two silicon MEMS, one polymer manufacturers, two research institutes and three universities which aims to increase interest in micro fluidics in Europe. The program offers easy access to the technologies and additional processes specifically designed for micro fluidics and bioMEMS.

An extensive training program is offered to enable a quick start to design in the various processes offered in the project. The training program is offered at universities, institutes and companies around Europe with highly qualified personnel from the μBuilder project.

The training program has three main modules:

- Awareness:

A half to one day introduction to the technologies available in the project which gives an overview of the possibilities and limitations.

-Technology:

A half to one day module which will teach the details of the technologies. Such details are design rules, key process technologies and other topics of key importance.

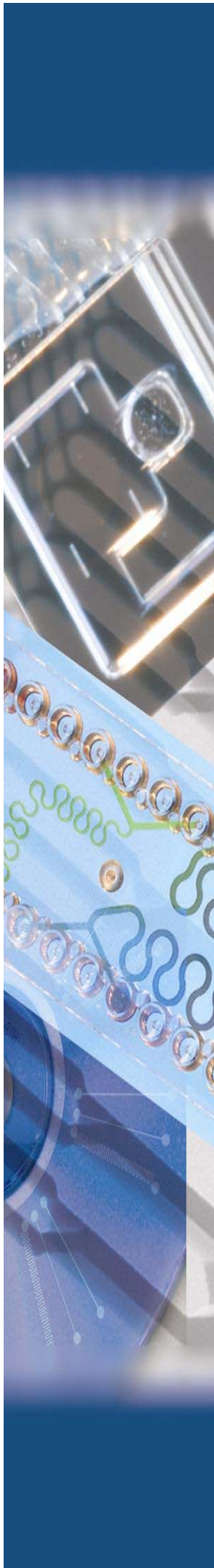
-Hands-on:

A one or two day module where the participants will learn how to design in one of the three processes using computer tools and technology templates.

Please see the next pages to find a short description of the core technologies and the agenda for this μBuilder event.

As the hands-on session has a limited number of seats, applications will be accepted until all seats are taken.

Where	Bucharest
When	3 Dec 2007
Duration	2 days
Special Focus	MultiMEMS hands-on training with Coventor software
Street address	126A, Erou Iancu Nicolae street
Postal code	077190
City	Bucharest
Country	Romania
Travel recommendations	
Recommended accommodation	



Silicon/Glass Multi Project Wafer services



Low cost prototyping and limited volume production are possible with Multi Project Wafer (MPW) services in which devices of different customers are fabricated in a single wafer run. Since multiple customers share the same mask set, the costs of mask making and fabrication are divided.

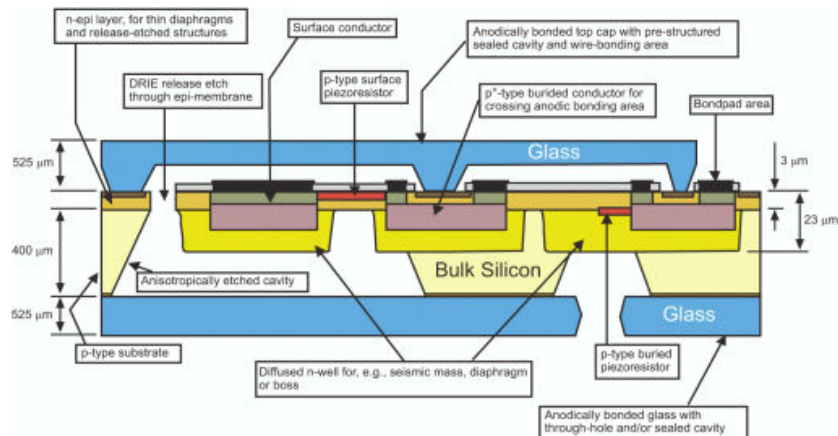
MPW processing

The microBUILDER project provides access to state-of-the-art MEMS technologies at Infineon Technologies SensoNor and TRONICS Microsystems. The MPW processes are fully documented in the microBUILDER design handbook. Customers have the choice to either use the microBUILDER services for designing a device or to design their own component. For this purpose, special training courses are provided.

Features of the Infineon Technologies SensoNor MPW process

The SensoNor MPW process offers buried conductors and piezoresistors, thin silicon diaphragms, cantilevers and channels as well as glass and silicon cavities in a triple-stack anodically bonded configuration.

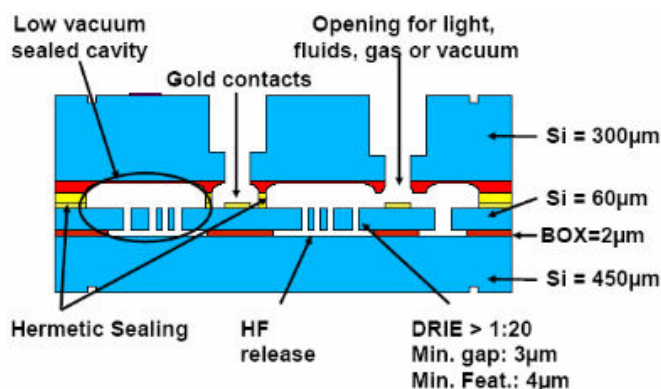
- * Chip size 3 x 3 mm², 3 x 6 or 6 x 3 mm², or 6 x 6 mm²
- * Minimum feature size 2 μm
- * High-volume approach to production
- * High-precision membrane definition by etch stop against pn-junctions
- * High aspect ratio RIE
- * High stability piezoresistors for sensing elements
- * Triple-stack Glass/Si/Glass anodically bonded
- * Hermetically sealed cavities with electrical feed-throughs
- * Thermal excitation / Piezoresistive detection



Features of the TRONICS Microsystems process

The TRONICS MPW process provides silicon channels, mixing pillars, heating electrodes and impedance sensing electrodes.

- * Chip size 8 x 7 mm²
- * Minimum feature size 4 μm
- * Minimum gap size 3 μm
- * SOI-HARM (High Aspect Ratio Micromachining), aspect ratio > 1:20
- * Si-DRIE/Glass under development

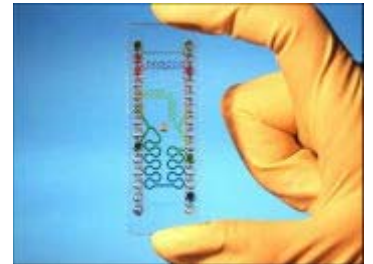
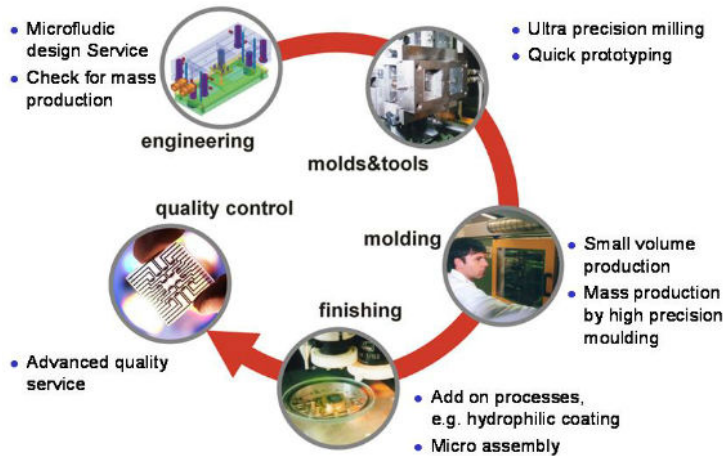


Polymer manufacturing and mixed technologies



Polymer manufacturing at thinXXS

Through microBUILDER the customers get access to state-of-the-art polymer technology at thinXXS. The company produces and develops customized micro structured devices and microfluidic platforms made from plastics for a wide variety of applications. Active microfluidic devices such as micro pumps off the shelf or customized passive microfluidic solutions such as lab-on-chip systems are available. The offered polymer technology is a full service from design and construction, mold and tool fabrication via micro molding in high volume to finishing and assembly.



Mixed Technology

Packaging processes, patterned gold-layers, electrodes, hydrophobic patterned surfaces, surface activation for protein attachment, and piezoelectric films are examples of mixed technology or add-on processes that can enhance the functionality of microsystem devices. The portfolio of possible applications for the microBUILDER technology is further increased as more processes are developed depending on customers' requests and requirements. All available add-on processes are qualified and documented in the master design handbook. This enables clients to make use of the add-on processes and to combine them with other microBUILDER processes or own technologies.

microBUILDER currently develop qualified processes for:

- electronic readout for a piezoresistive sensor
- hydrophobic/hydrophilic patterning
- gold pattern on silicon or glass
- biofunctional surfaces
- piezoelectric layers
- DRIE as add-on to MPW

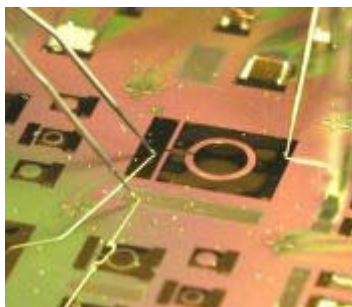


Photo: SINTEF



Photo: SINTEF/Stanford

Agenda



Session starts	Day 1	Day 2
09:00	MicroBuilder project presentation	Device examples
	10 min break	10 min break
	Thinxxs technology+add-on processes	Coventor software
12:00	Lunch	Lunch
13:00	Tronics technology	Hands-on with Coventor/MultiMEMS
	10 min break	10 min break
	MultiMEMS technology	Hands-on continue
16:00	End	End

All awareness courses are free, while technology and hands-on training is only free for academic personnel. Non-academics are charged 50 Euro for each of the modules 'Technology' and 'Hands-on'. Payment is done to the local organizer, cash only.

μBuilder will issue course certificates to all participants that complete training in the 'Technology' and 'Hands-on' modules.

To register for this μBuilder training event, please download the registration form from the 'Training' website under www.microbuilder.org and submit it as described

MultiMEMS hands-on using Coventor software

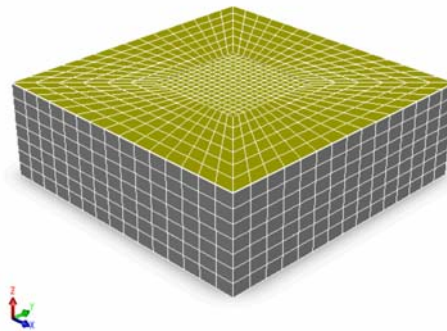


The MultiMEMS with Coventor software hands-on training includes design and simulation of a piezoresistive pressure sensor. The sensor is first designed and simulated using the Coventor Designer and Analyzer modules, before the same sensor is designed and simulated using the Coventor Architect module.

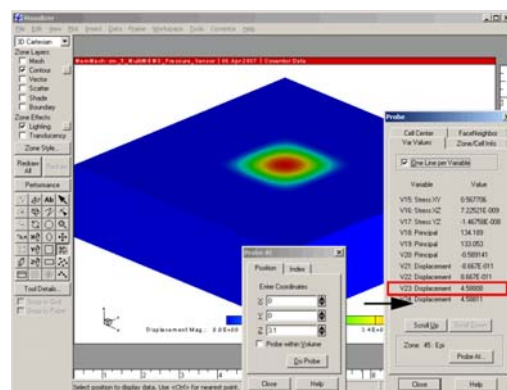
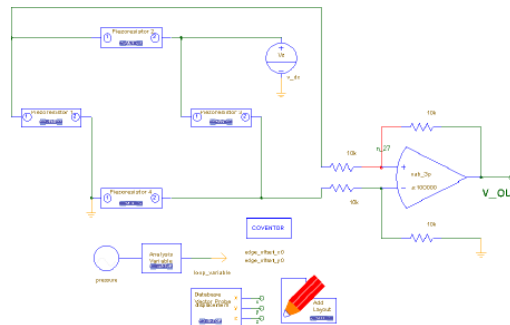
At the end of the training event the participant should be able to design and simulate MultiMEMS structures using the different Coventor packages.

Prerequisite:

The participant should have basic knowledge in semiconductor physics and processing. A basic understanding in mechanics is also preferable.



- A dedicated Coventor tutorial on using software modules Designer and Analyzer in used.
- The meshed model of the active regions of the pressure sensor.
- The Architect schematic used for describing the pressure sensor membrane and the position of the piezoresistors
- Simulation results from Analyser visulised using a 3D model.



Please note that to take part in a MultiMEMS hands-on training session a signed NDA must be supplied prior to the course. Please see more information on http://www.multimems.com/Downloads/MultiMEMS_NDA.htm