STIMESI MEMS Training Course Program

SensoNor and Tronics MEMS Processes

Laboratory for Analysis and Architecture of Systems: LAAS-CNRS

Toulouse, France
May, 11th-14th, 2009

Abstract

This four day training course provides instruction in the design of piezoresistive, thermal, electrostatic and capacitive sensors and actuators for fabrication using the multi-project wafer (MPW) processes of Infineon Technologies SensoNor and Tronics Microsystems.

Tronics Microsystems fabrication process utilises surface micromachining of an epitaxial Silicon-on-Insulator substrate. Through this approach, designers may exploit the excellent mechanical properties of the process' 20 µm thick silicon layer to construct highly sensitive capacitive transducers, electrostatic actuators, and resonators.

SensoNor's bulk micromachining multi-project wafer process facilitates the fabrication of buried and surface piezoresistive sensors, precisely defined diaphragms and masses, and the anodic bonding of glass-silicon-glass capping layers for the creation of sealed and/or vented cavity structures. Previously fabricated microsystems which are representative of the capabilities of this process include: absolute and differential pressure sensors, microfluidic flow sensors, accelerometers, and force sensors.

Target Groups

The course is primarily aimed at postgraduate students and researchers from European universities and research institutes with interest 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 minimal fee.

No prior knowledge of MEMS design and processing is required.

Objectives

- Introduce SensoNor's MultiMEMS and Tronics' SOI-HARM MPW processes and the key concepts of bulk and high aspect ratio micromachining of silicon;
- Provide awareness of common sensor transduction methods;
- Explain methods to help participants design and analyse devices manufactured in the SensoNor's and Tronics' MPW processes;
- Explain SensoNor's MultiMEMS and Tronics' SOI-HARM MPW process flows and design rules to enable students to design with confidence;
- Provide familiarity with major CAD tools, including L-Edit for layout and CoventorWare for MEMS design with supporting MultiMEMS- and SOI-HARM-specific modules;
- Reinforce learning through practical case studies and worked examples based on simple devices during and after the course;
- Support participants to develop their own design ideas.

Topics

Day 1

Optional tutorial, afternoon, on "Sensing Principles and MEMS Technologies". The attendees who are beginners in the MEMS field can start with this tutorial.

Day 2

The first day of this joined training course will be reserved for presenting the SensoNor's and Tronics' MPW processes, covering in detail SensoNor's wet, anisotropic etching of bulk silicon and Tronics' high aspect ratio micromachining (HARM) of silicon.

To enable the participants differentiate the two processes, both sessions will follow the same layout:
- Introduction to the multi-project wafer services;
- Features and limitations of the presented processes;
- Outline of the conventions and design rules;
- Overview of the recommended design flow.

Day 3

The focus of the second day of the course will be on practical hands-on training in the design procedure for each of the two covered processes. Initially, a description of the structure and contents of the foundry design kits will be given. Instruction in the use of appropriate design tools will follow. CAD tools employed in the course will include L-Edit and CoventorWare. The afternoon session shall consist of a hands-on design tutorial, targeting a design for the Tronics' process.

Day 4

During the morning of the third day of the course, participants will work through a step-by-step tutorial describing the design of a pressure sensor for fabrication on SensoNor's MPW process. In the afternoon, the course attendees may choose either to continue with a second design tutorial, in this instance for an accelerometer or a flow sensor, or, alternatively, may take the opportunity to work on own designs, and discuss the available options with the present foundry representatives.

What is STIMESI?

The goal of the STIMESI Stimulation Action is to stimulate European universities and research institutes to adopt MEMS and SiP technologies. The more experienced universities already active in MEMS design / technology will be assisted to increase their MEMS research activities and to design and fabricate more MEMS circuits and SiP components. Additionally other universities not currently active in this area will be given guidance to help them bootstrap their MEMS / SiP teaching and research activities.

Who should attend?

All EUROPRACTICE member universities and research institutes that want to begin or strengthen their teaching and/or research activities in MEMS / SiP technologies. Also companies having interest in using MEMS in future products are invited to attend.

Location

The course will be held at the "Laboratory for Analysis and Architecture of Systems" (LAAS-CNRS).
LAAS, located in Toulouse, France, is a large research unit of the CNRS, the French National Center for Scientific Research, within the Department of Information and Engineering Sciences and Technologies. LAAS is associated to the University of Toulouse (Université Paul Sabatier, Institut National Polytechnique de Toulouse, Institut National des Sciences Appliquées de Toulouse).

The STIMESI Course will take place in « Salle Europe »

Address:
STIMESI Course is on « Salle Europe »
LAAS/CNRS
7 avenue du colonel Roche
31077 Toulouse cedex 4
France

Useful links:
Website for general information: http://www.laas.fr
How to come to LAAS: http://www.laas.fr/laas/2-4275-How-to-access-to-LAAS.php
 (English version, including maps and timetable of buses and subway)
Roadmap (English):   http://www.laas.fr/laas/files/RE-COM/Acces-LAAS-anglais-MetroV2.pdf
Google Maps: click this link

Start /end date: May 11-14, 2009

Accommodation

Participants need to make their own accommodation and travel arrangements.
The following links may be helpful in finding the desired accommodation in Toulouse (French version only):
    http://www.laas.fr/laas/1-5571-Hebergement.php
    http://www.laas.fr/laas/images/RE-COM/Plan-Toulouse-2006.jpg

Fees

- Attendance is free for members of universities and research centers from all 27 EU countries and Norway, Iceland, Lichtenstein, Israel, Croatia, Switzerland and Turkey. In case the course is oversubscribed, access may be limited to one participant per institute and will be on a first-come basis;

- Companies and other organisations: 300 € (excl. 21% VAT);

- Fee includes all lectures, course materials, lunches and refreshment breaks. Accommodation, transport and other meals are not included in the course fee;

- Cancellation by a participant between 2 and 28 days before the start of the course is subject to a 200 € administration fee. A 300 € fee will be charged for cancellation within 48 hours of the start of the course or for those who do not attend.

More information

For more information, please visit the following links:

www.stimesi.org   www.europractice.com   www.multimems.com   www.tronics.eu
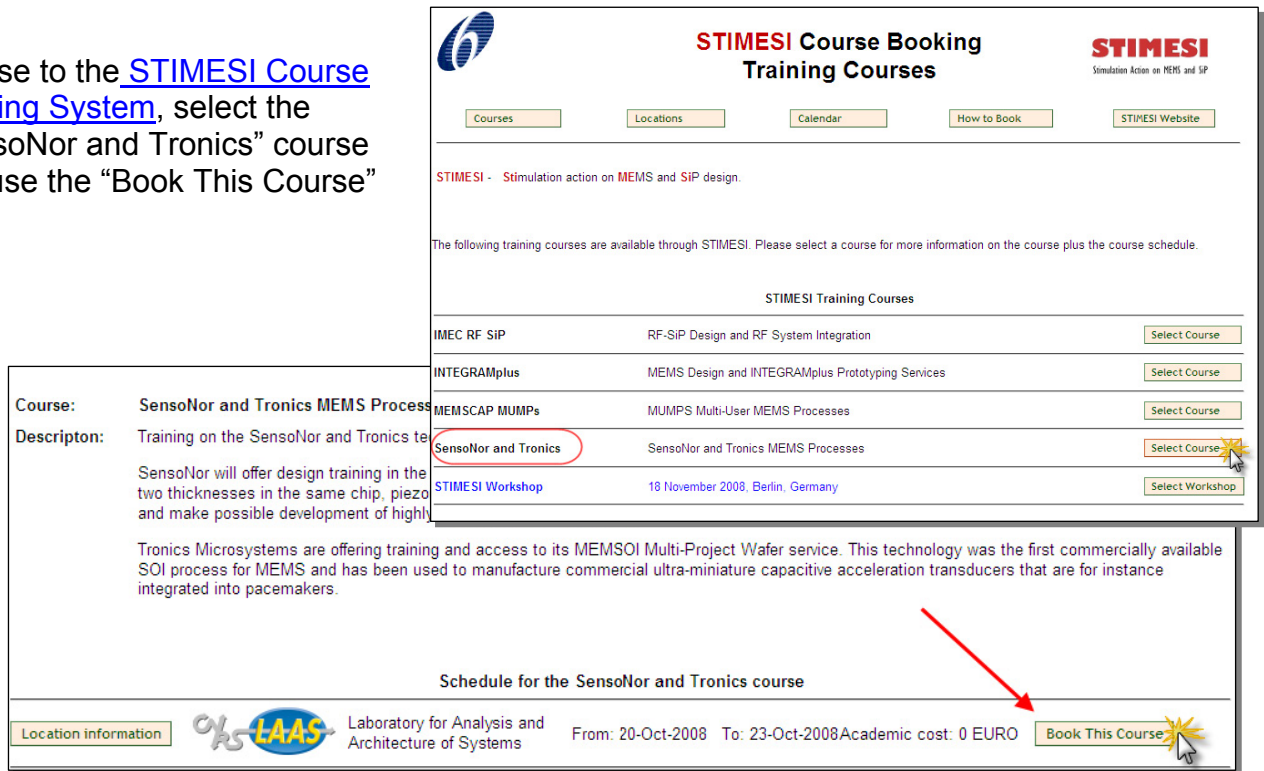
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REGISTRATION

Registration can be done using the STIMESI Course Booking System, which is managed and maintained by STFC Rutherford Appleton Laboratory, UK.

The following link brings you there :   http://www.stimesi.rl.ac.uk

Browse to the STIMESI Course Booking System, select the "SensoNor and Tronics" course and use the "Book This Course" link:

NOTES:

This course is limited to **30** participants to ensure a high quality of training. Please reserve your place early. This course runs approximately every 6 months and moves to different locations within Europe.

A joining pack will be sent to registrants containing details of the course location, schedule and suggested local accommodation.

All necessary cource material will be provided. To get complementary course materials, such as the MultiMEMS Design Handbook, the institutes or companies sending attendants to this course are requested to sign the MultiMEMS License Agreement, http://www.multimems.com/Downloads/License.htm.

The STIMESI Course Booking System is managed and maintained by STFC Rutherford Appleton Laboratory. All enquires should be emailed to: stimesi@rl.ac.uk