

# DTIP 2013

16-17-18 April 2013  
Barcelona - Spain

Symposium on  
Design, Test,  
Integration  
& Packaging  
of MEMS/MOEMS



Sponsored by



**Chair: Bernard COURTOIS, CMP, Grenoble, France**

**Co-Chair: Jean-Michel KARAM, MEMSCAP, Bernin, France**

## C O N F E R E N C E S

**CAD, Design and Test Conference**

**Chair: Bernard COURTOIS, CMP, Grenoble, France**

**Co-Chair: Arturo AYON, Univ. of Texas at San Antonio, USA**

**Microfabrication, Integration and Packaging Conference**

**Chair: Toshihiro ITOH, AIST, Tsukuba, Japan**

**Co-Chair: Benoit CHARLOT, IES, Montpellier, France**

# REGISTRATION



CNRS-Grenoble INP-UJF

**Circuits Multi-Projets**  
46 Avenue Félix Viallet  
38031 Grenoble Cedex France  
Tel. : +33 4 76 57 46 22  
Fax : +33 4 76 47 38 14

DTIP 2013 registration fee covers admission to all sessions, luncheons, coffee breaks, the social event and the Symposium proceedings (copy paper and CDRom).

Registrations should be done online at:

► <http://cmp.imag.fr/Conferences/dtip/dtip2013>

# HOTEL ACCOMMODATION



## PLEASE ARRANGE ACCOMMODATION TIMELY

**Novotel Barcelona City**  
(<http://www.accorhotels.com/gb/hotel-5560-novotel-barcelona-city>)

**Address:**  
Avinguda Diagonal 201, (entrada por ciutat de Granada)  
08018 Barcelona – Spain  
Phone: +34 93 326 24 99  
Fax: +93 320 87 79

**Informations and reservations:**  
Call Center: 902 15 15 16  
Att: Marta MIMOSO // H5560-na@accor.com  
Fax Number: + 93 320 87 79



Hotel reservation form available on the web site of DTIP'13

► <http://cmp.imag.fr/Conferences/dtip/dtip2013>

# INVITATION TO PARTICIPATE

**T**his Symposium will be a follow-up to the very successful issues held in 1999 and 2000 in Paris and in 2001, 2002 and 2003 in Mandelieu-La Napoule, in 2004 and 2005 in Montreux, Switzerland in 2006 and 2007 in Stresa, Italy, in 2008 in Nice, France, in 2009 in Rome, Italy in 2010 in Seville, Spain, in 2011 in Aix-en-Provence, France and in 2012 in Cannes, France.

This series of Symposia is a unique single-meeting event expressly planned to bring together participants interested in manufacturing microstructures and participants interested in design tools to facilitate the conception of these microstructures.

**Bernard COURTOIS & Jean-Michel KARAM**

# VENUE

**T**he Symposium is hosted at the **Novotel Barcelona City**. The Hotel is located right in the heart of the city on Avenida Diagonal (one of the city's main streets), next to Plaza Glòries and 55 yards (50 m) from the Jean Nouvel Tower.

**Barcelona** is the cultural, administrative, economic and historic capital of **Catalonia province of Spain**. Due to its huge importance in finance, publication, arts, entertainment and Medias, **Barcelona** is considered as a world culture town. The city is served by air, train, bus or boat and it flavours, sounds and smells, emphasized by awesome landscapes, will make your DTIP attendance unforgettable.

# HOTEL INFORMATION

**Novotel Barcelona City**  
Avda Diagonal 201,  
(entrada por ciutat de Granada)  
08018 Barcelona  
Spain



**PLEASE ARRANGE ACCOMMODATION TIMELY**  
(<http://cmp.imag.fr/Conferences/dtip/dtip2013>)



# ACCES

## By air INTERNATIONAL AIRPORT El Prat to 22 Km.

There are two terminals T1 and T2. T1 is the main one, corresponding to most of the main companies and T2 for low cost.

**Aerobus:** Connections between Barcelona and the airport and back: Aerobús (A1 and A2, respectively for T1 and T2). Daily service between Plaça de Catalunya and Barcelona Airport. Frequency: every 10 minutes. Approximate journey time: 35 minutes. They Link the terminals with downtown, this means Plaça Espanya and Plaça Catalunya. They Link the terminals with down-town, this means Plaça Espanya and Plaça Catalunya.

## By train - Cercanías (Rodalies in Catalan)

Between the commuter train to destinations and metro stops for its central (Plaça de Catalunya, Passeig de Gràcia, Sants Estacio, Arc de Triomf, Estacio de França, etc.). The Cercanías is somewhat equivalent to the RER Paris.

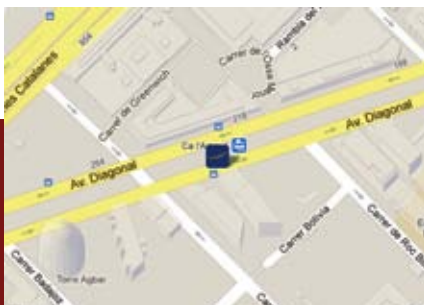
Managed by RENFE lines are named C1, C2, etc. (attention, in some ways, their number is preceded by an R and not a C). All pass through Sants Estacio, and then either serve Passeig de Gràcia or Plaça de Catalunya.

- The R2 line serves the airport (the safest solution to peak): Departures from Passeig de Gràcia. Take care the train goes only to T2. From T2 to T1 there is a free high frequency shuttle.

- FGC (Ferrocarrils de la Generalitat de Catalunya). The FGC is between the commuter and regional services, numbered L6 to L8, or R + S + number or number. Two terminals in the city: Plaça d'Espanya and Plaça Catalunya.

## By bus Barcelona North Bus Station to 1 Km.

**By car** The city has excellent road links and you can get to the Barcelona Sants Station conveniently using the motorway and road network. Underground (Line 1), TRAMbesòs (Glòries) and urban buses (line 7, 56, 92). All of them stopped next to the hotel.



# PROCEEDINGS

Proceedings of this Symposium will be available at the meeting as part of the registration fee. If you cannot attend, you may still order Proceedings at the price of 35€ (order form available on the conference web site, the sending of the Proceedings package will be done after the Symposium, and if the payment is received).

DTIP is happy to acknowledge the services of MOLESYSTEMS (<http://www.molesystems.com/>) for the technical management of the Symposium.

# SOCIAL EVENT WEDNESDAY 17 APRIL

A dinner will be served for a memorable evening, in the **Restaurant El Tunel**

**del Port** in beautiful surroundings and in a unique atmosphere with views of the beaches and Olympic Port. The Olympic harbor is one of the areas that attracts most tourists the night. So participants may stay there after dinner to enjoy the atmosphere of Barcelona.

Restaurant El Tunel del Port is on the beach, at 20' walking distance from the Novotel Barcelona City.



# CONTACTS

## DTIP

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## CAD, Design and Test Conference

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## Microfabrication, Integration and Packaging Conference

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Co-Chair:

**Benoit CHARLOT**

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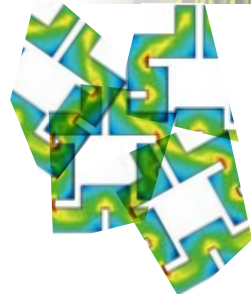
ies.univ-montp2.fr

# INSURANCE

While the Symposium organisation makes every effort in order to ensure the safety and well being of all the Symposium participants and associates, the Symposium cannot take responsibility for any accident or damage that may occur during the Symposium.

# SPECIFIC EVENT SPONSORING

If you wish to sponsor an event like a reception, a lunch, or any specific event during the Symposium, please contact the Symposium Chair.



# CAD DESIGN & TEST CONFERENCE

## The topics for this Conference include:

- Technology CAD in general
- Modeling and simulation of fabrication processes
- Devices and components (sensors, actuators, ...)
- MEMS/MOEMS libraries and IP
- Signal processing
- Integrated CAD tools
- Numerical simulation
- Yield estimation
- Failure mechanisms
- Fault modeling
- Fault simulation and test pattern generation
- Mechanical simulation
- Thermal evaluation
- Interoperability of CAD/CAE tools
- Multiphysics simulation
- Structured design methodologies
- Languages for designs and tool
- Model order reduction
- 3D Integration of MEMS

Chair:  
**Bernard COURTOIS**, CMP, Grenoble - France  
Co-Chair:  
**Arturo AYON**, Univ. of Texas at San Antonio - USA

**THE CAD, DESIGN AND TEST CONFERENCE** will bring together researchers, engineers and practitioners involved in the development of CAD tools and design methodologies for MEMS and MOEMS.  
The participants will also have the opportunity to interact with the other Conference by the means of plenary talks.

## Programme Committee:

**Pascal NOUET**, LIRMM, Montpellier, France  
**Anis Nurashikin NORDIN**, Int' Islamic Univ, Kuala Lumpur, Malaysia  
**Francis PRESSECO**, CNES, Toulouse, France  
**Gerold SCHROEPFER**, Coventor, France  
**Libor RUFER**, TIMA Lab., Grenoble, France  
**Mahnaz SHAMSHIRSAZ**, Amirkabir Univ. of Tech., Tehran, Iran  
**Marta RENCZ**, BUTE, Budapest, Hungary  
**Rainer LAUR**, Univ. of Bremen, Germany  
**Robert RUDD**, Lawrence Livermore National Lab. Livermore, USA  
**Souhil MEGHERBI**, Univ. Paris Sud, France  
**Thomas ZAHNER**, OSRAM Opto Semiconductors, Germany  
**Aurelio SOMA**, Politecnico di Torino, Italy  
**Romolo MARCELLI**, CNR-IMM Roma, Italy  
**Gerhard WACHUTKA**, Munich Univ. of Technology, Germany  
**Bart ROMANOWICZ**, Nano Science & Technology Institute, Cambridge, USA  
**Gaelle LISSORGUES**, ESIEE, Noisy-le-Grand, France  
**Franck CHOLLET**, Femto-ST, France  
**Ai Qun LIU**, Nanyang Techn. U., Singapore  
**Andrew RICHARDSON**, Lancaster University, UK  
**Igor BALK**, TDC LLC, USA  
**Jian ZHU**, Nanjing Electronic Devices Institute, China  
**Yung C. LIANG**, National Univ. of Singapore  
**Shawn BLANTON**, Carnegie Mellon Univ., Pittsburgh, USA  
**Narayan R. ALURU**, Univ. of Illinois Champaign, Urbana, USA  
**Ash PARAMESWARAN**, SFU, Canada  
**Ray ROOP**, Freescale Semiconductor, Inc., USA  
**Kazuhiro HANE**, Sendai University, Japan  
**Hisham HADDARA**, Si-Ware Systems, Cairo, Egypt  
**Vladimir SOBOLEV**, South Dakota School of Mines and Technology (SDSMT) USA  
**Tamal MUKHERJEE**, Carnegie Mellon Univ., Pittsburgh, USA  
**Jan MEHNER**, TU Chemnitz, Germany  
**Peter SCHNEIDER**, Fraunhofer IIS/EAS, Dresden, Germany

# MICRO FABRICATION INTE GRATION & PACK AGING CONFERENCE

## The topics for this Conference include:

- Integrated processes (micromachining, micromolding, ...)
- Process integration between MEMS and electronics
- Microlithography issues unique to MEMS/MOEMS
- Manufacturing
- Materials
- Assembly technologies
- Packaging for harsh environments
- MOEMS packaging
- RF and microwave packaging
- Test structures
- Devices and components (sensors, actuators, ...)
- Dimensional measurements
- Physical measurements
- Failure analysis
- Reliability
- Characterization
- Process monitoring
- Non destructive evaluation

Chair:  
**Toshihiro ITOH**, AIST, Tsukuba - Japan  
Co-Chair:  
**Benoit CHARLOT**, IES, Montpellier - France

**THE MICROFABRICATION, INTEGRATION AND PACKAGING CONFERENCE** will bring together researchers, engineers and practitioners involved in the development of integration technologies and packaging for MEMS and MOEMS.  
The participants will also have the opportunity to interact with the other Conference by the means of plenary talks.

## Programme Committee:

**Adrian IONESCU**, EPFL, Lausanne, Switzerland  
**Alain BOSSEBOEUF**, IEF, Paris-Orsay, France  
**Andrew TAY**, National Univ. of Singapore  
**Christian A. ZORMAN**, Case Western Reserve Univ., Cleveland, USA  
**Erik JUNG**, Fraunhofer IZM, Germany  
**Ciancarlo BARTOLUCCI**, Roma «Tor Vergata» University, Italy  
**Gou-Jen WANG**, National ChungHsing Univ., Taiwan  
**Henri CAMON**, LAAS, Toulouse, France  
**Hsiharng YANG**, National Chung Hsing Univ., Taiwan  
**Juerg DUAL**, ETH Zentrum, Zürich, Switzerland  
**Masayoshi ESASHI**, Tohoku Univ., Japan  
**Philippe RENAUD**, EPFL, Lausanne, Switzerland  
**Susumu KAMINAGA**, Sumitomo Precision Products Co., Japan  
**Xuechuan SHAN**, SIMTech, Singapore  
**Yuelin WANG**, SIMT, Shanghai, China  
**Yves-Alain PETER**, EPM, Montréal, Canada  
**Zhenfeng WANG**, SIMTech, Singapore  
**Dong F. WANG**, Ibaraki Univ., Japan  
**Alexandra GARRAUD**, Univ. Florida, USA  
**Emanuela PROIETTI**, IMM Roma, Italy  
**Victor M. BRIGHT**, Univ. of Colorado at Boulder, USA  
**Eng Hock (Francis) TAY**, National Univ. of Singapore  
**Geok Ing NG**, Nanyang Technological Univ., Singapore  
**Jyh-Cheng (Jason) YU**, Nat'l Kaohsiung 1st U. of Sc. & Tech., Taiwan  
**Xuming[AP] ZHANG**, The Hong Kong Polytechnic Univ., China  
**Philippe BASSET**, ESIEE, Noisy-le-Grand, France  
**Matthias WORGULL**, KIT, Karlsruhe, Germany  
**Virginia CHU**, INESC MN, Portugal  
**Robert PUERS**, KU Leuven, Belgium



# PLENARY INVITED SPEAKERS

## ELECTROMAGNETIC PHENOMENA: CONTROL OF MAGNETIC PROPERTIES VIA ELECTRICAL INPUT

● **Melanie W. COLE** from US Army Research Laboratory

Voltage control of magnetism (converse magnetoelectric effect) through spin polarized charge screening (charge mediated voltage induced magnetism) holds much promise to enable a new class of voltage tunable RF/microwave magnetic devices for RF/microwave communication and radar systems. The device structures (FM/FE-dielectric heterostructures), performance metrics, approaches for performance optimization, and the fabrication strategies to enable the control of magnetic properties of materials/devices via electrical input will be discussed in this presentation.

## MEMS TACTILE SENSORS FOR ROBOTS

● **Isao SHIMOYAMA** from the University of Tokyo

Micro-cantilevers and double-supported micro-beams with piezo-resistors provide sensitive force measurement. The cantilevers/beams embedded in organic material like epoxy become tiny tactile sensors which measure not only normal force but also shear force. The fabrication process and the performance of the sensors are shown in this report. Finally, the sensor is applied to a robotic hand.

# SPE CIAL SESSIONS

## SPECIAL SESSION ON RELIABILITY CRITERIA IN MEMS/NEMS DESIGN, MANUFACTURING AND TEST

MEMS/NEMS production needs interdisciplinary skills, especially concerning the integration of micro- and nano-technologies. For this reason, novel reliability criteria have to be defined for obtaining aging and failure of manufactured devices, and new protocols are needed with respect to well established procedures known in microelectronics.

This special session is organized by **Romolo MARCELLI** from *CNR-IMM Roma, Italy*.

## SPECIAL SESSION ON IN-VITRO DIAGNOSTIC DEVICES

In-Vitro Diagnostics (IVD) plays an essential and valuable role in the global healthcare industry. Recent advancements in micro/nano technologies have benefited the development of IVD devices that are low cost, sensitive, specific, easy to use, rapid and robust, and disposable, as well as consuming only a small sample. This special session focuses on the implementation of micro/nano technologies in the conception, design, fabrication and analysis of IVD devices.

This special session is co-organized by **Erik JUNG**, *FhG IZM, Berlin, Germany* and by **Gou-Jen WANG**, *National ChungHsing Univ, Taiwan*.

**FOR MORE INFORMATION:**  
<http://cmp.imag.fr/Conferences/dtip/dtip2013>

# TUES DAY 16 APRIL TECHNICAL PROGRAMME

08:00-08:50

Registration – Welcome coffee

08:50-09:00

Opening session

**Bernard COURTOIS**, CMP, Grenoble - France

09:00-09:40

Invited talk 1

## ELECTROMAGNETIC PHENOMENA: CONTROL OF MAGNETIC PROPERTIES VIA ELECTRICAL INPUT

**Melanie W. COLE**, US Army Research Lab - USA ● **Chair: Arturo AYON**, U. of Texas at San Antonio - USA

Coffee break

09:40-10:00

10:00-10:40

## Session C1: MEMS DEVICES AND COMPONENTS

● **Chair: Jean-Michel KARAM**, MEMSCAP, Bernin - France

**10:00** Influence of excitation waveform and oscillator geometry on the resonant pull-in of capacitive MEMS oscillators

**Jerome JUILLARD** (SUPELEC - France), **Gregory ARNDT** (TI - Norway), **Julien ARCAMONE** (CEA-LETI - France), **Eric COLINET** (APIX Technologies - France)

**10:20** Electrostatic actuation Gap reduction method and analysis for square plate resonator on SOI substrates

**Srinivasa KUPPI REDDI**, Oddvar SOERAASEN (U. of Oslo - Norway)

**10:40** Comparative analysis of zinc oxide and aluminium doped ZnO for GHz CMOS MEMS surface acoustic wave resonator

**Aliza MD RALIB**, **Anis NORDIN** (International Islamic U. Malaysia - Malaysia)

**11:00** Reversible acoustical transducers in MEMS technology

**Christoph GLACER**, **Rainer LAUR** (U. of Bremen - Germany), **Alfons DEH**, **Mohsin NAWAZ** (Infineon Technologies AG, Munich - Germany)

**11:20** From MEMS to NEMS: smart chips with senses and muscles

**Ali JAZAIRY** (World Intellectual Property Organization - Switzerland)

10:00-12:00

## Session T1: SENSORS

● **Chair: Benoit CHARLOT**, IES, Montpellier - France

**10:00** Multiparametric MEMS biosensor for cell culture monitoring

**Fei LIU**, **Ioana VOICULESCU** (City College of New York - USA), **Anis Nurashikin NORDIN** (International Islamic U. - Malaysia)

**10:20** Ionic gel based carbon dioxide gas sensor

**Yusuke TAKEI**, **Kotaro ISHIZU**, **Kentaro NODA**, **Akira INABAY**, **Kiyoshi MATSUMOTO**, **Isao SHIMOYAMA** (The U. of Tokyo - Japan), **Masahito HONDA**, (NMEMS Technology Research Organization, Ibaraki-ken - Japan/ OMRON Yasu, Shiga - Japan), **Toshihiro ITOH**, **Ryutaro MAEDA**, (NMEMS Technology Research Organization, Ibaraki-ken - Japan/AIST, Tsukuba - Japan)

**10:40** AlGaAs/InGaAs thermopiles for infrared imaging using surface bulk micromachining technology

**Kian Siong ANG**, **Louis Nicholas RETNAM** (TL@NTU/Nanyang Technological U. - Singapore), **Rene HOFSTETTER**, **Hong WANG**, **Geok I. NG** (NOVITAS/Nanyang Technological U. - Singapore), **Masayuki ABE** (3D-bio - Singapore)

**11:00** Developing MEMS DC electric current sensor for end-use monitoring of DC power supply: part III - integration with actuating and sensing elements

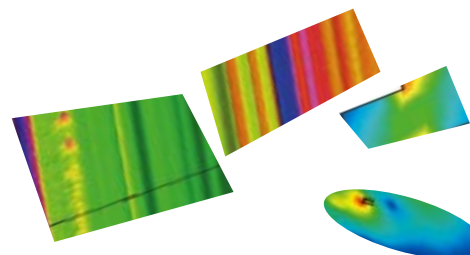
**Yasuhiro SUZUKI**, **Dong F. WANG**, **Yosuke SUWA**, (Micro Engineering & Micro Systems Lab/Ibaraki U., Hitachi - Japan), **Dong F. WANG**, **Takeshi KOBAYASHI**, **Toshihiro ITOH**, **Ryutaro MAEDA** (UMEMSME/AIST, Tsukuba - Japan)

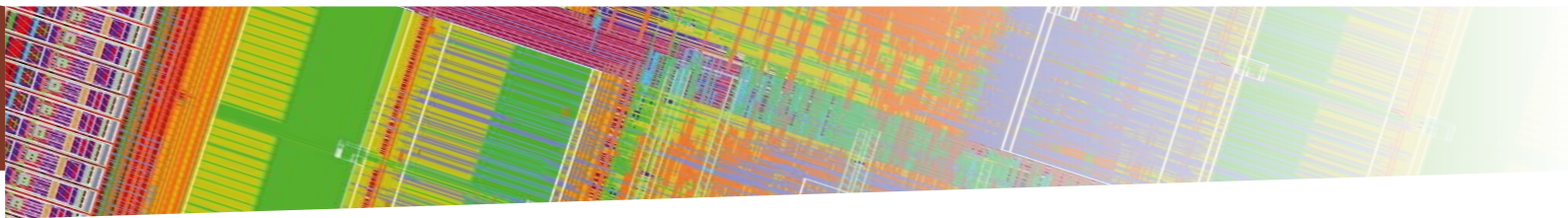
**11:20** Measurement of an airflow velocity change using a cantilever with Pb(Zr, Ti)O<sub>3</sub>

**Yutaka TOMIMATSU** (NMEMS Technology Research Organization, Tsukuba - Japan), **Kenta KUWANA** (Tokyo Denki U. - Japan), **Toshihiro ITOH**, **Takeshi KOBAYASHI** (AIST, Tsukuba - Singapore), **Hidetoshi TAKAHASHI**, **Kiyoshi MATSUMOTO**, **Isao SHIMOYAMA** (The U. of Tokyo - Japan), **Ryutaro MAEDA** (UMEMSME/AIST Tsukuba - Japan)

**11:40** Pyroelectric PZT sensors screen printed on glass

**Benoit CHARLOT**, **Denis COUDOUÉL**, **Philippe COMBETTE**, **Alain GIANI** (IES, Montpellier - France)





12:00-13:30

Lunch

13:30-15:30

## Special Session on IN-VITRO DIAGNOSTIC DEVICE

● Chairs: Erik JUNG, FhG IZM, Berlin - Germany and Gou-Jen WANG National ChungHsing U. - Taiwan

13:30

### Finite element analysis of piezoelectric millimeter-sized mass sensors

Amir Abbas KASHI, Mahdi ZAMANI, Mahnaz SHAMSHIRSAZ, Mostafa KHELGHATDOOST (Amirkabir U. of Technology Tehran - Iran)

13:50

### A highly sensitivity biosensor based on a 3D gold nanostructure modified screen-printed electrode for glucose detection

His-Chien LIU, Chung-Che TSAI, Gou-Jen WANG (National Chung-Hsing U., Taichung - Taiwan), Kang J. CHANG (California State U., Northridge - USA)

14:10

### Protein preconcentration using nanofissures generated by nanoparticle-facilitaed electric breakdown at the junction gaps

Chun-Ping JEN, Chen-Chi KUO, Pei-Ju CHIANG (National Chung Cheng U. - Taiwan)

14:30

### Detection of base pairs in single-nucleotide polymorphisms (SNP) using a nanostructured biosensor

Yu-Ting CHIN, Gou-Jen WANG (National Chung-Hsing U. - Taiwan)

14:50

### Diamond micro-electrode arrays (MEAs): a new route for in-vitro applications

Myline COTTANCE, Sébastien NAZEER, Lionel ROUSSEAU, Gaëlle LISSORGUES (ESIEE, Noisy-le-Grand - France), Alexandre BONGRAIN, Raphaël KIRAN, Emmanuel SCORSONE, Philippe BERGONZO (CEA LIST, Gif-sur-Yvette - France), Amel BENDALI, Serge PICAUD (Inserm/UPMC, Paris - France), Sébastien JOUCLA, Blaise YVERT (U. de Bordeaux/INCLIA, Talence - France)

15:10

### Protein preconcentration using nanofissures generated by nanoparticle-facilitaed electric breakdown at the junction gaps

Chun-Ping JEN, Chen-Chi KUO, Pei-Ju CHIANG (National Chung Cheng U. - Taiwan)

15:30-16:00

Break

# NOTES

16:00-18:20

## Session C2: MODELING AND CHARACTERIZATION

● Chair: Souhil MEGHERBI, Univ. Paris Sud - France

### 16:00 Characterization of temperature effects on single-photon avalanche diodes fabricated in a HV-CMOS conventional technology

Eva VILELLA-FIGUERAS, Oscar ALONSO, Andreu MONTIEL, Angel DIEGUEZ (U. of Barcelona - Spain)

### 16:20 DRIE process modelling – a MEMS case study on a real design

Julien PAGAZANI, Frédéric MARTY, Gaëlle LISSORGUES, (ESIEE, Noisy-le-Grand - France), Artem BABAYAN, Andreas HOESSINGER, Ahmed NEJIM (Silvaco Europe Cambridgeshire - UK)

### 16:40 Energy harvesting from human motion with piezo fibers for the body monitoring by MEMS sensors

Giorgio De PASQUALE, A. SOMA (Politecnico di Torino - Italy)

### 17:00 Active control of effective mass, damping, and stiffness of MEMS

Jason CLARK, Shehrin SAYED (Purdue U., West Lafayette - USA)

### 17:20 Minimizing the variation in performance by optimizing the design parameters

Xing JIN, Jason CLARK (Purdue U., West Lafayette - USA)

### 17:40 Modeling of chemical mechanical polishing processes by cellular automata and finite element/matlab integration methods

Kuo-Shen CHEN, Shang-Lun WU (National Cheng-Kung U. - Taiwan)

### 18:00 High performance nanopillars array silicon solar cells

Pushpa Raj PUDASAINI, Arturo AYON (U. of Texas at San Antonio - USA)

16:00-18:20

## Session T2: MATERIALS AND MANUFACTURING

● Chair: Henri CAMON, LAAS, Toulouse - France

### 16:00 Suspended integration of pyrolytic carbon membrane on C-MEMS

Shuang XI, Tielin SHI, Hu LONG, Liangliang XU, Zirong TANG (Huazhong U. of Science and Technology - China)

### 16:20 MEMS 3-axis inertial sensor process

Sophia DEMPWOLE, Roy KNECHTEL (X-FAB Semiconductor Foundries, Erfurt - Germany)

### 16:40 A novel fabrication method of tapered-cone microneedle for drug delivery by using the microlens mask and UV contact printing

Tsung Hung LIN, Ching-Kong CHAO (National Taiwan U. of Science and Technology - Taiwan)

### 17:00 Synthesis of Sn nanoparticles and its size effect on melting point

Yang JU, Takafumi TASAKA, Hayato YAMAUCHI, Tomoki NAKAGAWA (Nagoya U. - Japan)

### 17:20 Fabrication of AFM probe with CuO nanowire formed by stress-induced method

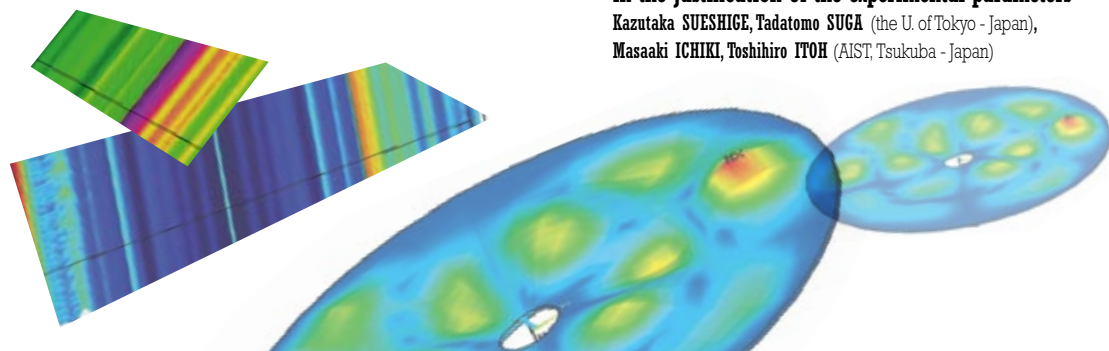
Atsushi HOSOI, Hisataka KOTO, Yang JU (Nagoya U. - Japan)

### 17:40 Development of TSV interposer with 300mm wafer for 3D packaging

Seiichi YOSHIMI (NMEMS Technology Research Organization, Ibaraki-ken - Japan), Koji FUJIMOTO, Miyuki AKAZAWA, Hidenobu MATSUMOTO, Hiroshi MAWATARI, Kousuke SUZUKI (Dai Nippon Printing, Chiba-ken - Japan), Toshihiro ITOH (AIST, Tsukuba - Japan), Ryutaro MAEDA (UMEMSME/AIST Tsukuba - Japan)

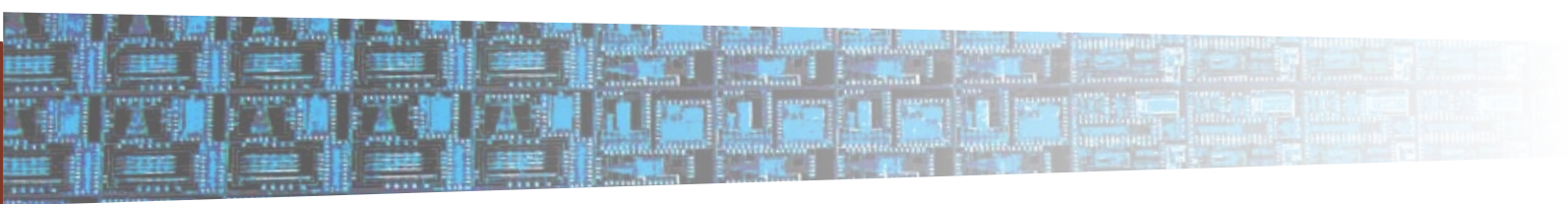
### 18:00 Preparation and characterization of the ferroelectric thin films based on the statistical analysis in the justification of the experimental parameters

Kazutaka SUESHIGE, Tadatomo SUGA (the U. of Tokyo - Japan), Masaaki ICHIKI, Toshihiro ITOH (AIST, Tsukuba - Japan)





# WEDNESDAY 17 APRIL



## 09:00-10:00

### Session C3: MICROFLUIDICS

● **Chair:** Andrew RICHARDSON, Lancaster U. - UK

**09:00** Operation placement for application-specific digital microfluidic biochips

Mirela ALISTAR, Paul POP, Jan MADSEN (Denmark Technical U., Lyngby - Denmark)

**09:20** Modeling and simulation framework for flow-based microfluidic biochips

Morten FOGED SCHMIDT, Wajid HASSAN MINHASS, Paul POP, Jan MADSEN (Denmark Technical U., Lyngby - Denmark)

**09:40** Performance evaluation of PEMC liquid level detection sensors subjected to temperature variation

Amir Abbas KASHI, Mahdi ZAMANI, Mahnaz SHAMSHIRSAZ

(Amirkabir U. of Technology Tehran - Iran)

## 10:00-10:40 Invited talk 2

### MEMS TACTILE SENSORS FOR ROBOTS

Isao SHIMOYAMA, The U. of Tokyo - JAPAN ● **Chair:** Toshihiro ITOH, AIST, Tsukuba - JAPAN

## 10:40-11:10 Coffee break

## 11:10-12:10

### Session C4: RF MEMS

● **Chair:** Hisham HADDARA, Si-Ware Systems, Cairo - Egypt

**11:10** A novel approach to RF MEMS device - and system-level simulation based on MEMS+ and matlab-simulink

Julien PAGAZANI, Gaelle LISSORGUES (ESIEE, Noisy-le-Grand - France), Alexandre MEHDAOUI, Gerold SCHROEPFER (Coventor, Villebon sur Yvette - France)

**11:30** An analytic approach for the synthesis of RF MEMS capacitive switches

Giancarlo BARTOLUCCI, Giorgio DE ANGELIS, Andrea LUCIBELLO, Romolo MARCELLI, Emanuela PROIETTI (U. of Roma "Tor Vergata" / CNR-IMM Roma - Italy)

**11:50** Reliability of RF MEMS capacitive and ohmic switches for space redundancy configurations

Andrea LUCIBELLO, Romolo MARCELLI, Emanuela PROIETTI (CNR-IMM Roma - Italy), Giancarlo BARTOLUCCI (U. of Roma "Tor Vergata" and CNR-IMM Roma - Italy), Viviana MULLONI, Benno MARGESIN (Fondazione B. Kessler, Trento - Italy)

## 09:00-10:00

### Session T3: TEST AND RELIABILITY

● **Chair:** Marta RENCZ, BUTE, Budapest - Hungary

**09:00** Reliability of a typical TSV structure with thermal bias

Ben-Je LWO, Kuo-Hao TSENG (National Defense U. - Taiwan),

Kun-Fu TSENG (Asia-Pacific Institute of Creativity - Taiwan)

**09:20** A robust repair-aware test method for multi-memory

Gang WANG (Institute of Computing Technology, Chinese Academy of Sciences - China)

**09:40** A novel robust repair-aware test flow and methods for multi-memory

Gang WANG, Yuan XUE (Inst of Computing Tech./Chinese Academy of Sciences - China)

## 11:10-12:30

### Session T4: CHARACTERIZATION

● **Chair:** Francis PRESSECQ, CNES, Toulouse - France

**11:10** The effect of sensing area position on the mechanical response of mass – detecting cantilever sensor

Marius PUSTAN, Cristian DUDESCU, Corina BIRLEANU (TU. of Cluj-Napoca - Romania)

**11:30** Characterization of an all polymer piezoelectric film using a reel-to-reel continuous fiber process

Takahiro YAMASHITA (Macro BEANS Center, Tsukuba - Japan), Seiichi TAKAMATSU, Takeshi KOBAYASHI, Toshihiro ITOH (AIST, Tsukuba - Japan)

**11:50** Characterization of the piezoelectric power generation of PZT ceramics under mechanical force

Shohei YAMAGISHI (Tokyo City U. - Japan), Shigeru FUJIMOTO (Tokyo City U. - Japan), Masaaki ICHIKI (UMEMSME/ AIST, Ibaraki - Japan), Tokio KITAHARA (Shonan Inst. of Tech., Kanagawa - Japan), Takeshi MORITA (The Univ. of Tokyo, Chiba - Japan)

**12:10** Investigation of nonlinear thermal parameters of compound semiconductor devices

Zoltan SARKANY, Marta RENCZ (Budapest U. of Technology and Economics - Hungary)

## 12:30-14:00

## 14:00-16:00

## Lunch

### Special session on RELIABILITY CRITERIA IN MEMS/NEMS DESIGN,

### MANUFACTURING AND TEST

● **Chairs:** Romolo MARCELLI, CNR-IMM Roma - Italy

## 14:00

**RF-MEMS switch design optimization for long-term reliability**

Viviana MULLONI, Francesco SOLAZZI, Giuseppe RESTA, Flavio GIACOMOZZI, Benno MARGESIN (Fondazione B. Kessler, Trento - Italy)

## 14:20

**Fabrication of large area sub-wavelength structure for anti-reflection and self-cleaning optical plate**

Cheng-Hsin CHUANG, Wen-Yu LEE, Feng-Fu CHUANG (Southern Taiwan U. of Science and Technology - Tainan - Taiwan)

## 14:40

**Design and Simulation of a 1.78GHz CMOS MEMS oscillator based on MEMS SAW resonator**

Fei LIU, Ioana VOICULESCU (City College of New York - USA), Anis Nurashikin NORDIN (International Islamic U. - Malaysia)

## 15:00

**Model and measurement technique for temperature dependent electrothermal parameters of microbolometer structures**

Fabian UTERMOEHLEN, Ingo HERRMANN (Robert Bosch GmbH, Gerlingen-Schillerhoehe - Germany)

## 15:20

**Imaging and reliability of capacitive RF MEMS switches in III/V technology**

Anna PERSANO, Fabio QUARANTA, Pietro SICILIANO, Adriano COLA (IMM-CNR, Lecce - Italy), Augusto TAZZOLI (U. of Padova, Padova - Italy / Carnegie Mellon U., Pittsburgh - USA), Gaudenzio MENEGHESIO (U. of Padova, Padova - Italy / IUNET, Bologna - Italy)

## 15:40

**MEMS for space: the real story...**

Laurent MARCHAND (European Space Agency - France)

## 16:00-20:00

## 20:00

## Free Time

## Dinner



A dinner will be served for a memorable evening, in the Restaurant El Tunel del Port in beautiful surroundings and in a unique atmosphere with views of the beaches and Olympic Port. The Olympic harbor is one of the areas that attracts most tourists the night. So participants may stay there after dinner to enjoy the atmosphere of Barcelona.

THURS  
DAY 18

APRIL

08:30-09:00

Coffee break

09:00-10:40

### Session C5: MEMS ACCELEROMETERS

● **Chair:** Peter SCHNEIDER, Fraunhofer IIS/EAS, Dresden - Germany

**09:00** Lattice structure for a critically damped high-G MEMS accelerometer

Leonardo BALDASARRE, Alessandro TOCCHIO, Mikel AZPEITIA URQUIA, Sarah ZERBINI (STMicronics, Cornaredo - Italy)

**09:20** Sensitivity modeling of dual-axis CMOS MEMS convective accelerometers using fem and spherical model

Brahim MEZGHANI, Fares TOUNSI, Mohamed MASMOUDI (ENIS, Sfax - Tunisia)

**09:40** Nondestructive diagnosis of mechanical misalignments in dual axis accelerometers

Alvaro GOMEZ-PAU, Luz BALADO, Joan FIGUERAS (UPC Barcelona - Spain)

**10:00** Design of a monolithic 3-axis thermal convective accelerometer

Huy Binh NGUYEN, Frédéric MAILLY, Laurent LATORRE, Pascal NOUET (LIRMM/U. Montpellier II - France)

**10:20** Self-test and self-calibration of a MEMS convective accelerometer

Ahmed Amine REKIK, Florence AZAIS, Frédéric MAILLY, Pascal NOUET (LIRMM/U. Montpellier II - France), Ahmed Amine REKIK, Mohamed MASMOUDI (ENIS/U. of Sfax - Tunisia)

09:00-10:40

### Session T5: DEVICES AND COMPONENTS

● **Chair:** Aurelio SOMÀ, Politecnico di Torino - Italy

**09:00** Design and optimization of a novel bistable power generator for autonomous sensor nodes

Weiqun LIU, Adrien BADEL, Fabien FORMOSA, Yipeng WU, Amen AGBOSSOU (Lab SYMME/U. de Savoie-LOCIE, Annecy le Vieux - France)

Amen AGBOSSOU (Lab LOCIE/U. de Savoie-LOCIE, Annecy le Vieux - France)

**09:20** A multi-channel integrated readout circuit chip for small capacitance sensors

Xiang HE, Theodore A. FRITZ, Ronald W. KNEPPER, Anton MAVRETIC (Boston U. - USA)

**09:40** Synchronized oscillation in micro-mechanically coupled oscillator system: part II - non-synchronized super harmonic oscillation

Mamoru NAKAJIMA, Dong F. WANG, Takumi ITOH (Ibaraki U., Hitachi, Ibaraki - Japan), Dong F. WANG, Tsuyoshi IKEHARA, Ryutaro MAEDA (UMEMSME/AIST, Ibaraki - Japan)

**10:00** Thermal matching designed CMOS MEMS-based thermoelectric generator for naturally cooling condition

Xiao YU, Yanxiang LIU, Hong ZHOU, Yi WANG, Tie LI, Xinli GAO, Fei FENG, Yuelin WANG (SIMIT, Shanghai - China)

**10:20** New electro-thermally actuated micromanipulator with optimized design and FEM simulations analyses

Rodica-Cristina VOICU, Raluca MULLER (IMT Bucharest - Romania)

10:40-11:10

Coffee break

11:10-12:50

### Session T6: PROCESS INTEGRATION

● **Chair:** Pascal NOUET, LIRMM, Montpellier - France

**11:10** Growth and characterization of anodized aluminum oxide thin film on paper-based substrate  
Mamadou BALDE, Fabien BIBI, Benoit CHARLOT, Philippe COMBETTE, Brice SORLI (IES/U. Montpellier II - France)

**11:30** IC design of an adaptive high-voltage electrostatic vibration energy harvester

Andrii DUDKA, Dimitri GALAYKO (LIP6/UPMC, Noisy-le-Grand - France), Philip BASSET (ESYCOM/ESIEE, Noisy-le-Grand - France)

**11:50** Novel 3-dimensional integration technique of chip-on-wafer (COW) for MEMS applications

Koji FUJIMOTO, Seiichi YOSHIMI, Nobuhide MAEDA, Shoichi KODAMA, Young Suk KIM, Hideki KITADA, Yoriko MIZUSHIMA, Takayuki OHBA (The U. of Tokyo - Japan), Tomoji NAKAMURA, (Fujitsu Lab., Kanagawa - Japan), Koji FUJIMOTO, Seiichi YOSHIMI, Kousuke SUZUKI, (Dai Nippon Printing, Chiba - Japan)

**12:10** Using proximity exposure to produce asymmetrical lens for light control films

Tung-Yu CHANG, Chien-Hsin HUNG, Zhen-Jie LIAN, Hsiharng YANG (National Chung Hsing U., Taichung - Taiwan)

**12:30** Development and process optimization of C2W self-alignment and temporary bonding system

Yuta NAKANO, Masanori HAYASE (Tokyo U. of Science - Japan), Jian LU, Hideki TAKAGI, Ryutaro MAEDA (UMEMSME/AIST, Tsukuba - Japan)

11:10-13:10

### Session T7: ASSEMBLY AND PACKAGING

● **Chair:** Alain BOSSEBOEUF, IEF, Paris-Orsay - France

**11:10** Assembly of super compact wireless sensor nodes for environmental monitoring applications

Jian LU, Hironao OKADA, Toshihiro ITOH (AIST, Tsukuba - Japan), Takeshi HARADA (NMEMS Technology Research Organization, Ibaraki - Japan), Ryutaro MAEDA (UMEMSME/AIST, Tsukuba - Japan)

**11:30** Solder paste for highly dissipative power electronic assemblies

Kateryna KIRYUKHINA, Frederic COURTADE, Sophie DAREYS (CNES, Toulouse - France/Vietnam National University-HoChiMinh City - Viet Nam), Hoa LE TRONG, Philippe TAILHADES, Jacques LACAZE (CIRIMAT, Toulouse - France), Olivier VENDIER, Lidwine RAYNAUD (Thales Alenia Space, Toulouse - France)

**11:50** Miniaturization of the packaging for an implantable heart monitoring device

Anh-Tuan NGUYEN, Fjodor TJULKINS, Knut E. AASMUNDTVEIT, Nils HOIVIK, Lars HOFF, Kristin IMENES (IMST/Vestfold University College, Tønsberg - Norway)

**12:10** Characterization of bonding interface prepared by room temperature bonding after flattening by thermal imprint process

Yuichi KURASHIMA, Atsuhiko MAEDA, Hideki TAKAGI (UMEMSME/AIST, Tsukuba - Japan)

**12:30** RF-MEMS devices packaging by using quartz caps and epoxy polymer sealing rings

Flavio GIACOMOZZI, Viviana MULLONI, Sabrina COLPO, Alessandro FAES, Guido SORDO, Stefano GIRARDI (Fondazione Bruno Kessler, Trento - Italy)

**12:50** Variable focus liquid lens module using direct current electromagnetic driving

Yi-Chun LEE, Hsiharng YANG (National Chung Hsing U., Taichung - Taiwan), Wang-Lin LIU (Precision Machinery Research Develpt Center Taichung - Taiwan)

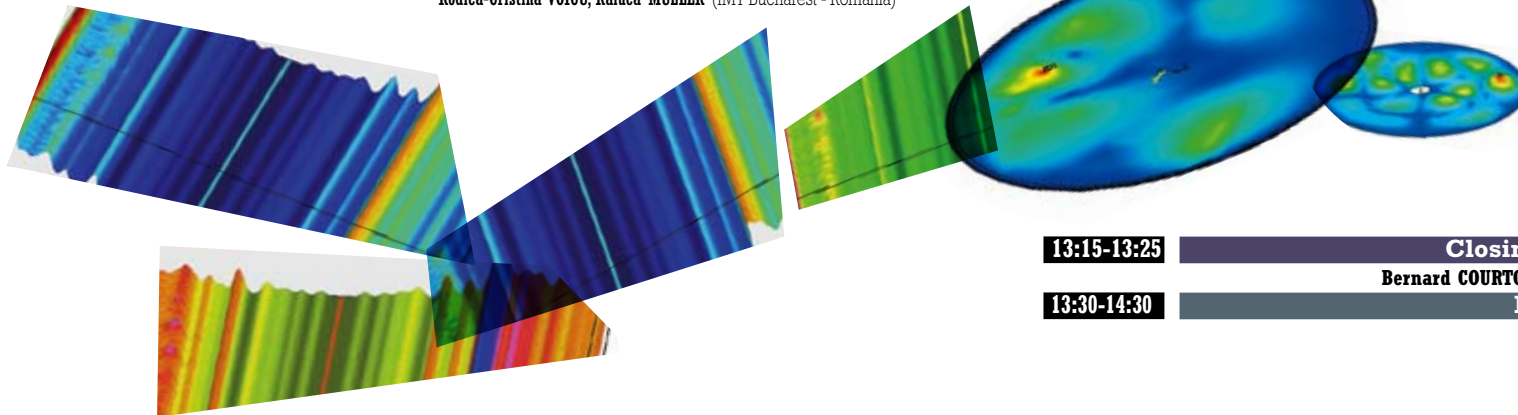
13:15-13:25

Closing remarks

Bernard COURTOIS, CMP, Grenoble - France

13:30-14:30

Lunch





# ATA GLANCE

## TUESDAY 16 APRIL 2013

08:00-08:50 Registration - Welcome coffee

08:50-09:00 Opening Session

Bernard COURTOIS, CMP, Grenoble - France

09:00-09:40 INVITED TALK 1

**ELECTROMAGNETIC PHENOMENA: CONTROL OF MAGNETIC PROPERTIES VIA ELECTRICAL INPUT**

Melanie W. COLE, US Army Research Lab - USA

Chair: Arturo AYON, U. of Texas at San Antonio - USA

09:40-10:00 Coffee break

10:00-11:40 **SESSION C1**  
**MEMS DEVICES AND COMPONENTS**

Chair: Jean-Michel KARAM

MEMSCAP, Bernin - France

10:00-12:00 **SESSION T1**  
**SENSORS**

Chair: Benoit CHARLOT

IES, Montpellier - France

12:00-13:30 Lunch

13:30-15:30 **Special Session on**  
**IN-VITRO DIAGNOSTIC DEVICE**

Chairs: Erik JUNG, FhG IZM, Berlin - Germany  
and Gou-Jen WANG, National ChungHsing U. - Taiwan

15:30-16:00 Break

16:00-18:20 **SESSION C2**  
**MODELING AND CHARACTERIZATION**

Chair: Souhil MECHEBBI

Univ Paris Sud - France

16:00-18:20 **SESSION T2**  
**MATERIALS AND MANUFACTURING**

Chair: Henri CAMON

LAAS, Toulouse - France

## WEDNESDAY 17 APRIL 2013

09:00-10:00 **SESSION C3**

**MICROFLUIDICS**

Chair: Andrew RICHARDSON

Lancaster U. - UK

09:00-10:00 **SESSION T3**

**TEST AND RELIABILITY**

Chair: Marta RENCZ

BUTE, Budapest - Hungary

10:00-11:40 **INVITED TALK 2**

**MEMS TACTILE SENSORS FOR ROBOTS**

ISAO SHIMOYAMA, The U. of Tokyo - Japan

Chair: Toshihiro ITOH, AIST, Tsukuba - Japan

10:40-11:10 Coffee break

11:10-12:10 **SESSION C4**

**RF MEMS**

Chair: Hisham HADDARA

Si-Ware Systems, Cairo - Egypt

11:10-12:30 **SESSION T4**

**CHARACTERIZATION**

Chair: Francis PRESSECQ

CNES, Toulouse - France

12:30-14:00 Lunch

14:00-16:00 **Special Session on RELIABILITY**

**CRITERIA IN MEMS/NEMS NEMS**

**DESIGN, MANUFACTURING AND TEST**

Chair: Romolo MARCELLI, CNR-IMM Roma - Italy

16:00 Free time

20:00-22:00 A dinner will be served in the Restaurant

El Tunel del Port in beautiful surroundings and in a unique atmosphere with views of the beaches and Olympic Port.

## THURSDAY 18 APRIL 2013

08:30-09:00 Coffee

09:00-10:40 **SESSION C5**

**MEMS**

**ACCELEROMETERS**

Chair: Peter SCHNEIDER

Fraunhofer IIS/EAS, Dresden - Germany

09:00-10:40 **SESSION T5**

**DEVICES**

**AND COMPONENTS**

Chair: Aurelio SOMÀ

Politecnico di Torino - Italy

10:40-11:10 Coffee break

11:10-12:50 **SESSION T6**

**PROCESS**

**INTEGRATION**

Chair: Pascal NOUET

LRMM, Montpellier - France

11:10-13:10 **SESSION T7**

**ASSEMBLY**

**AND PACKAGING**

Chair: Alain BOSSEBOEUF

IEF, Paris-Orsay - France

13:15-13:25 **Closing remarks**

Bernard COURTOIS, CMP, Grenoble - France

13:30-14:30 Lunch