

**1st Day Program: 9<sup>th</sup> April, 2014**      **Course chair: Cosmin Moisa, Continental**  
**Course site: Continental Automotive Romania SRL,**  
**Siemens Street, Timisoara, 300701, Romania**

13:00-13:15    **Introduction**

13.15-14.45    **Nanotechnology – novel devices, applications and trends**  
Presentation of an invited renowned scientist

János Mizsei: „Electronics, microelectronics, nanoelectronics, ...”

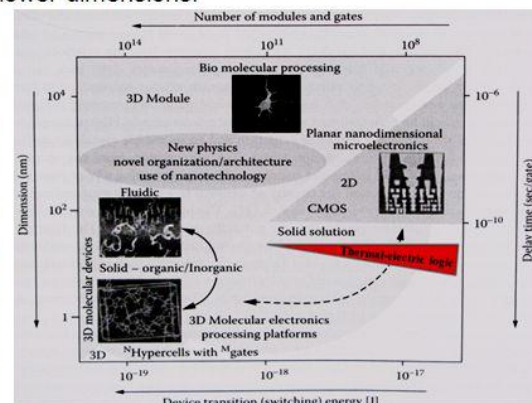


*János Mizsei*  
CSc, PhD, DSc  
Professor  
Head of the Semi-conductor Laboratory  
Department of Electron Devices  
Budapest University of Technology and Economics  
[www.eet.bme.hu/staff/run/en/id/mizsei](http://www.eet.bme.hu/staff/run/en/id/mizsei)

#### Abstract

Until now, the continuous development of electronics has been characterized by Moore's law. The scale down resulted in the nanosized CMOS integrated circuits, pushing the “red brick wall” towards the lower dimensions.

On the other hand, there are many new ideas for building atomic or molecular scale devices for the information technology. However, there is still a gap between the up-to-date “top-down” CMOS technology and the “bottom-up” devices, i.e. molecular electronics, nanotubes, single electron transistors. The new thermal-electric device (phonsistor) and the CMOS compatible thermal-electric logic circuit (TELC) may help to fill this gap.



14.45-15.00 Coffee break

15.00-16.15    **Presentations about nanotechnology equipment development**  
Presentation of an industrial expert from Raith, Germany

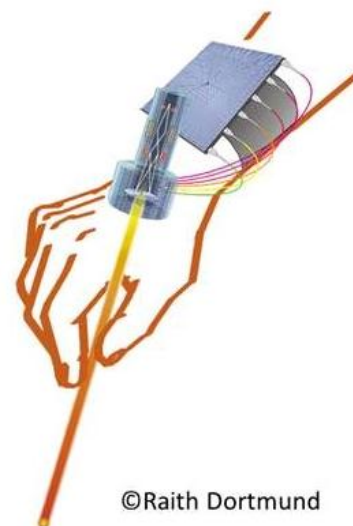
Martin Kirchner: “Instrumentation and processing with electron and ion beam lithography”



*Martin Kirchner*  
Sales Director New Markets  
Raith GmbH  
Dortmund/Germany

#### Abstract:

Electron and ion beam lithography are enabling technologies for research and development in many fields of nano technology. The presentation reviews the basics of both technologies. Emphasis is given on instrumentation and processing which is useful in academic or industrial research and in small batch production. Application results from recent years are presented stemming from various disciplines including Electronics and Photonics.



©Raith Dortmund

**Figure symbolizes a focused charged particle beam structuring substrates at nano scale.**

The presenter is with Raith, a high tech company headquartered in Dortmund, Germany. Since two decades Raith instruments are extensively used within the nano fabrication and nano engineering community. Raith made conventional electron beam lithography accessible to a broad research community worldwide. In February 2013 Raith acquired Vistec Lithography who is known for more than 40 years of experience in the field of electron beam lithography under the brands of Philips, Cambridge Instruments and Leica.

## 16.15-17.15 **Applications of nanotechnology** Presentation of a young East European scientist

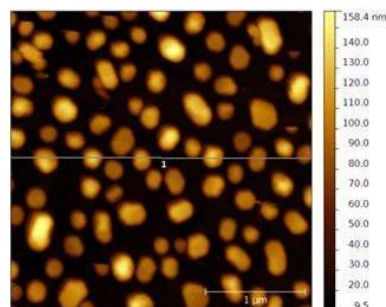
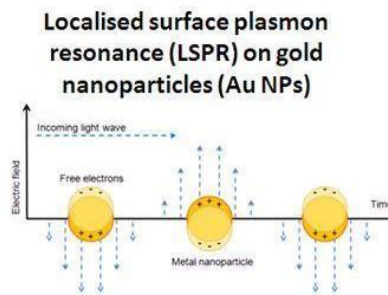
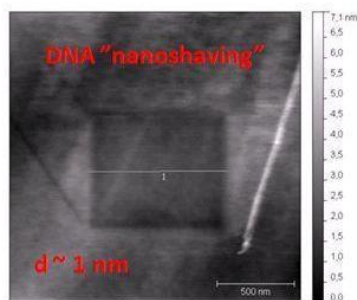
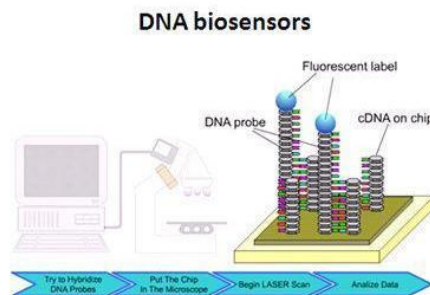
Attila Bonyár: "Enhancing Biosensors with Nanotechnology"

### Abstract

Biosensors applying nanoscale biomaterials such as DNA molecules as sensing elements possess great potential in the fields of disease diagnostics, environment monitoring or in pathogen detection. The optimization of sensor properties (such as sensitivity or limit of detection) is a constant challenge in this multi-disciplinary field. Signal amplification methods, including the application of nano-materials or nano-patterned surfaces for surface plasmon resonance imaging (SPRI); and novel atomic force microscopy (AFM) based nanotechnology tools and investigation methods are in the focus of this presentation.



Attila Bonyár  
Assistant Professor  
Department of  
Electronics  
Technology,  
Budapest University  
of Technology and  
Economics



17.15-17.30 **Problem solving discussion** – with the participation of the invited scientists, local professors, the industrial expert and the EuroTraining delegates.

**2nd Day Program: morning, 10<sup>th</sup> April, 2014** Visit host: **Cosmin Moisa, Continental**  
Course site: **Continental Automotive Romania SRL,**  
**Siemens Street, Timisoara, 300701, Romania**

10:00–13:00 **Practical demonstration:**  
Visit to Continental Automotive Romania

13:00–14:15 Lunch break

**2nd Day Program: afternoon, 10<sup>th</sup> April, 2014** Course chair: **Prof. Aurel Gontean**  
**Joint program with the TIE 2014 Workshop**  
Course site: **Politehnica University of Timisoara,**  
**300006 Timisoara, Pta Victoriei No 2, 1st Floor, Senate Room, Romania**

14.15-14.30 **Welcome from universities:**  
Prof. Marius Oteșteanu, Ph.D., Vice-rector for Scientific Research and External Relations, "Politehnica" University of Timișoara, Romania  
**Welcome from industries:**  
Prof. Dr. h. c. Christian von Albrichsfeld, Ph.D., Continental, Romania  
**Welcome from TIE technical workshop:**  
Prof. Dr.h.c. Paul Svasta, Ph.D., Politehnica University of Bucharest, Romania



14.30-16.30 **First Session: Electronic Module Value Chain – Session chairs:**  
 Prof. Dan Pitică, Ph.D., Technical University of Cluj-Napoca, Romania  
 Detlef Bonfert, Ph.D., Fraunhofer EMFT, Munich, Germany

14.30-15.10 **Current research results**

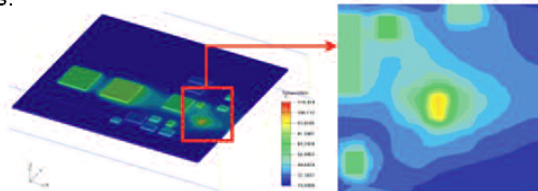
Alain Michel: „The role of simulation in high performance electronic design”



Alain Michel  
 Business  
 Development  
 Manager  
 Electronics, Europe  
 ANSYS, Inc.

**Abstract:** We are in the midst of an electronics-centered innovation boom that has transformed the way we communicate, work, learn and entertain. No product is exempt from these improvements. It is obvious that these devices are affecting the quality of our lives. What is not so apparent is how interconnected products have become and how they impact our safety. This presentation explores the factors behind the electronics explosion and the role of simulation in product design. Innovation is the result of a well thought-out design process, one that incorporates a radical shift in attitude to make engineering simulation an integral part of the process.

Chip size reduction and speed improvements together result in power densities that can create hot spots on the chip and in the surrounding PCB circuitry. Figure shows how simulation is used to identify the hot spots.



15.10-15.50 **Current research results**

Bálint Medgyes “Dendrites: Secret Pests in the Microelectronics,,

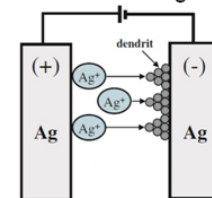


Bálint Medgyes  
 Assistant Lecturer at  
 Budapest University  
 of Technology and  
 Economics  
 Electrical Engineer,  
 MSc,  
 Engineer-economist

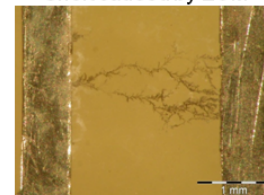
**Abstract**

Nowadays, because of the keen competition in the electronic industry, customer requirements must be ranked to the first place. Therefore, it has increased importance to ensure the reliability and quality of electrical devices next to the cost effective technologies. Depending on the applications, the requirements of the customers are different, but all of them would like to know whether the life-time, quality and reliability of the device meet costumers' requirements. My research field is focused on the electrochemical migration (ECM) phenomenon, with the universal aim, to improve higher reliability related to microelectronics.

**Electrochemical migration**



Short caused by ECM



15.50-16.30 **Current research results**

Alexander Neufeld: “Smart electronics in home appliances,,



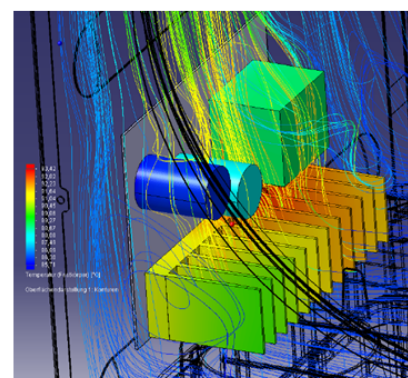
Alexander Neufeld,  
 Dipl.-Ing.  
 Sensors, Drives &  
 Semiconductors  
 Miele & Cie. KG &  
 Werk Electronic,  
 Gütersloh, Germany

**Abstract**

Electronics is an indispensable part of today's domestic appliances. Modern simulation tools open up possibilities to effective and target orientated development of electronics. Thermal simulation of heat sinks (see figure) and other components is used as an outstanding example of modern engineering. Thermal simulation allows us to test a variety of different versions, without time-consuming and costly prototypes.

An important ambition in Miele development is the life-time of twenty years for its products. The simulation of life-time is only partially possible, so lots of efforts and time consuming tests are necessary to guarantee perfect results.

**Thermal simulation of heat sink behavior**



16.30-17.00 **Networking Break**

17.00-19.00 **Second Session: Design for Manufacturing – Session chairs:**  
 Prof. Aurel-Ștefan Gontean, Ph.D., Politehnica University of Timișoara, Romania  
 Hartmut Hohaus, General Manager, Miele Tehnica SRL

17.00-17.40 **Current research results**

Zsolt Illyefalvi-Vitéz: "Life-time Prediction of Soldered Joints,,

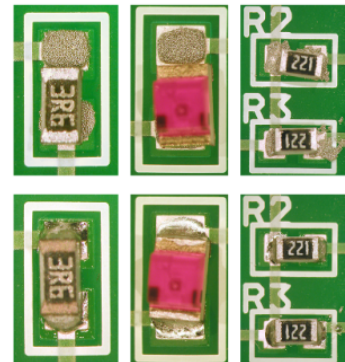


Zsolt Illyefalvi-Vitéz  
 Professor, Ph.D., Dr.h.c.  
 Department of  
 Electronics Technology  
 Budapest University of  
 Technology and  
 Economics

**Abstract**

Study, modeling, investigation and comparison of reliability tests and failure mechanisms of micro-electronic packages soldered on laminate substrates are presented. The study is focusing on the principles of accelerated test methods, including standardized, conventional and new ones. Combined life-time test regimes are investigated that provide a better simulation of the real life conditions. In particular the effects of the lead-free reflow process and the self-alignment ability on the quality and life-time of soldered joints are investigated and evaluated. The effect of the reduced solder paste amount to the process robustness and the reliability is also tested.

The effect of self alignment:  
 photos before and after soldering



17.40-18.20 **Current research results**

Ioan Plotog: "DFM Concept integrated in the predicted Life Cycle of a New Product,,



Ioan Plotog, PhD  
 Associate Professor  
 Politehnica University  
 of Bucharest  
 Executive Director  
 CETTI-ITA

**Abstract**

Today the trend is a larger integration on PCB for different types of devices, from small to medium power in order to create new electronic products in short time, at lower manufacturing costs. Life Cycle prediction and Electromagnetic Compatibility (EMC) are major problems for all electronic systems, especially for Systems On Boards operating at high frequency. Designers should consider the use of collaborative, conceptual analysis-based simulations early in the design process to identify and fix the problems and achieve lower cost. According to Design for Manufacturing (DFM) concept, a successful design assures all requirements for the PCB, the assembling technology and finally for the system according to international standards and directives.

DFM and total quality concept actions



18.20-19.00 **Current research results**

Balázs Illés „Nano-characterization in tin whisker research”

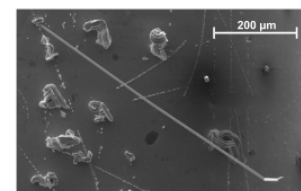


Balázs Illés  
 Associate professor  
 at  
 Budapest University  
 of Technology and  
 Economics  
 Electrical Engineer,  
 Ph.D

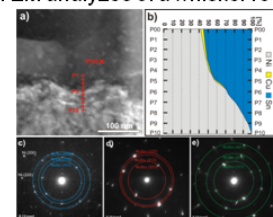
**Abstract**

Since the implementation of the European Union's Restriction of Hazardous Substances regulation, pure tin coatings have been used by the electronics industry in order to replace the traditional Sn/Pb. Unfortunately, tin coatings has a high risk of developing tin whiskers on its surface. Tin whisker can cause short circuits in fine pitch electronics and this phenomenon decreases the reliability of our appliances. Discover how nano-characterization methods – such as transmission electron microscopy or selected area electron diffraction – are becoming more and more important in today's tin whisker researches in order to find the root causes of whisker growth.

Tin whiskers



TEM analyzes of a whisker root



19:00–19:30 **Farewell coffee with discussion and course evaluation**

The **participation** in the two-day course **is free** of charge.

**Please register** by downloading and filling the registration form from the following link:

<http://www.ett.bme.hu/eurotraining> and sending it back to any of the contact persons below.

**Further information / contact persons:**

Dr. Olivér Krammer ([krammer@ett.bme.hu](mailto:krammer@ett.bme.hu) tel: +36 1 4632755)

Dr. Zsolt Illyefalvi-Vitez ([illye@ett.bme.hu](mailto:illye@ett.bme.hu) tel: +36 1 4632753)

Budapest University of Technology and Economics,

Department of Electronics Technology, Hungary