

## Invited Talk 1:

### **RF MEMS for Commercial and Defense Applications**

**Gabriel M. Rebeiz**

Professor of Electrical Engineering and Computer Science  
The University of Michigan, Ann Arbor  
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The development of RF MEMS switches and varactors has accelerated considerably over the past several years, and currently there are several switches which have been tested to 10-100 billion cycles with no failures. However, it is still hard to package these devices and fundamental questions regarding the need of a hermetic package and the failure modes of RF MEMS switches under medium to high-power conditions are not well understood. The talk will present the latest work in RF MEMS switches, and an honest assessment of their potential applications and pitfalls. Examples of high-isolation switch networks, phase shifters, reconfigurable networks and tunable filter circuits from 1 GHz to 100 GHz will be presented. An important aspect of RF MEMS is their amazing linearity, and the talk will also present modeling on the intermodulation distortion of MEMS devices and how they are 40-50 dB better than GaAs or Silicon devices. The talk will conclude with the challenges that still need to be solved in RF MEMS in order to make a viable product for commercial and defense applications

## Invited Talk 2

### **BioMEMS: Applications and Opportunities in the Life Sciences**

**Karan V.I.S. Kaler**

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The development/application of MEMS technology in the domain of the life sciences (BioMEMS), in recent years has attracted considerable world wide attention from both the industrial and research sectors of the industrial nations. Advances in development and utility of BioMEMS devices and systems are anticipated to be rapid and projected to

command a significant fraction of the MEMS market in the not to distant future. This presentation will explore the anticipated development of BioMEMS technology and it's potential impact in the application space of the life and biotechnology fields.

The second half of the presentation will focus on the development of a microsystem based genetic analysis platform that integrates dielectrophoresis (DEP), microfluidics, PCR and electrophoresis (EP) technology. The presentation will focus on the development and implementation of microchip based measurement tools and analysis methods to probe and interrogate and quantify the living intact biological systems such as cells or biomolecules.

### **Invited Talk 3**

## **Optical MEMS: Challenges and Opportunities**

**Paul Hagelin, Ph.D.,**

Director of MEMS Development,  
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Many optical MEMS products have failed due to design, manufacturing, and market barriers. In this talk, the challenges in the design and fabrication of optical micromirrors will be given from the perspective of a startup company. Wide-ranging applications of micromirrors are driving advancements in optical MEMS processes, wafer-scale packaging, testing, simulation, and electronics integration. Opportunities for design and process innovation exist because many large corporations are cutting back on internal research programs, and exciting design approaches were overlooked in a rush to market during the telecom boom. Our experience shows that multi-user processes at MEMS-only foundries lack a number of critical elements. We conclude that an experienced CMOS-based foundry is more likely to provide reliable production solutions despite the need for new process synthesis.

## Invited Talk 4

### **Integrated MEMS**

Mr. Bob Sulouff

Director of Business Development, Analog Devices Inc., Cambridge Massachusetts

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Microsystems are rapidly expanding into new fields of applications with mechanical and chemical functions being integrated with electronics. This presentation will describe the issues associated with integrating electronics with structures and materials for sensor, actuators and microsystems. The presentation will first give a description of the technology using examples from accelerometers and other products. The author will then describe the wide range of application areas and important challenges that are being addressed. The presentation will conclude with future trends in this field as size and function provide new products and business opportunities.