Manufacturing Science and Technology
Room 131 - Session MS-MoA

Manufacturing Technologies for the Information Industry
Moderator: M. Surendra, IBM T.J. Watson Research Center

2:00pm **MS-MoA1 Silicon on Insulator for 100 nm Generation System on Chip*, G. Shahidi,*** IBM Microelectronics Division **INVITED**

SOI CMOS has become a mainstream CMOS technology. In this paper, we will first give a brief overview of the key attributes and challenges of SOI CMOS. As we scale CMOS into 100 nm and beyond, SOI opens novel opportunities, where bulk CMOS is approaching its limits. We will review the extendibility of benefits of SOI (performance gain and floating body effects at 100 nm and beyond). SOI opens some very exciting opportunities in RF CMOS, low power, and other elements needed for system on chip. SOI CMOS is the technology to use when high performance, low power, and capability to easily integrate other needed elements for SOC, at CMOS generations beyond 100 nm.

2:40pm **MS-MoA3 Integrated Circuit Challenges for sub-100nm Generations*, M. Bohr,*** Intel Corp. **INVITED**

This talk will cover the challenges faced as transistors and interconnects are scaled to sub-100nm dimensions and review some of the device and material options being investigated to meet these challenges.

3:20pm **MS-MoA5 The Future for Storage Technology and Manufacturing*, M. Re,*** Read Rite Corp. **INVITED**

4:00pm **MS-MoA7 An Overview of Manufacturing Processes of Some Passive and Active Components for Fiberoptic Communication Networks*, N.A. O'Brien, S.P. Sapers,*** JDS Uniphase Corporation **INVITED**

The wide proliferation of the Internet in the mid 1990s has led to an exponential growth in bandwidth demand. The fiberoptic communications industry was faced with the option of installing more fiber and increasing the bit rate from 10 Gbit/sec in the existing communication systems by, time division multiplexing (TDM). In TDM systems, multiple signals of one wavelength are transmitted through a single fiber but are distinguished from each other by specific time intervals. That option was not economically viable. Wavelength division multiplexing (WDM) emerged as the new technology that increases the capacity of existing fiber by sending multiple (multiplexing) wavelengths down one fiber. The total bandwidth per fiber is the sum of the bit rate of each wavelength. Systems have been built with up to 128 wavelengths per fiber. There are several competing technologies that are employed for multiplexing and demultiplexing such as thin film interference filters, fiber Bragg gratings, and arrayed waveguide gratings. While WDM has kept up with the increase in bandwidth demand, fiberoptic communication systems still rely on optical-to-electrical conversion for switching purposes. This leads to inflexibility of the systems, increased maintenance, and high costs. There exists a great need to have an all-optical network. Recent developments in micro-electro mechanical systems (MEMS) provide a great promise towards making that a reality. MEMS are nanodevices. They are often likened to integrated circuits (ICs) due to similarities in size and manufacturing methods, except ICs route electrons and MEMS can route photons. WDM filter technology has matured and has become yesterdayâ€™s news, while MEMS applications remain in development stages but near commercialization. This presentation is structured to talk about WDM filter technologies and MEMS in the context of passive and active devices respectively, with emphasis on the manufacturing processes.

4:40pm **MS-MoA9 Scientific Challenges in Harnessing Molecules for Electronic Devices*, D.L. Allara,*** Pennsylvania State University **INVITED**

Recent work has shown that molecules are capable of functioning as electronic components such as resistors, diodes and switches. These fundamental properties, in principle, can lead to new generations of devices and computing machines. However, many fundamental challenges lie ahead as the implementation of these technologies begins. These challenges include issues of chemical assembly, lithographic scales and electrical contacts. These and other aspects will be presented and discussed from a broad point of view with an emphasis on the underpinning science that is needed to help enable process development.

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