2009 International Conference on Solid State Devices and Materials
=Workshop=
Green Technology -Nanodevices Toward Environmental-Friendly Society-

Date: October 6th (Tue), 2009

Workshop Location: Seminar room, COE building, 3F, Institute of Fluid Science, Tohoku University 2-1-1, Katahira, Aoba-ku, Sendai, Miyagi, 980-8577, Japan

Registration fee: General: ¥15,000, Student: ¥3,000
(Attendee of SSDM 2009 Short Course: General: ¥20,000, Student: ¥5,000)

Capacity: 100

Registration: Participants are required to register online at the conference web site http://www.ssdm.jp, in which the forms for workshop will be available from the beginning of June, 2009 to September 24th, 2009. After September 24th, please register onsite.

※All lectures are given in English.

Secretariat: c/o Inter Group Corp. Toranomon Takagi Bldg., 1-7-2 Nishishimbashi, Minato-ku, Tokyo 105-0003, Japan
TEL: 03-3597-1108/ FAX: 03-3597-1097/ E-mail: ssdm_secretariat@intergroup.co.jp

Organizers

Tetsuo Endoh(Tohoku University)/Takahiro Shinada (Waseda University)

The earth is currently going to face environmental issues due to global warming caused by greenhouse gases. There is a growing interest in "green technologies" for building a sustainable society by reducing environmental burdens. Technological innovation in various leading-edge technology fields will drive the environmental-friendly society. This workshop is focused on device technologies: photovoltaic cell for the application of solar energy; light-emitting diode (LED) illumination and low power integrated-circuit (IC) for low power operation; power devices for power management; and micro-system technology for energy saving, so as to contribute to green technology. These technologies will be presented by experts in the fields.

Program

12：30-13：15 Ultra-Low Power IC Technology Integrated with Innovative Materials

Prof. T. Hanyu, Tohoku University

Nonvolatile logic-in-memory architecture, where nonvolatile memory elements are distributed over a logic-circuit plane, is expected to realize both ultra-low-power and reduced interconnection delay. This paper presents a novel nonvolatile logic circuit based on logic-in-memory architecture using magnetic tunnel junctions (MTJs) in combination with MOS transistors. Since the MTJ with a spin-injection write capability is only one device that has all the following superior features as large resistance ratio, virtually unlimited endurance, fast read/write accessibility, scalability, complementary MOS (CMOS)-process compatibility, and nonvolatility, it is very suited to implement the MOS/MTJ-hybrid logic circuit with logic-in-memory architecture. A concrete nonvolatile logic-in-memory circuit is designed and fabricated using a 0.18-um CMOS/MTJ process, and its future prospects and issues are discussed.

13：15-14：00 Low Power Organic Light Emitting Devices

Prof. C. Adachi, Kyushu University

We review present status of organic light emitting diodes (OLEDs) and related technologies such as light-emitting FETs and organic laser diodes. Recently OLEDs realized not only ultimate internal electroluminescence (EL) efficiency of nearly 100% but also very low driving voltage less than 5V. We mention design rules of organic semiconductors useful for carrier transport and emitter layers and device structures to achieve high EL characteristics. Further, we discuss potential application of OLEDs for flexible flat panel display and lighting. Finally, we present future prospect of organic light emitting devices using more sophisticated morphologies of organic materials such as organic single crystals.

14：10-14：55　Low-Power 3D CMOS Integration

Prof. T. Kuroda, Keio University

Power dissipation for IC interconnection has been rapidly increasing. It can be reduced by stacking chips and connecting them by an emerging technology, namely wireless TSV. The wireless TSV based on inductive coupling exploits characteristics of an electro-magnetic wave in the near field, and exhibits comparable performance to TSV with much inexpensive cost. It enables staking of 64 NAND flash memory chips in a package to lower power dissipation of SSD. It also lowers power dissipation of high-speed DRAM interface significantly. This talk will cover recent research achievements of the wireless TSV for low-power 3D CMOS integration.

14：55-15：40　Advanced Photovoltaic Cell Technologies and Future Perspectives

Dr. M. Kondo, AIST

Solar photovoltaics are a promising pillar of carbon-free and sustainable energy sources. The important issue is reduction of power generation cost. The latest technologies to overcome the cost issue are overviewed and its future outlook is discussed in terms of novel materials and devices.

15：40-16：25　Leading-Edge Power Devices and Future Prospective

Dr. H. Ohashi, AIST

Importance of power electronics is officially accepted for the first time as a cross-cutting technology in the METI Cool Earth Energy Innovative Technology Plan. Leading-edge of power devices as a key component of the power electronics is still making big progress not only in wide-band gap semiconductor power devices, but also in silicon power devices. Technical trend of recent power devices will be reviewed by focusing on advanced IGBTs and MOSFETs as well as SiC and GaN power devices. Future prospective of the devices will be also discussed taking an impact of the device progress on future power electronics possibility in sight.

16：35-17：20　Micro-System Technologies for Energy Saving

Prof. M. Esashi, Tohoku University

The contribution of power electronics as IGBT for saving energy is large enough but MEMS (Micro Electro Mechanical Systems) have also great potential for the requirement of saving energy and preserving natural resources. MEMS are small but functional systems which are fabricated by micromachining based on semiconductor technologies. MEMS sensors plays important roles for the requirements and the MEMS based maintenance systems in narrow spaces can be used for these. MEMS can be produced in large volume with reduced cost. On the other hand small volume production is needed for many applications of MEMS. The technology for saving energy in the small volume production is required.