

# GENERAL INFORMATION

## DATE

Conference: September 22-24, 2010 (Official language is English)

Short Course: September 21, 2010 (in English)

## CONFERENCE VENUE

### The University of Tokyo

7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan

Phone +81-3-5841-6564 (from Sept. 21 to September 24)

[http://www.u-tokyo.ac.jp/index\\_e.html](http://www.u-tokyo.ac.jp/index_e.html)

SSDM 2010 will be held at Hongo campus, the main campus of the University of Tokyo. The conference rooms are distributed over the campus. For details, see the campus map on the conference website and in Page 66 of this booklet.

### Tokyo Dome Hotel

1-3-61 Koraku, Bunkyo-ku, Tokyo, 112-8562, Japan

Phone: +81-3-5805-2111 Fax: +81-3-5805-2200

<http://www.tokyodome-hotels.co.jp/e/index.html>

Special Plenary Session and Conference Reception will be held at Tokyo Dome Hotel. The hotel is located close to Korakuen station on Namboku line. This is the next station of Todaimae station. The access map from the University to the hotel is available on the conference web site and in Page 67.

## TECHNICAL SESSIONS AND EVENTS

### Oral and Poster Presentations:

The rooms for the technical sessions will be located in Faculty of Engineering Bldg. 2. The poster presentation will be held at Takeda Bldg., which is located in approximately 5 minutes walk from Faculty of Engineering Bldg. 2. See the campus map in Page 66.

### Plenary Sessions:

Plenary Session and Special Plenary Session are scheduled on September 22. Plenary Session will be held at Yasuda Auditorium in The University of Tokyo after the opening session. Special Plenary Session "A Half Century of Esaki Diode and Lasers" will be held at Tenku in Tokyo Dome Hotel from 17:00 on the same day. Short abstracts for Plenary and Special Plenary Talks are shown in Page 11.

### Conference Reception:

The conference reception will be held at Tokyo Dome Hotel on September 22, 18:30-20:00. The reception will start just after the Special Plenary Session in the next room. The reception is completely free of charge. Participants who register the conference are welcome to the reception. Drinks and appetizers will be served. During the reception, SSDM Young Researcher Award ceremony will be held.

### Rump Sessions:

SSDM 2010 is organizing two Rump Sessions, which will be held on September 23, 18:30-20:00 at Sanjo Conference Hall, The University of Tokyo. Details can be found on Page 12.

### Short Course:

On September 21, Short course lectures on "Si technology challenges in More Moore and More than Moore era" are arranged. When you are going to attend the course, you are requested to make a registration for short course, not for the conference itself. The scope and contents of the course are shown in Page 13.

### Award Ceremony:

Award Ceremony for SSDM Award and SSDM Paper Award will be held in the opening session, which will start at 10:00AM on September 22 in Yasuda Auditorium.

### Exhibition:

Exhibition will be held at the exhibition space on Forum, the 2nd floor of Faculty of Engineering Bldg. 2. For details, see Page 55.

## REGISTRATION

All participants, who have registered through the conference website, are requested to stop by the registration desk to pick up your name card and congress kit. Please present your confirmation slip which will be e-mailed to you after your payment is confirmed. On-site registration is also available on the desk. The desk will be located on Forum, the 2nd floor of Faculty of Engineering Bldg. 2.

Open hours are as follows:

September 22	8:30-16:00
	16:00-18:10 in front of Room Tenku in Tokyo Dome Hotel (B1F)
September 23	8:30-17:00
September 24	8:30-15:30

## SPECIAL ISSUE of JJAP

Authors of SSDM2010 papers are encouraged to submit their original papers to the Special Issue of Japanese Journal of Applied Physics which will be published in April 2011.

## INSURANCE

The organizer cannot accept responsibility for accidents that may occur during a delegate's stay. Delegates are therefore encouraged to obtain travel insurance (medical, personal accident, and luggage) in their home countries prior to departure.

## CLIMATE

Tokyo is warm and sometimes humid in September. The temperature range is 18-30°C.

## ELECTRICAL APPLIANCES

Japan operates on 100 volts for electrical appliances. The frequency is 50 Hz in eastern Japan including Tokyo (conference site) and 60 Hz in western Japan including Kyoto and Osaka.

## INTERNET ACCESS

Wireless internet access is available on the 1st and 2nd floor of the conference main site, Faculty of Engineering Bldg. 2. The following commercial connection services are available: BB mobile point (Softbank Telecom) <http://tm.softbank.jp/wlan/index.html>, Livedoor Wireless (Livedoor) <http://wireless.livedoor.com/> In addition, complementary internet connection will be provided. Detailed information will be included in the congress kit.

## PLENARY SESSION

September 22 (Wednesday) 10:30-12:00  
Yasuda Auditorium, The University of Tokyo

10:30-11:15  
“Nanotechnology for Sustainable Society”



**Michiharu Nakamura**  
Director, Hitachi Ltd., Japan

The primary role of nanotechnology is to provide disruptive technologies for social sustainability and industrial revitalization. The theme of this presentation is to discuss the future direction of nanotechnology R&D in a global society. The rapid technological progress seen in the 20<sup>th</sup> century focused on higher performance and better functionality. This technology-push approach, however, is being re-examined since the critical state of global sustainability, resulting from modern industrialization and its accompanying lifestyles which are heavily dependent on massive consumption of natural resources, has been recognized.

Society requires that these problems be solved through technology-based innovations such as “green” and “life” innovations; and it is exciting to imagine how we can resolve such social problems and reinforce industrial competitiveness with advanced nanotechnology R&D. We show that nanotechnology is playing key roles in the spiral cycles of green innovation and life innovation, and that comprehensive approaches including technology development, device feasibility study, system prototyping, and human resource development are crucial in terms of achieving nanotechnology-based innovations. Collaborative R&D centers represented by TIA-nano in Tsukuba will accelerate such activities in Japan. Collaborative efforts between academia, independent R&D institutes, and industry *under one roof* will overcome organizational constraints and work better for technology development, education, and achieving social goals.

11:15-12:00  
“More Moore and More Than Moore meeting for 3D in the 21<sup>st</sup> century”



**Simon Deleonibus**  
Research Director, CEA-LETI, France

Co-integrating More than Moore devices with CMOS to interface the outside Multiphysics world brings Functional Diversification. 3D integration will address at wafer level device to packaging technologies capable to reduce cost and improve system performance.

Nanoelectronics linear scaling appeals new 3D integration schemes in order to continue Moore’s law. Unique opportunities exist to increase the devices performances, system complexity and reduce power consumption of mobile, handheld objects. Also new design and functional architectures will be

possible by mixing logic and memory devices to save power consumption and introduce new applications by using neuromorphic or bio inspired approaches. Devices other than CMOS can be co-integrated with CMOS to interface the outside Multiphysics world (MEMS, sensors and actuators, RF devices, power devices,...) allowing new functionalities. 3D Wafer Level Packaging and System on a Wafer allow these new routes.

Functional diversification added to Nanoelectronics will make possible new future systems to address increasing societal needs. 3D integration will address, at the wafer level, device to packaging technologies capable of reducing cost and improving system performance.

## SPECIAL PLENARY SESSION "A Half Century of Esaki Diode and Lasers"

September 22 (Wednesday) 17:00-18:30  
Tenku, Tokyo Dome Hotel

17:00-17:45  
“50 Years of the Lasers”



**Koichi Shimoda**  
Professor Emeritus, The University of Tokyo, Japan

Invention of the maser by C. H. Townes in 1954 opened the door for generation of coherent electromagnetic wave at higher frequencies than that could be obtained with electronic devices. Competitive research for infrared and optical masers resulted in the achievement of the laser in 1960.

Pulsed laser action in ruby was first observed by T. H. Maiman on May 16, 1960. Then the cw operation of He-Ne laser was achieved by A. Javan and his collaborators on December 12, 1960. They were followed by evolution of a variety of solid-state lasers, gas lasers, semiconductor lasers, liquid lasers, short

pulse lasers, as well as laser theories and laser applications. A high-power laser system may now deliver a peak power of multi-peta watts, while nano-laser may generate single photons.

Recent development of new lasers is not restricted by the resonance of atoms and molecules, but by artificial structures. Thus tunable lasers operating in a wide spectral range are being developed. Quantum-dot lasers on the one hand and X-ray free electron lasers on the other hand are now under active investigation.

17:45-18:30  
“In Half a Century of Research Career, What Did I Explore?”



**Leo Esaki**  
President, Yokohama College of Pharmacy Chairman, The Science and Technology Promotion Foundation of Ibaraki, Japan

In 1945-46, we physics students were really fascinated by the introduction of the revolutionary knowledge of “Quantum Mechanics” which had not yet been widely disseminated. I was interested in putting the new knowledge of quantum mechanics to practical use.

In 1956, I initiated the investigation of the quantum mechanical tunneling in narrow Ge p-n junctions at SONY, Tokyo. We first obtained a backward diode.

When the junction width narrowed down to about 10 nanometers, the current-flow mechanism was convincingly tunneling not only in the reverse direction but also in the low-voltage range of the forward direction, giving rise to a prominent current-peak. Since the current-peak associated with a negative resistance had never been predicted, the Esaki Tunnel diode - the very first quantum electron device - came as a total surprise in 1957.

In 1969, Esaki and Tsu at IBM T.J. Watson Research Center, New York, proposed a semiconductor superlattice, a “man-made periodic quantum structure” which is engineered by applying the advanced growth technique of MBE, after designing the periodic structure in accordance with the principles of quantum theory in such a way as to exhibit unprecedented electronic properties.

Esaki and his coworkers’ pioneering research on superlattices and quantum wells in the 1970s and 1980s triggered a wide spectrum of experimental and theoretical investigations resulting in not only the observation of a number of intriguing phenomena, but also the emergence of a new class of transport and optoelectronic devices.

# RUMP SESSIONS

September 23 (Thursday) 18:30-20:00

Sanjo Conference Hall, The University of Tokyo

## Session A (1st Floor)

### “Will Carbon Create A New ICT Paradigm Beyond The Silicon Establishments?”

CNT and recently graphene have been attracting a considerable research interest even in Si community, though only high mobility or migration robustness will not reroute the way to step aside from the red brick wall. So, questions are, whether or not, (i) we will be able to muddle through the present Si research blockade by welcoming a new friend, Mr. Carbon (a tough negotiator), (ii) carbon will really challenge to silicon giant by him/herself (Don Quixote), or (iii) carbon will create application frontiers Si tech has not been so far interested in (a western cowboy). This rump session will discuss challenges (optimistically) and opportunities (positively) of “carbon” for something new from above standpoint. Join our rump session just for a fun as well as for catching some for further Si tech advancement.

Organizer: Y. Mochizuki (NEC)

Moderator: A. Toriumi (Univ. of Tokyo)

M. Nihei (AIST)

Panelists: A. A. Balandin (UC Riverside)

B. H. Hong (Sungkyunkwan Univ.)

T. Otsuji (Tohoku Univ.)

K. Wakabayashi (NIMS)

J. C. S. Woo (UCLA)

## Session B (Basement Floor)

### “Silicon Solar Cells - Their key technologies and future prospects - ”

The era of solar energy is coming. Solar cells show a bright future as a clean and inexhaustible electric power source. Their production level has expanded more than 10 GW, and approximately 85% shipped solar cells were crystal and poly-crystal silicon solar cells in 2009. In this rump session, we will discuss the key technologies of silicon solar cells and foresee their future.

Organizer: T. Fukui (Hokkaido Univ.)

Moderator: A. Yamada (Tokyo Tech)

A. Masuda (AIST)

Panelists: M. Konagai (Tokyo Tech)

T. Sameshima (Tokyo Univ. of Agri. & Tech.)

N. Usami (Tohoku Univ.)

I. Sakata (AIST)

# SHORT COURSE

September 21 (Tuesday) 11:00-17:30

Room 241, Faculty of Engineering Bldg.2, 4F, Hongo Campus, The University of Tokyo

## “Si technology challenges in More Moore and More than Moore era”

Organizers: D. Hisamoto (Hitachi, Ltd.) / K. Ohashi (NEC)

\*All lectures are given in English.

ULSI technology has been flourished for over 40 years in line with Moore’s Law, today, however, advanced technologies which can take us beyond the Law (more Moore) or superior technologies (more than Moore) are urgently being pursued. In this short course, the outlook for Si technology challenges today and in the future with regard to the above situation will be presented by spirited tutors from academia and industry. To raise interest and inspire students and young researchers, the issues will be explained from basic theoretical and practical points of view.

11:00-12:00 Overview of Si challenges

A Toriumi, Univ. of Tokyo

(12:00-13:00 Lunch)

13:00-13:50 Advanced CMOS Technology — Continuing challenges to keep Moore's Law —  
K. Ishimaru, Toshiba America Electronic Components Inc.

13:50-14:40 Carrier Transport in Advanced CMOS Transistors

N. Mori, Osaka University

14:40-15:30 Electric property fluctuation in deca- nanometer scale MOSFET caused by single electron capture and emission

R. Yamada, Hitachi, Ltd.

(15:30-15:50 Break)

15:50-16:40 Si Photonics

K. Wada, Univ. of Tokyo

16:40-17:30 Surface MEMS

H. Toshiyoshi, Univ. of Tokyo