
Call for Papers

2009 INTERNATIONAL CONFERENCE ON SOLID STATE DEVICES AND MATERIALS

Conference: October 7-9, 2009

Short Course / Workshop: October 6, 2009

The 2009 International Conference on Solid State Devices and Materials (SSDM2009) will be held from October 7 to 9, 2009 at Sendai Kokusai Hotel (Sendai, Miyagi, Japan). Since 1969, the conference has provided an excellent opportunity to discuss key aspects of solid-state devices and materials. For the 2009 conference, 14 program subcommittees have been organized covering circuits and systems, as well as devices and materials. In SSDM 2009, a one-day short course and workshop are also scheduled prior to the conference. The short course offers tutorial lectures on important aspects of the technology. The workshop offers advanced discussion on topical device technologies, “green technology” in SSDM 2009.

Original, unpublished papers will be accepted after review by the Program Committee. Several invited speakers will cover topics of current interest. An Advance Program will appear in August. More information about SSDM2009 is available online at:

<http://www.ssdm.jp>

PLENARY SESSIONS

Plenary Speakers:

"Moore's Law Past 32nm: the Challenges in Physics and Technology Scaling"

K. Kuhn (Intel Corp., USA)

"The Third Generation of Solar Photovoltaic Electricity"

T. Tomita (Univ. of Tokyo, Japan)

SCOPE OF CONFERENCE

The conference aims at providing a forum for synergistic interactions among research scientists and engineers working in the fields related to solid state devices and materials and encouraging them to discuss problems to be solved in these fields, new findings, new phenomena, and state-of-the-art technologies related to devices and materials. The conference also aims to facilitate mutual understanding among people in the device and material fields and those in the circuit, system and packaging fields. For the 2009 conference, fourteen program subcommittees have been organized in order to realize selection of higher quality papers and strengthen specific technology areas. The scope of each subcommittee is listed below.

Area 1

Advanced Gate Stack / Si Processing & Material Science

(Chair: J. Yugami, Selete)

This subcommittee covers all the innovative front-end-of-line process technologies and sciences for advanced silicon-based LSI devices. Not only the gate stack technology but all the new concepts on Si-based front-end process technologies are welcome. Papers are solicited in the following areas (but are not limited to these areas): (1) advanced gate stack technologies, such as a SiON gate insulator, high-k gate insulator, metal gate, and high-mobility channel materials, including device integration technology; (2) front-end-of-line process technologies that break through the scaling limit, such as a low-temperature process, shallow and conformal junction formation, novel diffusion/oxidation, high-precision dry/wet etching and highly controlled surface preparation technique for nm

scale fabrication; (3) reliability physics and analysis; and (4) Material characterization and modeling for a Si process..

Invited Speakers:

"Development of high-k / metal gate CMOS technology in Selete"

K. Ikeda (Selete, Japan)

"Microscopic Characterization of Devices by Scanning Transmission Electron Microscopy: From single atom imaging to macroscopic properties"

S. J. Pennycook (Oak Ridge National Lab., USA)

"Process Condition Dependence of Random VT Variability in NFETs and PFETs"

T. Tunomura (Selete, Japan)

"Characteristics and Integration Challenges of FinFET-based Devices for sub-32nm technology nodes Circuit applications"

A. Veloso (IMEC, Belgium)

Area 2

Characterization and Materials Engineering for Interconnect Integration

(Chair: M. Matsuura, Renesas Tech. Corp.)

Technologies and sciences that cover a Si back-end-of-line (BEOL) process are discussed, including 3-D interconnects and packaging technologies. These areas require new innovations and different ideas from conventional interconnect in characterization, material, and process/structure technologies. Papers are solicited in the following areas: (1) characterization methodology for materials, mechanical and electrical properties in small geometry, metrology and yield improvement; (2) materials, process and packaging technologies for advanced Cu/Low-k interconnect; (3) reliability phenomena and physics, such as EM, SIV, TDDDB, and modeling/prediction; (4) passive components for RF or High-speed operations; (5) new structures and materials on future interconnects, such as a 3-D interconnect with TSV, a CNT interconnect, an on-chip optical interconnect, and BEOL-based memory applications, i.e. MRAM and PRAM.

Invited Speakers:

"Through-Si-Via Technology Solutions for 3D System Integration"

E. Beyne (IMEC, Belgium)

"Carbon Nanomaterials for Next-Generation Interconnects and Passives: Physics, Status and Prospects"

K. Banerjee (Univ. of California-Santa Barbara, USA)

"Patterning and metallization options for 22nm node contact module integration"

S. Demuynck (IMEC, Belgium)

"Wireless interconnection by electro-magnetic coupling of open-ring resonators and its application to system integration"

Y. Ohno (Univ. of Tokushima, Japan)

"The Helium Ion Microscope for Device Imaging, Failure Analysis and Circuit Modification Applications"

W. Thompson (Carl Zeiss, USA)

Area 3

CMOS Devices /Device Physics

(Chair: H. Wakabayashi, Sony Corp.)

The aim of this area is to discuss advanced silicon device technologies and physics. Papers are solicited in the following areas: (1) sub-100-nm silicon CMOS devices and their integration technologies; (2) performance enhancement technologies, such as a strained-silicon channel or any high-mobility channels; (3) post-bulk-planar silicon device structures, including planar SOI, FinFET, multi-channels, or nano-wires; (4) device physics of advanced CMOS, including simulation and modeling on carrier transport and reliability; and (5) manufacturing and yield science in conjunction with the increasing variability of device parameters, fluctuations of fabrication parameters or the intrinsic atomistic nature.

Invited Speakers:

"Ultrathin Body and BOX SOI for Low Power Application at the 22nm node and below"

F. Andrieu (CEA-LETI, France)

"Advanced device architectures"

J. Woo (UCLA, USA)

Area 4

Advanced Memory Technology

(Chair: A. Nitayama, Toshiba Corp.)

Advanced memory technologies are very much expected to explosively evolve SoC devices and digital information technologies toward “high speed and high density, broadband and mobile.” Papers are solicited in the area of all advanced volatile or nonvolatile memory devices, such as DRAM, flash (including SONOS and nanocrystal devices), FeRAM, MRAM, phase change RAM, resistance RAM, one time programming memory, 3-D memory, and others. Topics include cell device physics and characterization, process integration and materials, tunneling dielectrics, ferroelectric and ferromagnetic materials, reliability, failure analysis, quality assurance and testing, modeling and simulation, process control and yield enhancement, integrated circuits, new concept memories, and new applications and systems (solid state disks, memory cards, programmable logic, etc.).

Invited Speakers:

"Electrical defects in dielectrics for flash memories studied by Trap Spectroscopy by Charge Injection and Sensing (TSCIS)"

R. Degraeve (IMEC, Belgium)

"Overview and Future Challenges of Capacitor-less DRAM Technologies for High Density Memory Applications"

P. Fazan (Innovative Silicon, Switzerland)

"Overview and Future Challenge of High Density FeRAM"

I. Kunishima (Toshiba Corp., Japan)

"Current Status and Future Challenge of PRAM"

Y-H. Shih (Macronix Int'l Co., Ltd., Taiwan)

"Switching Mechanism of TaOx ReRAM"

Z. Wei (Panasonic Corp., Japan)

"Advancements and Future Challenge of Spin torque MRAM"

H. Yoda (Toshiba Corp., Japan)

Area 5

Advanced Circuits and Systems

(Chair: S. Kawahito, Shizuoka Univ.)

Original papers bridging the gap between materials, devices, circuits, and systems in Si-ULSI, including SiGe, are solicited in subject areas that include, but not limited to the following: (1) advanced digital, analog, and mixed-signal circuits as well as memory; (2) high-speed and high-frequency circuits; (3) wireless, wireline, and optical communication circuits; (4) power devices and circuits as well as power management technology; (5) interconnection design for communication inside a chip as well as among chips; (6) technologies for systems on a chip (SoC) and system in a package (SiP); (7) LSI testing technology; (8) three-dimensional IC technology; (9) MEMS (passive) devices as well as circuits, RF MEMS; (10) sensor devices and circuits; (11) thin film transistors and circuits; and (12) organic transistors and circuits.

Invited Speakers:

"CMOS Circuit Design Techniques for Millimeter-Wave Applications"

R. Fujimoto (Toshiba Corp., Japan)

"Recent Topics in Power Management"

H. Kobayashi (Gunma Univ., Japan)

"Wireless CMOS TSV"

T. Kuroda (Keio Univ., Japan)

"Recent Progress in High-Resolution and High-Speed CMOS Image Sensor Technology"

I. Takayanagi (Aptina Japan, LLC., Japan)

Area 6

Compound Semiconductor Circuits, Electron Devices and Device Physics

(Chair: T. Hashizume, Hokkaido Univ.)

This session covers all aspects of advanced electron device and IC technologies based on compound semiconductors, including III-V, III-N, SiC, oxide semiconductors and other materials. Papers are solicited in the following areas: (1) FETs, HFETs, HBTs, and other novel device structures;

(2) high-voltage or high-temperature electron devices; (3) microwave and millimeter-wave amplifiers, oscillators, switches, and other ICs; (4) III-V high-mobility transistors and high-speed digital ICs; (5) advanced sensor devices; (6) theory and physics of electron devices; (7) processing and characterization techniques for devices and ICs; (8) stability and reliability issues; and (9) novel applications utilizing compound semiconductor devices and circuits. Contributions related to other interesting topics are also welcome.

Invited Speakers:

"Materials and Strain Issues in AlGaN/GaN HEMT Degradation"

E. Munoz (Univ. Politécnica de Madrid, Spain)

"SiC power MOSFETs"

J. Palmour (Cree, USA)

"Performance Projection of III-V and Ge Channel MOSFETs"

H. Tsuchiya (Kobe Univ., Japan)

"Advances of GaN Power Transistors"

Y. Wu (Transphorm Inc., USA)

"High-performance inversion-mode III-V MOSFETs enabled by atomic-layer-deposited high-k dielectrics"

P. D. Ye (Purdue Univ., USA)

Area 7

Photonic Devices and Device Physics

(Chair: H. Yamada, Tohoku Univ.)

This subcommittee covers all aspects of emerging technologies in active, passive, and integrated optoelectronic and photonic devices as well as device physics, which include: (1) laser diodes, LEDs, optical amplifiers, and photodetectors; (2) quantum nanostructure optical devices including quantum wells, quantum wires, or quantum dots; (3) photonic nanostructures including photonic crystals; (4) functional optical devices including optical switches, modulators, or optical MEMS; (5) nonlinear optical devices including wavelength converters or all-optical switches; (6) waveguide devices and photonic integrated circuits with silica, silicon, or polymer

materials; (7) photonic devices and integration with silicon photonics; (8) material and device processing and characterization techniques; (9) packaging and moduling for photonic devices; (10) optical communication, interconnection and signal processing applications of optoelectronic and photonic devices; (11) linear and nonlinear optical properties, electronic band structures, and the relaxation mechanism of quantum nanostructures; and (12) novel phenomena and applications including slow light, fast light, optical memory, and optoelectronic tweezers, etc.

Invited Speakers:

"Quantum Dot Lasers. Commercial challenges and opportunities"

A. Kovsh (Innolume, Inc., Germany)

"Active Ge based Devices for Si Photonics"

J. Michel (MIT, USA)

"Optical Gain in Ultra-Thin Silicon Resonant Cavity Light-Emitting Diode"

S. Saito (Hitachi, Ltd., Japan)

Area 8

Advanced Material Synthesis and Crystal Growth Technology

(Chair: A. Yamada, Tokyo Tech.)

The scope of this subcommittee covers all kinds of synthesis, growth, and fabrication techniques of not only semiconducting but also novel functional materials and structures, nitride compounds, CNT, nanowires and nanoparticles, etc. The principle idea is to enhance mutual communication among people in different committees to share knowledge of commonly important key technologies in fabrication processes. Specific scopes are, but not limited to, the following: (1) novel material systems and structures; (2) nitride-related compound semiconductors; (3) novel synthesis, growth, and fabrication techniques; (4) carbon nanotubes; (5) nanowires and nanoparticles; (6) microscale and nanoscale 3-D structures; (7) characterization of fundamental properties.

Invited Speakers:

"High throughput combinatorial materials exploration for advanced magneto-electronics"

T. Fukumura (Tohoku Univ., Japan)

"Growth and electronic structure of epitaxial graphene on silicon carbide"

K. Horn (Fritz-Haber-Institut der Max-Planck-Gesellschaft, Germany)

"III-V Nanowires grown by MOCVD for Optoelectronic Applications"

H. H. Tan (The Australian National Univ., Australia)

"Recent advances in InN-based III-nitrides towards novel nanostructure photonic devices"

A. Yoshikawa, S.-B. Che, Y. Ishitani, N. Hashimoto, and A. Yuki (Chiba Univ., Japan)

Area 9

Physics and Applications of Novel Functional Materials and Devices

(Chair: T. Fujisawa, Tokyo Tech.)

This session covers physics, applications and fabrication techniques of novel functional devices and materials. We strongly encourage novel, pioneering, and fundamental research works that would be influential in various solid state devices of materials (semiconductors, metals, superconductors, magnetic and organic materials, etc.). Specific topics are (1) quantum phenomena in nanostructures; (2) transport and optical characteristics of low-dimensional structures; (3) devices dealing with single electron, hole, excitation, photon, and other quanta; (4) solid-state quantum computing and communications; (5) nanometer-scale characterization with spanning probe techniques; (6) nanofabrication techniques and self-organized phenomena; and (7) other novel functional devices, but are not limited to these subjects.

Invited Speakers:

"Spin Read-Out of Donors in Silicon"

M. Brandt (Walter Schottky Inst., Germany)

"Electromechanical Systems for Memory and Logic Devices"

I. Mahboob (NTT Basic Res. Labs., Japan)

"From single-atom spectroscopy to lifetime enhanced triplet transport in MOSFETs"

S. Rogge (Delft Univ. of Tech., Netherlands)

"AFM nanolithography of grapheme"

L. Rokhinson (Purdue Univ., USA)

Area 10

Organic Materials Science, Device Physics, and Applications

(Chair: K. Kato, Niigata Univ.)

This field covers organic materials, device physics, characterization, and applications to organic devices. Papers are solicited in the following areas (but are not limited to these areas): (1) organic transistors and circuits; (2) organic light emitting devices; (3) organic diodes, photodetectors, and photovoltaic devices; (4) chemical sensors and gas sensors; (5) molecular electronics; (6) fabrication and characterization of organic thin films; (7) electrical and optical properties of organic thin film and materials; (8) organic-inorganic hybrid systems; and (9) interfacial phenomena, LC devices, etc.

Invited Speakers:

"Roll-to-Roll Printed 13.56 MHz Operated RFID Tags on Plastic Foils"

G. Cho (Sunchon National Univ., Korea)

"Efficient organic p-i-n solar cells having very thick codeposited i-layer consisting of highly purified organic semiconductors"

M. Hiramoto (IMS, Japan)

"Environmental and Electrical Stability of Organic Transistors"

D. Knipp (Jacobs Univ. Bremen, Germany)

"Organic TFT-Driven Flexible Displays"

K. Nomoto (Sony Corp., Japan)

"Surface selective deposition of molecular semiconductors for solution-based integration of organic field-effect transistors"

K. Tsukagoshi (MANA-NIMS, Japan)

Area 11

Micro/Nano Electromechanical and Bio-Systems (Devices)

(Chair: I. Yamashita, NAIST)

This session focuses on micro/nano electromechanical systems(MEMS/NEMS) and their applications, such as biosensors. Bio-M/NEMS devices and bio-sensors are widely applied to biochemical, medical, and environmental fields in which many devices are studied, such as biochips, micro-TAS, lab on a chip, etc. Interdisciplinary research of microelectronic devices with materials and technique in the chemical, biological, and medical fields is expected to open the door to new scientific and business fields. Papers are solicited in the following areas (but are not limited to these areas): (1) micro/nano electromechanical systems(M/NEMS) for RF, optical, power and biomaterial fields, and others; (2) micro-TAS and lab on a chip; (3) various biochips and sensors; (4) fabrication technologies and surface/interface modification techniques, such as SAM for micro-TAS and/or biochips; and (5) new integrated micro/nanosystems for biochemical and medical applications.

Invited Speakers:

"Silicon and glas microfabricated cell separation systems using ultrasonic standing wave forces"

T. Laurell (Lund Univ., Sweden)

"Bio-transducers for biomedical applications"

K. Mitsubayashi (Tokyo Medical & Dental Univ., Japan)

"Soft Bio-materials in Solid State Devices"

K. Shiba (Japanese Foundation for Cancer Res., Japan)

Area 12

Spintronic Materials and Devices

(Chair: K. Ando, AIST)

This field covers spintronic materials (metals, semiconductors, insulators, hybrid structures, and nanostructures), spin-related phenomena, and device

applications. Papers are solicited in the following areas (but are not limited to these areas): (1) ferromagnetic and/or half-metallic materials; (2) hybrid structures and nanostructures in which spin effects are apparent and important; (3) spin-dependent optical and transport phenomena; (4) spin dynamics; (5) spintronics devices and systems including magnetic tunnel junctions and TMR devices, nonvolatile memory, magnetic sensors, spin-transistors, optical isolators, optical switches etc; (6) quantum information processing using spin states.

Invited Speakers:

"Spin Injection, Transport, and Control in Silicon"

I. Applebaum (Univ. of Maryland, USA)

"Spin transfer microwave emission in metallic nanopillars and magnetic tunnel junctions"

J. Grollier (UMP CNRS-Thales, France)

"Silicon spintronic devices"

R. Jansen (Univ. of Twente, Netherland)

"Non-volatile logic based on MTJ"

T. Hanyuu (Tohoku Univ., Japan)

"High-speed Magnetic Memory based on Spin-Torque Domain Wall Motion"

N. Ishiwata (NEC Corp., Japan)

"Graphene Spintronics"

M. Shiraishi (Osaka Univ., Japan)

Area 13

Applications of Nanotubes and Nanowires

(Chair: K. Ishibashi, RIKEN)

All kinds of applications using nanotubes & nanowires are included in the scope of this sub-committee. Nanotubes & nanowires, e.g., carbon nanotube, BN nanotube, Si nanowire, compound semiconductor nanowire, layered nanowire, etc. are all included. Molecular nanostructures are also within our scope. Applications using nanotubes & nanowires in the scope are as follows; 1) Active electronic and optical devices, e.g., FET, HEMT, optical transistor, optical switch, and quantum devices including single electron transistor (SET), SET logics, resonant tunneling devices, quantum computing devices and so on. 2) All

kinds of sensors, e.g., bio sensors, gas sensors, pressure sensors, acceleration sensors and so on. 3) Application for passive elements, e.g., wiring & via technology for future LSI and so on. 4) Nanomechanical application, e.g., probe applications for STM/AFM, tweezers, motors, oscillators and so on. 5) Fundamental research related to those applications of nanotube & nanowire, e.g., new growth technology, analysis of growth mechanism, new device fabrication process and so on. 6) New evaluation technology, e.g., TEM, SEM, Raman scattering, photo luminescence and so on. 7) Theoretical analysis of device physics, new physics in the nanotube & nanowire, e.g., Tomonaga liquid, one dimensional quantum transport and so on.

Invited Speakers:

"Giant g-factors, Kondo physics, and anomalous spin-correlated blockade in few-electron InSb nanowire quantum dots"

H.Q.Xu (Lund Univ., Sweden)

"Metal-free Elementary Semiconductor Nanowires: Synthesis and Device Applications"

D. Whang (Sungkunkwan Univ., Korea)

Area 14

Power Electronics

(Chair: M. Ishiko, Toyota Central R&D Labs., Inc.)

This session focuses on energy conversion devices such as solar cells and power devices which are key devices to contribute to the greenhouse gas reduction as well as energy resource saving, and the scope covers all aspects of energy conversion device technologies and applications. Papers are solicited in the following areas (but are not limited to these areas): (1) materials and processes for Solar cells based on crystalline silicon, amorphous/microcrystalline silicon, CIS, III-V, CdTe, and organic molecules; (2) processes and characterization of solar cells and power devices including crystal growth, doping, etching, passivation and lithographic techniques; (3) device physics and modeling including novel device concept, power ICs (isolation techniques, SOI, monolithic

vs. hybrid, ESD;etc.), high & low power devices, RF power devices; (4) CAD/simulation including novel device, device & circuit design, layout, verification tools; (5)packaging, module and interconnection technologies including photovoltaic systems, stress & thermal simulation, reliability analyses & measurements (solder, etc.), integration methodology; (6) applications including photovoltaic systems and their components, power supply, motor control, power management, evaluation methods.

Invited Speakers:

"Towards a better understanding of heterojunction solar cells: key parameters and overestimated ones."

J. Damon-Lacoste (EPFL, Switzerland)

"Technology Trends of CZ-Silicon Substrates for Power Devices"

K. Kashima (Covalent Materials Corp., Japan)

"Current Status and Technology Trends of Grid-Interactive Inverter for PV Application"

S. Nishi (Sharp Corp., Japan)

"Silicon Carbide Wafer Technologies for Power Devices"

S. Nishizawa (AIST, Japan)

"Defect characterization of CIS-related compound solar cells by admittance spectroscopy and DLTS"

P. Zabierowski (Warsaw Univ. of Tech., Poland)