

The 2002 International Conference on Solid State Devices and Materials (SSDM 2002) will be held on September 17-19, 2002 at Nagoya Congress Center, Nagoya. Since 1969, the conference has provided good opportunity to discuss key aspects of solid state devices and materials. For the 2002 conference, a total of 14 subcommittees are established. The changed part from last year is that the nano structure device field moved to Core Area, and established the "Micro-Nano Electromechanical/Bio Conjugated Systems" in Strategic Area newly. In addition, half-day short courses are scheduled after the conference, which offer tutorial lectures on important areas.

Original and unpublished papers will be accepted after being reviewed by the Program Committee. Several invited speakers will overview topics of current interest. Advance Program will appear in July. On-line information about SSDM 2002 is available on the web site: **Web Site: <http://ssdm.bcasj.or.jp/>**

PLENARY SESSIONS

"Start-Up Companies, University-Industry Relations, and Emerging High Tech Markets: Implementing the New Innovation Systems of the 21st Century" R.B. Dasher (Stanford Univ., USA)

"Message from the Desk of Automotive Electronics" H. Ono (Toyota Motor, Japan)

"Ionic-Electronic Hybrids: Ion Channels, Nerve Cells and Brains on Semiconductor Chips" P. Fromherz (Max Planck, Germany)

SCOPE OF CONFERENCE

The purpose of this conference is to provide a venue for researchers and engineers related to solid state devices and materials to discuss problems to be solved in their field, new findings and interpretations of new phenomena related to devices and materials, new technologies for device processes, evaluation technology for properties of materials and so on, and to determine the direction of future research. This conference encourages total and mutual discussion on devices and materials in relation to circuits and systems. In addition to the core fields mentioned below, this conference is designed to encourage discussion on topics in strategic fields, which may become core fields of solid state devices and materials in the near future. For this year's conference, a total of 14 subcommittees are established. The changed part from last year is that the nano structure device field moved to Core Area, and established the "Micro-Nano Electromechanical/Bio Conjugated Systems" in Strategic Area newly. The scopes of each subcommittee are listed below.

CORE AREA

[1] *Advanced Silicon Circuits and Systems* (Chair, T. Kuroda, Keio Univ.)

Original papers bridging the gap between materials, devices, circuits, and systems, are solicited in the subject areas including, but not limited to, the following: (1) Advanced digital, analog, mixed-signal, and memory, (2) Wireless, wireline, and optical communications, (3) Imagers, displays, and MEMS, (4) Low power technologies and power aware systems, (5) High speed circuits and systems, (6) Technologies for

systems on a chip, and (7) New concept and technologies; based on nanoelectronics, quantum mechanics, 3D-electronics, ferroelectrics, photonics, and organic electronics; using neural network, fuzzy logic, and multi-valued logic; and for bio-medical and microfluidic applications.

Invited Speakers:

"Digital Pixel Image Sensors" *A.E. Gamal (Stanford Univ., USA)*

"CMOS IC for Optical Interconnections" *H.-J. Yoo (KAIST, Korea)*

[2] Advanced Silicon Devices and Device Physics (Chair, T. Mogami, NEC)

The scope of this subcommittee covers all aspects of advanced silicon devices and device technologies for circuit applications. Papers are solicited in the following areas: (1) Sub-100nm silicon CMOS devices including logic, memory and merged logic/memory LSIs, (2) Post-CMOS silicon device structures including vertical devices and strained-silicon channel devices, (3) New concepts, theories and breakthroughs in silicon-related devices, passive devices and other functional devices, (4) Physics and reliability for advanced processes/devices including simulation and modeling and (5) Manufacturing and yield issue.

Invited Speakers:

"Simulation of Intrinsic Fluctuations in Decanano MOSFETs: Present Status and Future Challenges." *A. Asenov (Univ. of Glasgow, UK)*

"Strained Si- and SiGe-On-Insulator (Strained SOI and SGOI) MOSFETs as New Device Options for High Performance CMOS"

S. Takagi (MIRAI-ASET, Toshiba, Japan)

"Device Design Consideration for Ultra-Thin Silicon Channel SOI and Double-Gate MOSFET" *M. Jeong (IBM, USA)*

[3] Silicon Process / Materials Technologies (Chair, N. Kobayashi, Selete)

The session consists of advanced process and materials technologies for Si ULSI applications. Strongly encouraged are the topics of material innovations to improve device performance, manufacturability, and cost-efficiency. Papers are solicited in, but not limited to, the following areas: (1) Novel materials technologies such as high-k and ultra-low-k process to break through the scaling limitations towards sub-100nm technological node, (2) Key process technologies to integrate sub-130nm Si ULSIs such as gate oxide integrity and Cu/low-k processes, and (3) FEOL and BEOL process improvement to fabricate Si devices with high reliability and/or high yield.

Invited Speakers:

"Adhesion and Reliability in Thin-Film Structures Containing Cu and Low-k Materials: Experiments and Multi-Scale Simulations"

R. Dauskardt (Stanford Univ., USA)

"Critical Materials Issues for High-k Gate Dielectric Integration" *R. Wallase (North Texas Univ., USA)*

"Integrated High-k and Metal Gate Processing Using RTP and ALCVD/DTM" *C. Werkhoven (ASM America, USA)*

[4] New Materials and Characterization (Chair, S. Takagi, MIRAI-ASET, Toshiba)

Introduction and utilization of new materials are expected as a key concept for further evolution and functionalization of Si-based logic and memory LSIs. Also, novel characterization techniques are indispensable in realizing these advanced devices. Papers are solicited in the following areas (but not limited to these subjects): (1) Characterization and processing of group-IV semiconductors, high-k and low-k dielectrics and other new materials, including diamond, silicides (germanides), nano-tubes, fullerenes and any other materials applicable to Si-based LSIs, (2) Physics and chemistry of surface and interface phenomena (including oxidation and nitridation), (3) Reliability physics and failure analysis of gate oxides and interconnect systems, and (4) New characterization methods for devices and materials including *in-situ* monitoring and nanometer-scale characterization. Submission of papers at a germinal stage is also encouraged.

Invited Speakers:

"High-Resolution Compositional Profiling of High-k Gate Stack Structures." *E. Garfunkel (Rutgers Univ. USA)*

"MOSFET Channel Engineering Using Strained Si, SiGe, and Ge Channels " *E.A. Fitzgerald (MIT, USA)*

[5] Compound Semiconductor Materials and Devices (Chair, N. Kobayashi, NTT)

Compound semiconductors are the key materials that support the modern information society; Basic technology for III-V, II-VI and other compound semiconductors including wide-gap semiconductors such as GaN and ZnO, and magnetic semiconductors. "Compound Semiconductor Materials and Device" covers the following areas (but not limited); (1) Growth and characterization, (2) Heterostructures and superlattices, and (3) Optical devices (LEDs, LDs and detectors) and electron devices (HFETs and HBTs), their device processing and reliability.

Invited Speakers:

"Growth and Characterization of p-type ZnO Thin Films by MBE " *D. Eason (Eagle-Picher Technologies, USA)*

"Pseudo Epitaxy of GaN on Si" *B. Lynch (Nitronex, USA)*

"ZrB₂ Substrate for Nitride Semiconductor" *H. Kinoshita (Kyocera, Japan)*

"Metal-Semiconductor Hybrid Granular Films Designed for High-Sensitive Magnetic Field Sensors" *H. Akinaga (AIST, Japan)*

"Mass Production Technology of MOVPE for InP, GaN and Progressed GaAs Related Materials" *Y. Otoki (Hitachi Cable, Japan)*

"Progress on InGaNAs Long Wavelength Lasers" *T. Miyamoto (Tokyo Inst. of Technol., Japan)*

"Epitaxial Manufacturing Outlook for Microwave Industry" *N. Hayafuji (Procomp Informatics, Taiwan)*

[6] Optoelectronic Devices and Photonic Crystal Devices (Chair, O. Wada, Kobe Univ.)

Optoelectronic devices are exploring novel functions and extreme performance by introducing new device physics and concepts and advanced technologies. The scope of this subcommittee covers all aspects of emerging technologies in active, passive, and integrated optoelectronic and photonic devices, which includes (1) Laser diodes, LEDs, photo-detectors, SOAs, and OEICs, (2) Optical modulators, switches, and MEMS, (3) Optical wavelength converters, nonlinear optical devices, and all-optical switches, (4) Passive waveguide components and PLCs, (5) Photonic crystal devices and other new concepts of devices, (6) Hybrid and monolithic integration and packaging, (7) Epitaxial growth and device processing technologies, and (8) Optical communications, interconnections and signal processing applications of such devices.

Invited Speakers:

"Single Transverse Mode Operation of 1.55- μ m Buried Heterostructure VCSELs" *Y. Ohiso, H. Okamoto, R. Iga, K. Kishi and C. Amano (NTT, Japan)*

"High Performance Wavelength Tunable DBR Lasers for DWDM Network Applications" *D. J. Robbins (Bookham Technologies, UK)*

"Photonic Crystals and Their Applications" *S. Noda and T. Asano (Kyoto Univ., Japan)*

"2D Semiconductor-Based Photonic Crystals for Nano-Integrated Optics" *Y. Sugimoto and K. Asakawa (FESTA, Japan)*

"Ultrafast SOA-Based SMZ-Type All-Optical Regenerators and Wavelength Converters"

Y. Ueno, S. Nakamura and K. Tajima* (Univ. of Electro-Comm. and *NEC, Japan)*

[7] Novel Devices, Physics & Fabrication (Chair, K. Ishibashi, RIKEN)

The aim of this subcommittee is to explore novel devices and physics, mainly in nanoscale, with inorganic and molecular materials. Papers are solicited in the following areas, but not limited to: (1) Quantum phenomena in nanoscale, (2) Quantum dots and single electron devices, (3) Solid state quantum computing, (4) Spintronics, (5) New nanoscale materials such as carbon nanotubes, (6) Molecular electronics, (7) Other novel devices such as small superconducting devices and resonant tunneling devices, and (8) Nanofabrication, nanomechanics and characterization techniques in nanoscale.

Invited Speakers:

"Controlling and Measuring Molecular-Scale Properties for Molecular Electronics" *P. Weiss (Pennsylvania State Univ., USA)*

"Spin Polarized Electron Injection through Tunneling Junctions and Its Application for SP-STM"

K. Sueoka, A. Subagyo and K. Mukasa (Hokkaido Univ., Japan)

"Single Dot Photodiodes -Coherent Xxcitation of a Two-Level System with Electric Contacts (Tentative)" *A. Zrenner (Univ. Paderborn, Germany)*

[8] Quantum Nanostructure Devices and Physics (Chair, Y. Arakawa, Univ. of Tokyo)

The field covers recent progress in physics, fabrication and device applications of nanostructures. The main topics includes (1) Growth and processing of quantum dots, (2) Transport/optical properties and THz/Femto-second dynamics, (3) Nanometer-scale characterization such as SPM and SNOM, (4) Nano electronic/optical devices, and (5) Novel nanostructures and nanomaterials such as photonic crystals, magnetic materials, and organic semiconductors.

Invited Speakers:

"Self Size-Limiting Growth of Uniform InAs Quantum Dots by Molecular Beam Epitaxy" *K. Yamaguchi (Univ. of Electro-Comm., Japan)*

"Investigations towards Semiconductor/Ferromagnet Spin Transistors: Rashba Effect, Local Hall Effect and Spin Injection" *Th. Schäpers (Forschungs Zentrum Juelich, Germany)*

"Single Photon Emission (tentative)" *Y. Yamamoto (Stanford Univ., USA)*

"Quantum Mechanical Time-Evolution of Exciton States in Semiconductor Quantum Dots: Quantum Gate Operation of Exciton Qubits"

H. Kamada, H. Ando, T. Takagahara**, H. Gotoh, and J. Temmyo*** (NTT, *Konan Univ., **Kyoto Inst. of Technol. and ***Shizuoka Univ., Japan)*

STRATEGIC AREA

[9] Silicon-on-Insulator Technologies (Chair, T. Nishimura, Mitsubishi Electric)

SOI technology is now taking off for the actual applications and is also giving the basis for novel devices and physics. The scope of this subcommittee covers the following aspects of SOI technologies, (1) Devices (Double gate / Vertical channel structures, New or novel devices, etc.), (2) SOI material science, characterization and manufacture, (3) Physics and Modeling of SOI Device/Process and Circuits, (4) SOI circuit applications (High performance, RF, Analog/linear, High voltage, etc.), (5) Reliability Issues (Hot Carrier Injection, GOI, Radiation Effects, etc.), and (6) Manufacturebility and process integration of devices.

Invited Speakers:

"Advanced Fully-Depleted SOI CMOS" *R. Chau (Intel, USA)*

"TBD" *M.M. Pelella (AMD, USA)*

"Future Electron Devices and SOI Technology (tentative)" *T. Hiramoto (Univ. of Tokyo)*

"Characterization and Challenges of SOI Wafer Material at Present and Its Perspective (Tentative)" *C. Maleville (SOITEC, France)*

[10] Non-Volatile Memory Technologies (Chair, K. Takasaki, Fujitsu Labs.)

"Non-volatile Memories" session solicits all NV memory (Flash, FeRAM, EPROM, EEPROM, Anti-fuse, MRAM and others) technology related papers. Topics relating to NV devices include cell device physics and characterization, processing and materials, tunnel dielectrics, ferroelectric materials, reliability, failure analysis, quality assurance and testing, modeling and simulation, integrated circuits, new concept technologies, and new applications and systems (solid state disks, memory cards, programmable logic etc.).

Invited Speakers:

"High-Performance MRAM Technology with an Improved Magnetic Tunnel Junction Material (tentative)" *M. Motoyoshi (Sony, Japan)*

"A 0.25 μ m 1MB to 32MB FeRAM Module Family" *T. Ho (IOTA Technol., USA)*

"Embedded MONOS Nonvolatile Semiconductor Memory Technology" *S. Minami (Hitachi, Japan)*

"Nonvolatile Memory Challenges toward Gigabit and Nanoscaling Era" *S. Pan (Macronix, Taiwan)*

[11] SiGe/III-V/III-N Devices and Circuits for Wireless and Optical Communications (Chair, T. Enoki, NTT)

Compound-semiconductor devices are playing important roles in wireless and optical communications systems. Future communications systems definitely require devices and circuits that dissipate lower energy, operate at higher bit rates or frequencies, have lower noise, generate higher signal power, and are more compact. This session covers advanced device and IC technologies that meet these challenges through the use of SiGe, GaAs-based, InP-based, and N-based materials (but not limited). Monolithic ICs or multi-chip modules integrating optical and electrical devices will also be discussed. Papers demonstrating breakthroughs and novel concepts, discussing potentials and limitations, and addressing issues in these technologies are strongly solicited for this session.

Invited Speakers:

"InP HBT Device and Design Technologies for Ultrahigh Speed Electronics" *M. Rodwell (UCSB, USA)*

"SiGe BiCMOS Technologies for Communication Systems" *M. Racanelli (Conexant Systems, USA)*

"GaAs on Si Technology and Its Application to PA Amplifier" *T. Hierl (IQE, USA)*

"Device Scaling and Prospect of GaN FET" *Y. Ohno (Univ. of Tokushima, Japan)*

"HEMT Technologies for over 40 Gbit/s Optical Communications Systems" *Y. Nakasha (Fujitsu Labs., Japan)*

[12] System-Level Integration and Packaging Technologies (Chair, M. Koyanagi, Tohoku Univ.)

The scope of this subcommittee covers all aspects of advance packaging technologies and new system-level integration technologies. Papers are solicited in, but not limited to, the following areas: (1)Advanced packaging technologies including CSP(Chip Size Package), 3D-Package, SoP (System-on-Package)/SIP(System-in-Package), (2)Three-dimensional (3D) integration technologies including wafer stacking, 3D-MEMS and hybrid integration of various materials, devices and sensors, (3)Design and CAD technologies for advanced packages and integrated systems considering EMI and EMC management, high frequency and ultra-high speed data transfer capability and connectabilities, (4)Testing and reliability including module testing, burn-in and KGD (Known Good Die), and (5) Heat sinking technologies.

Invited Speakers:

"Genuine Technologies for Three-Dimensional Integration and Packaging" *K. Okumura (Univ. of Tokyo, Japan)*

"Chip-on-Chip Technology for High Performance Mobile Systems" *A. Matsuzawa (Matsushita Electric, Japan)*

"Three-Dimensional Integrated Circuits for Low Power and High Performance System-on-a Chip" *L.G. McIlrath (R3 Logic, USA)*

[13] Organic Semiconductor Devices and Materials (Chair, Y. Ohmori, Osaka Univ.)

Electronic and Optical processes in organic materials and device application in the following fields (but not limited): (1) Organic transistors, diodes and circuits, (2) Organic light emitting devices, (3) Organic photodetectors and photovoltaic devices, (4) Chemical sensors and gas sensors, (5) Fabrication and characterization of organic thin films, (6) Electrical and optical properties of organic thin film and materials, (7) Organic-inorganic hybrid systems, and (8) Interfacial phenomena, etc.

Invited Speakers:

"High Performance Organic Non-Volatile Memory Device - a Direct Challenge to the Si Technology" *Y. Yang (UCLA, USA)*

"Molecular Photonics Devices and Materials by Photoinduced Changes of Electronic State" *T. Nagamura (Shizuoka Univ., Japan)*

[14] Micro-Nano Electromechanical/Bio Conjugated Systems (Chair. Y. Horiike, Univ. of Tokyo)

Micro/nano electromechanical systems (M/NEMS) are now expanding new application fields to optical, RF, power, etc. as well as actuators. Research fields called µ-TAS or Lab. on a Chip are also exploring biological /medical applications. Fusion of these devices with present and future microelectronic devices is expected to lead to creation of new super-functional devices. Papers are solicited in the following areas (but not limited): (1) Micro/nano electronic mechanical system (M/NEMS) for RF, optical, power and others, (2) Micro-TAS and Lab on a chip, (3) Various Bio-chips such as DNA, healthcare and protein chips, (4) These fabrication technologies, and (5) New integrated micro/nano systems fused with these devices.

Invited Speakers:

"MEMS Based Nanotools for Detection and Manipulation at the Molecular Level" *N.F. Rooji (Univ. of Neuchatel, Switzerland)*

"Therapeutic Applications of Biodegradable and Bioactive Forms of Silicon" *L. Canham (Univ. of Birmingham, UK)*

SUBMISSION OF PAPERS

Prospective authors must submit a 2-page camera-ready paper with all figures and tables.

Paper Deadline is May 8, 2002.

The 2-page paper must be written in English and typed on 8.5x11 inches or A4-size white bond paper. The first page must include the title of the paper, author(s), affiliation(s), address, telephone number, fax number, e-mail address, and article text. The second page should be used for indicating figures, tables and photographs. Detailed format information will be available at the conference World Wide Web site. The paper should report original and previously unpublished work, including specific results.

Original 2-page paper plus 15 copies on both sides of a sheet with author application form(PDF/MS-Word) and copyright transfer form(PDF/MS-Word) should be sent to SSDM 2002 Secretariat.

Authors must specify the area at which the paper should be presented and a preferable method of presentation (oral presentation, poster only, or either) in the author application form. Papers to be presented at the conference will be selected by each

subcommittee on the basis of the suggested areas and the content of the submitted paper.

Authors of accepted papers would be notified by the middle of July and will be requested to give either an oral presentation conforming to a 15-20 minute format or a poster presentation. Each conference-room will be provided with overhead projectors (O.H.P.) for oral presentations.

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LATE NEWS PAPERS

Late news papers describing important new developments may be submitted. A 2-page paper must be sent in the camera-ready format as required for the regular papers. The accepted papers will be included in the extended abstracts.

Original 2-page paper plus 15 copies on both sides of a sheet with author application form(PDF/MS-Word) and copyright transfer form(PDF/MS-Word) should be sent to SSDM 2002 Secretariat.

Late News Paper Deadline is July 25, 2002.

Notice of acceptance will be mailed by the middle of August.

CONFERENCE FORMAT

The conference has been organized to provide as much interaction and discussion among the participants as possible. The program will include a plenary session along with technical sessions comprised of invited and contributed papers for oral or poster presentation.

- **Paper Instruction** ([PDF](#) / [MS-Word](#))
- **Authors Application Form** ([PDF](#) / [MS-Word](#))
- **Copyright Transfer Form** ([PDF](#) / [MS-Word](#))