The 7th Japan–Taiwan Microelectronics International Symposium
− Mobile and secure electronics −

Date:	from October 24, 2007 to October 25, 2007
Venue:	Takeda hall, Takeda Building, The University of Tokyo
Co-sponsored by:	VLSI Design and Education Center (VDEC), The University of Tokyo
	Interchange Association, Japan (IAJ)
	National Science Council, Taiwan (R.O.C.)
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Cooperation with:	IEEE SSCS Japan Chapter
	IEEE SSCS Kansai Chapter
	Semiconductor Technology Academic Research Center (STARC)

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Takuo Sugano, The University of Tokyo/Toyo University</td></tr>
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Steve Chung, Dean of International Affairs & Professor, Dept. of Electronics Engineering, National Chiao Tung University</td></tr>
<tr><td>10:20– 11:50</td><td colspan="2">Session 1
Session Chair: T.B.D.</td></tr>
<tr><td rowspan="3">10:20 – 10:50</td><td rowspan="3">1-1</td><td>Revolutional Progress of Silicon Technologies: Revolutional Progress of Device Performance and Manufacturing Technologies</td></tr>
<tr><td>Tadahiro Ohmi, New Industry Creation Hatchery Center, Tohoku University</td></tr>
<tr><td>The newly developed radical reaction based semiconductor manufacturing using microwave excited high density plasma with very low election temperature has been confirmed to form very high integrity gate insulator films such as SiO2 by O* radicals and Si3N4 by NH* radicals on any crystal orientation silicon surface with same oxidation and nitridation speed. The leakage current through the radical oxide (SiO2) and the radical nitride (Si3N4) has been proved to be decreased down to less than 3 orders of magnitude compared to that of current thermal oxide (SiO2)(1).
Thus, the radical reaction based semiconductor manufacturing has created new possibilities of silicon technologies, i.e., three dimensional structure MOS transistor integration on any crystal orientation Si surface instead of current two dimensional planner on structure MOS transistor integration only on Si (100) surface, resulting in a revolutional progress of silicon technologies exhibiting very high speed performance over 50 GHz clock rate at 45nm technology node by introducing accumulation mode MOS transistor integration on (551) surface SOI wafers, where there must be implemented two key technologies such as the atomic order flat gate insulator film to silicon interface and drastic reduction of source and drain electrode series resistance by a factor of at least two orders of magnitude(2).
In addition to the revolutional progress of Si LSI performance, the newly developed microwave excited high density plasma has been confirmed to maintain its uniformity on the entire wafer surface even for various gas working pressures, various gas species, various self−bias voltages of substrate electrode and wide variety of substrate surface structures. If one of these four parameters is changed, on the other hand, it is completely impossible for the current plasma equipment to maintain the uniformity on the entire wafer surface, resulting in severe destructions of many chips on the wafer.
Thus, we are now going to establish very attractive and very challengeable manufacturing equipment system consisting of various different thin films continuous depositions in the same proves chamber and various different thin films continuous etchings in the same process chamber only by changing process gas species succeedingly, i.e., an establishment of revolutional progress of semiconductor manufacturing.</td></tr>
<tr><td rowspan="3">10:50 – 11:20</td><td rowspan="3">1-2</td><td>Image Authentication with Tampering Localization for Security</td></tr>
<tr><td>Long-Wen Chang, Professor, Dept. of Computer Science
& Director of Institute of Information Systems and Applications, National Tsing Hua University</td></tr>
<tr><td>In the very near future, many multimedia applications in our daily life will be done in the digital world. For example, crime images, and medical images or videos in web-based video surveillance systems are digital. The digital image is susceptible to various attacks for modifying the image contents in either wired or wireless networks. In order to prevent the image from being used mistakenly, image authentication and tampered area localization are very important for security in mobile devices. Both techniques for image authentication and tampered area localization will be addressed and some simulation results will be shown.</td></tr>
<tr><td rowspan="3">11:20 – 11:50</td><td rowspan="3">1-3</td><td>Physical Technologies for Studying LSI Tamper Resistance</td></tr>
<tr><td>Shigeru Nakajima, President, Device Analysis Corporation</td></tr>
<tr><td>Physical analysis technologies for studying tamper resistance of security LSI are almost the same with failure analysis technologies. Failure analysis technologies are developing with progress of VLSI technologies in fabrication and design field. Therefore, security LSI may be always faced to new types of physical attack using new failure analysis technologies. However, types of physical phenomena generated in operating LSI are very few, therefore, if design and structural methods to prevent physical analysis of LSI will be introduced, tamper resistance of security LSI may be greatly improved. In this paper, physical phenomena in LSI and detecting methods for them are firstly presented. Then, some methods to improve tamper resistance are shown. Finally, classification of tamper resistance is tried according to applicable failure analysis equipments and failure analyst’s skills.</td></tr>
<tr><td>11:50 – 13:30</td><td colspan="2">Lunch Time</td></tr>
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Time	subject/speaker	
13:30 – 16:00	Session 2: Session Chair: T.B.D.	
13:30 – 14:00	2-1	RFID Technology Development and Applications in ITRI
		Jenn-Hwan Tarng, General Director, Identification and Security Technology Center, Industrial Technology Research Institute (ITRI) & Professor, Dept. of Communication Engineering, National Chiao Tung University
		This presentation introduces ITRI's role and technology development in establishing the RFID industries in Taiwan. RFID is an identification technology comprising of a tag, a reader, and an application system. In ITRI, the UHF RFID technology developments are mainly focused on (1) Reader Miniaturization, (2) Smart Tag, (3) RFID-based Security Control, and (4) Testing. Through planned applications in the areas of (1) security and safety, (2) pedigree tracing, (3) supply chain management, and (4) mobile commerce service for private and public sectors, the RFID system shows its economic and societal value, which is also booming the RFID industry in Taiwan.
14:00 – 14:30	2-2	IT Evolution with Ubiquitous Computing
		Masayuki Miyazaki, Kei Suzuki, Kazuo Yano, Central Research Laboratory, Hitachi, Ltd. & YRP Ubiquitous Networking Laboratory
		Evolution of the ubiquitous computer causes several changes in the Information Technology. In a device technology, the computer size becomes smaller and smaller. Now the size goes down to 1 cc. People will use the ubiquitous computer unawares because of the miniature shape. Such a ubiquitous computer varies an information service process. Conventionally, current of information was almost one way and download rich as Web services. Hereafter, the current will become upload rich, and then, a real world will be able to reappear in a virtual world. Furthermore, personal work / life style will be visible, and the knowledge-work / life-management renovation will come arrive.
14:30 – 15:00	2-3	Location Sensing Techniques and Applications in Wireless Sensor Networks
		Yu-Chee Tseng, Chairman, Department of Computer Science & Associate Dean, College of Computer Science, National Chiao-Tung University
		In this talk, I will talk about location sensing technologies in wireless sensor networks. A new signal scrambling and a new data clustering techniques for pattern-matching localization schemes will be introduced. Then tracking and placement of sensors will be discussed. Communication issues on Zigbee for WSN will be discussed, and finally several location-based applications will be introduced.
15:00 – 15:30	2-4	Challenges in Ubiquitous Network from Web 2.0 Viewpoint
		Hiroyuki Morikawa, Professor, Research Center for Advanced Science and Technology, The University of Tokyo
		Two major properties will characterize Web 2.0 services: 'collection of contents' and 'collection of personal information'. These two properties promise a computing infrastructure that seamlessly and ubiquitously aids users in accomplishing their tasks, and are the core of ubiquitous network research and development. This talk begins by providing a deployment scenario and roadmap of ubiquitous networks from four viewpoints of 'from home to town', 'personalization', 'physical integration', and 'power consumption'. The following section provides our ubiquitous network projects at the University of Tokyo, and make clear the challenges that may very well require a fresh approach.
15:30 – 16:00	2-5	Reconfigurable and Cognitive Networks for Ubiquitous Communications
		Ching-Yao Huang, Associate Professor, Dept. of Electronics Engineering, National Chiao Tung University
		Multiple wireless systems, including cellular, indoor, and home entertainment, have been deployed to support a variety of needs in transmission. In the next generation of wireless systems, instead of merging all systems into one standard, different wireless systems in fact have their own development schedules to enhance transmission efficiency and quality. Under limited radio resources, to optimize the system performance and to support new services, a reconfigurable architecture and cognitive radio transmission have been wildly investigated in recent years. In this presentation, we will discuss design issues and the realization of ubiquitous communications by having reconfigurable controls and cognitive transmission.
16:00 – 16:30	Coffee Break	
16:30 – 18:00	Session 3: Panel Discussion	
		Security and Network · Future perspective of security technology · Education on security · Security and certification in Asia area
		Panel Co-Chair, *Kunihiro Asada, Professor and Director, VLSI Design and Education Center, University of Tokyo*
		Panel Co-Chair, *Shyh-Jye Jou, Professor and Chairman, Dept. of Electronics Engineering, National Chiao Tung University*
		Panelist
		Japan Side: *Hiroto Yasuura (Kyushu University), Shigeru Nakajima (Device Analysis), Hanane Fathi (AIST)*
		Taiwan Side: *Long-Wen Chang (National Tsing Hua University), Jenn-Hwan Tarng (ITRI), Shiuhpyng Shieh (NCTU)*
19:00 – 21:30	Speakers' Banquet	

9:30 – 17:00, Thursday, October 25, 2007		
Time	subject/speaker	
8:30 – 9:30	Registration	
9:30 – 12:00	Session 4: Session Chair: T.B.D.	
9:30 – 10:00	4-1	Dependable VLSI for Social Information Infrastructure *Hiroto Yasuura, Director and Professor, System LSI Research Center, Kyushu University* Our daily lives heavily depends on the social information infrastructure, which includes a huge numbers of VLSI chips. Various system failures are caused by physical faults in the circuits, human errors in design/fabrication/operation and malicious attacks. In this talk, the causes and countermeasures of failures of VLSI are summarized. The discussion leads a new direction of researches of design technology of dependable VLSI. New approaches of theory and implementation of dependable VLSI for social information infrastructures are introduced. As an example of social information systems, e-money systems are discussed in detail.
10:00 – 10:30	4-2	Baseband Processing for Future Wireless Communications *Tzi-Dar Chiueh, Professor, Dept. of Electrical Engineering, National Taiwan University* Wireless communications free users from being attached to wires and allow them to remain connected even when they move around at home or are on the road. Services that support high throughput yet cost little or even nothing are attractive to the consumers. Today, most wireless standards, with the exception of cellular phones, are based on multi-carrier modulation (specifically OFDM). Multi-carrier modulation technology enjoys flexible spectral resource allocation/management as well as easy equalization. On the other hand, antenna array and spatial MIMO processing, which has been around for several decades, can provide spatial diversity gain and/or signal quality. The application of the MIMO technology to consumer wireless communications takes place only recently, exemplified by the passage of the new 802.11n WLAN standard. In this talk I will address major baseband processing techniques for the above two technologies using insightful illustration and a design example.
10:30 – 11:00	4-3	Quantm Cryptosystem *Akio Tajima, Research Manager, System Platforms Research Laboratories, NEC Corporation* Information communication technologies are indispensable for our lives. Large amount of data exchange over optical networks must be prevented from hacking, bugging, and other abuses. Code makers have long played a cat-and-mouse game with code breakers. Quantum key distribution (QKD) is attracting much attention as potent candidates for finally ending the game. This is because QKD enables two distant parties to generate a secret key that has guaranteed privacy due to the use of quantum physics. At the symposium, I will introduce an overview of QKD and a recent progress in QKD system technologies.
11:00 – 11:30	4-4	Wireless Security–Attacks and Countermeasures *Shiuhpyng Shieh, Professor, Dept. of Computer Science and Information Engineering, National Chiao Tung University* Wireless network attacks have become great threats to the employment of wireless networks. These attacks are different from those in the fixed networks, and are more difficult to deal with. In this talk, we will introduce these new attacks, and their countermeasures. A prototype system, Wireless Security Operation Center (WiSec), has been developed to protect wireless network users against these attacks. This development involved fifteen professors and fifty graduate students from six universities.
11:30 – 12:00	4-5	Wireless Network Security with LR-AKE *Hanane Fathi, Research Center for Information Security, Advanced Industrial Science and Technology (AIST)* This presentation describes the risks involved in wireless communications and how to cope with them. The risks include 1) eavesdropping over the air communication, 2) users' careless access to fake servers and/or access points, 3) adversaries' unauthorized access to the network and so on. To overcome these risks, we present authenticated key exchange (AKE) protocols as a countermeasure providing secure channels; classify and discuss the previous works on AKE protocols and define a new problem setting. We then present the Leakage-Resilient AKE protocol that fits in this new problem setting and its applications in wireless networks, specifically for IP-based mobile and vehicular networks and wireless personal area networks.
12:00 – 13:30	Lunch Time	
13:30 – 16:30	Session 5: Session Chair:	
13:30 – 14:00	5-1	User's Expectation from Information and Communication Technology *Hiroshi Esaki, Professor, Department Head, Information and Communication Engineering, University of Tokyo* The Internet has entered to the fourth wave, that is broadband and ubiquitous. In this new stage, the role of wireless communication must be critical, since large number of unwired devices must be connected to the Internet and must be available ubiquitously. All the devices and informations will be shared by any device connected to the Internet space on the globe. Yet another new challenge by the unwired Internet is for mobility of devices. Mobile devices must be securely connected to the Internet and securely share their digital information among the appropriate user group, while maintaining the ubiquitous connectivity for every single device. We must establish a globaly scalable AAA (Authentication, Authorization and Accounting) system, toward the upcoming unwired Interenet environment.
14:00 – 14:30	5-2	Wireless Heterogeneous Reconfigurable Messenger (HeRMes) *Sau-Gee Chen, Professor, Dept. of Electronics Engineering, National Chiao Tung University* An MCU/FPGA-based SOC design and verification platform for the development and fast prototyping of state-of-the-art wireless communication technologies and 4G systems is under development. Based on the platform, complete HW and SW codesign methodology and design flows are established. The platform is particularly tailored for reconfigurable and SDR designs of various wireless heterogeneous baseband transceivers. Owing to the platform, 802.11n and 802.16e baseband transceivers have been designed and demonstrated. Various high-performance soft/hard IPs for baseband signal processing and MAC layer facilitating fast and reliable prototyping are also developed. Our ongoing and future works include completing the SOC platform design, reconfigurable and unified design of 802.11n/802.16e baseband transceiver and/or DVB and 4G systems.

14:30 – 15:00	5-3	Mobile Terminals toward LTE and Requirements on Device Technologies *Tadao Takami, Director of Hardware Strategy Group, Communication Device Development Department, NTT DoCoMo, Inc.* This lecture overviews the universal mobile telecommunications system long term evolution (LTE) and the requirements for device technologies pertaining to mobile terminals. The LTE represents the next generation cellular phone technology that is intended to achieve a high peak data rate, low latency, and high radio efficiency in addition to low cost and sufficiently high mobility characteristics. Vigorous discussion regarding the specifications for LTE is currently ongoing in the 3rd generation partnership project. This lecture also introduces various device technologies that support current mobile terminals and new cutting-edge technologies are expected to enhance upcoming LTE mobile terminals.
15:00 – 15:30	Coffee Break	
15:30 – 16:00	5-4	Research and Development of Mobile Broadband Wireless Communications in Taiwan *Ta-Sung Lee, Professor, Dept. of Communication Engineering, National Chiao Tung University* In the past decade, the mobile broadband wireless communications (MBWC) industry in Taiwan has been developing at an impressive speed. Driven by huge market forces and R&D resources, technology evolution is expected to continue and makes Taiwan a leading world-class player of MBWC in the future. In this talk, Taiwan's wireless communications technology landscape will be first introduced. In what follows, the current R&D status of MBWC in Taiwan will be addressed. Topics to be covered include Taiwan's national MBWC technology initiatives, such as TW4G and M-Taiwan, major related academic research programs, industrial development status, and future trends and challenges. In particular, joint efforts between the government, academia and industry will be highlighted.
16:00 – 16:30	5-5	Biomimetic Microelectronic Systems: Bridging Engineering, Medicine and Biology *Wentai Liu, Professor of Electrical Engineering Integrated Bioelectronics Laboratory,* *Campus Director of NSF-ERC on Biomimetic MicroElectronic Systems (BMES), University of California, Santa Cruz,* *& Chair Professor of Intelligent Prosthesis Research Center, National Chiao Tung University* Microelectronic systems that mimic biological functionality have a wide range of applications ranging from understanding the highly complex biological systems to treating intractable diseases such as deafness, blindness, and paralysis. Research in these areas has progressed rapidly in the recent years fueled by the unique interdisciplinary efforts fusing engineering, medicine and biology. The talk will present the opportunities, challenges and the enabling technology associated with this highly interdisciplinary field. This includes biocompatible electrodes, implantable microelectronics, wireless telemetry, signal processing algorithms, miniaturized 3D packaging, energy scavenging. Examples of such technology developed as part of the various interdisciplinary projects of Prof. Liu's research will be presented along with clinical trial results. These projects include Retinal Prosthesis, Wireless Power and Data Telemetry for Biomedical Implants, Brain Machine Interface for studying shark movements, Neural Prosthesis for Spinal Cord Injury and Hybrid Microstimulator for Facial Nerve Palsy.
16:30 – 17:00	Conference Closing	
18:00 – 20:30	Speakers' Warp-up Party	