Semiconductor Technology for Ultra-Large Scale Integrated Circuits and Thin Film Transistors VII

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Monday, May 20, 2019

07:00 - 08:00	Breakfast
08:00 - 08:10	Introductions *Yue Kuo*, Conference Chair *Norman Li*, ECI Liaison
	Overviews **Session Chair:** Yue Kuo, Texas A&M University
08:10 - 08:50	**(Plenary) Transparent oxide semiconductors: Materials design, electronic structure, and device applications** *Hideo Hosono, Tokyo Institute of Technology*
08:50 - 09:20	**(Invited) ULSI and TFT technologies in industry, research and higher education in France: An evolution towards innovation resulting from close and sustainable interaction** *Olivier Bonnaud, University of Rennes 1, GIP-CNFM*
	Device Physics I **Session Chair:** *Hideo Hosono, Tokyo Institute of Technology*
09:20 - 09:50	**(Invited) Terahertz testing of very large scale integrated circuits** *Michael Shur, RPI, Troy and Electronics of the Future, Vienna; J. Suarez, University of Delaware, Newark*
09:50 - 10:20	**(Invited) Photoemission characterization of interface dipoles and electronic defect states for gate dielectrics** *Seiichi Miyazaki, Akio Ohta, Nagoya University*
10:20 - 10:50	Coffee Break
	Device Physics II **Session Chair:** *Akira Toriumi, University of Tokyo*
10:50 - 11:20	**(Invited) What will come after V-NAND – Vertical resistive switching memory?** *Cheol Seong Hwang, Seoul National University*
11:20 - 11:50	**(Invited) Operation analysis of resistive switching of CBRAM using in-situ TEM** *Yasuo Takahashi, Atsushi Tsurumaki-Fukuchi, Masashi Arita, Hokkaido University, Sapporo*
11:50 - 12:20	**(Invited) Strain engineering for GeSn/SiGeSn multiple quantum well laser structures** *D. Grützmacher, D. Buca, Nils von den Driesch, Daniela Stange, Dennis Rainko, Inst. Semicond. Nanoelectron., Jülich; Z. Ikonic, University of Leeds, Leeds; J.M. Hartmann, Univ. Grenoble Alpes, Grenoble*
12:20 - 13:30	Lunch

Monday, May 20, 2019 (continued)

Device Reliability
Session Chair: *Niko Münzenrieder, University of Sussex*
Cheol Seong Hwang, Seoul National University

13:30 - 14:00 **(Invited) Reliability degradation phenomena in metal oxide thin film transistors**
Yukiharu Uraoka, Juan Paolo Bermundo, Mami Fujii, Mutsunori Uenuma, Yasuaki Ishikawa, Nara Institute of Science and Technology

14:00 - 14:30 **(Invited) Carrier transport and bias stress stability of IGZO TFT with heterojunction channel**
Mamoru Furuta, Daichi Koretomo, Ryunosuke Higashi, Syuhei Hamada, Kochi University of Technology

14:30 - 15:00 **(Invited) Relatively low-temperature processing and its impact on device performance and reliability**
Chadwin D. Young, Pavel Bolshakov and Rodolfo A. Rodriguez Davila (equal contributors), Peng Zhao and Christopher Smyth, Manuel Quevedo-Lopez and Robert M. Wallace, University of Texas at Dallas

15:00 – 15:20 **Reliability of flexible low temperature poly-silicon thin film transistor**
Ting-Chang Chang, Bo-Wei Chen, Shin-Ping Huang, Yu-Ching Tsao, Chih-Yang Lin, Yi-Ting Tseng, Cheng-Hsien Wu, Mao-Chou Tai, National Sun Yat-Sen University, Kaoshiumg; Po-Wen Chang, National United University, Miaoli; Po-Hsun Chen, Chinese Naval Academy, Kaohsiung

15:30 - 18:30 *ad hoc* sessions / Free discussions

(Optional) Tour of Sake microbrewer (led by Prof. Fukunaka)
Meet at lobby reception at 15:30

18:30 - 20:00 Dinner

20:00 - 21:00 **Poster Session**
Session Chair: *Mutsumi Kimura, Ryukoku University*

21:00 - 22:00 **Panel Discussion: Challenges in speed and power**
Panel Leaders: *Akira Toriumi, University of Tokyo*
Kyung Min Kim, KAIST

Tuesday, May 21, 2019

07:00 - 08:00	Breakfast
	Materials I **Session Chair:** *Oussama Moutanabbir, École Polytechnique de Montréal*
08:00 - 08:30	**(Invited) Challenge of crystalline IGZO ceramics to silicon LSI - Its application to AI and displays** *Shunpei Yamazaki, Semiconductor Energy Laboratory, Atsugi*
08:30 - 09:00	**(Invited) Introducing novel functional materials and liquids for breaking the limit of memory devices** *Kentaro Kinoshita, Tokyo University of Science, Tokyo*
09:00 - 09:30	**(Invited) Flexible organic thin film transistors for high-performance biosensors** *Feng Yan, Hong Kong Polytechnic University*
09:30 - 10:00	**(Invited) Mechanical ball shear, electromigration, and thermal cycling reliability testing on novel solder interconnects of highly integrated chips for advanced applications** *Tzu-Ting Chou, Collin Fleshman, Rui-Wen Song, Hao Chen, Jeng-Gong Duh, National Tsing Hua University, Hsinchu*
10:00 - 10:30	Coffee Break
	Materials II **Session Chairs:** *Yukiharu Uraoka, Nara Instiute of Science and Technology*
10:30 - 11:00	**(Invited) Non-volatile n^+-TiO_2 channel FETs with ferroelectric HfO_2** *Akira Toriumi, University of Tokyo*
11:00 - 11:30	**(Invited) Langmuir-type mechanism for in-situ doping in CVD Silicon and Germanium Epitaxial Growth** *Junichi Murota, Tohoku University, Sendai*
11:30 - 12:00	**(Invited) Germanium-tin semiconductors: A versatile silicon-compatible platform** *Oussama Moutanabbir, Simon Assali, Anis Attiaoui, Étienne Bouthillier, Patrick Del Vecchio, Aashish Kumar, Samik Mukherjee, Jérome Nicolas, École Polytechnique de Montréal*
12:00 - 13:00	Boxed Lunch (pick up in reception lobby)
13:00 - 18:00	Excursion to Kyoto / *ad hoc* sessions
18:00 - 19:30	Dinner

Tuesday, May 21, 2019 (continued)

Materials, Devices, and Designs
Session Chairs: *D. Grützmacher, Inst. Semicond. Nanoelectron.*

19:30 - 20:00 **(Invited) High performance gas sensor platform based on integrated sensing mechanisms**
Jong-Ho Lee, Yujeong Jeong, Yoonki Hong, Meile Wu, Seongbin Hong, Gyuweon Jung, Wonjun Shin, Seoul National University, Seoul

20:00 - 20:20 **Embedded DRAM using c-axis-aligned crystalline In-Ga-Zn oxide FET with 1.8V-power-supply voltage**
Eri Yamamoto, Seiya Saito, Keita Sato, Kazuma Furutani, Yuto Yakubo, Tatsuya Onuki, Takanori Matsuzaki, Tomoaki Atsumi, Yoshinori Ando, Tsutomu Murakawa, Kiyoshi Kato, Shunpei Yamazaki, Semiconductor Energy Laboratory

20:20 – 20:50 **(Invited) A new design methodology of highly reliable TFT based integrated circuits in display applications**
Di Geng, Yue Su, Ling Li, Ming Liu, Chinses Academy of Sciences, Beijing, Kai Wang, Sun Yat-sen University, Guanzhou

21:00 - 22:00 **Panel Discussion: Challenges in new materials and processes**
Panel Leaders: *Junichi Murota, Tohoku University*
Jin Jang, Kyung Hee University

Wednesday, May 22, 2019

07:00 - 08:00	Breakfast
	Processes I **Session Chairs:** *Karl D. Hirschman, Rochester Institute of Technology*
08:00 - 08:30	**(Invited) Dual Gate LTPS TFT versus Oxide TFT** *Jin Jang, Kyung Hee University, Seoul*
08:30 - 09:00	**(Invited) Fabrication and AC performance of flexible Indium-Gallium-Zinc-Oxide thin-film transistors** *Niko Münzenrieder, University of Sussex; Giuseppe Cantarella, Luisa Petti, Free University of Bolzano-Bozen, Italy*
09:00 - 09:30	**(Invited) Observation of the behavior of additives in copper electroplating using a microfluidic device** *Masanori Hayase, Takanori Akita, Mineyoshi Tomie, Ryo Ikuta, Haruki Egoshi, Tokyo University of Science*
09:30 - 9:50	**Thermal oxidation kinetics of germanium** *Akira Toriumi, University of Tokyo*
09:50 - 10:20	Coffee Break
	Processes II **Session Chairs:** *Shunpei Yamazaki, Semiconductor Energy Laboratory* *Jin Jang, Kyung Hee University*
10:20 - 10:50	**(Invited) Development of high performance metal oxide thin-film transistor for OLED and flexible display** *Jae Kyeong Jeong, Hanyang University, Seoul*
10:50 - 11:20	**(Invited) Introduction on atomic layer deposition for high-k dielectric & high mobility oxide semiconductor thin film transistors** *Jin-Seong Park, Wan-Ho Choi, Jiazhen Sheng, Tae-Hyun Hong, Hanyang University, Seoul*
11:20 - 11:50	**(Invited) Flash lamp annealed polycrystalline silicon as a potential candidate for large panel manufacturing** *Karl D. Hirschman, Glenn Packard, Adam Rosenfeld, Viraj Garg, Rochester Institute of Technology; Robert Manley, Corning Inc.*
11:50 – 12:20	**(Invited) Homo-junction bottom-gate amorphous In-Ga-Zn-O TFTs with metal induced source /drain regions** *Shengdong Zhang, Yang Shao, Xiaoliang Zhou, Peking University*
12:20 - 13:30	Lunch

Wednesday, May 22, 2019 (continued)

Processes III
Session Chair: *Jae Kyeong Jeong, Hanyang University*

13:30 - 14:00	**(Invited) Back-end of line compatible transistors for hybrid CMOS applications** *Po-Tsun Liu, Po-Yi Kuo, Chien-Min Chang, Hsiu-Hsuan Wei, National Chiao Tung University, Hsinchu*
14:00 - 14:30	**(Invited) Adhesion lithography for large-area patterning of asymmetric nanogap electrodes** *Gwenhivir Wyatt-Moon, Andrew Flewitt, University of Cambridge, Cambridge*
14:30 - 15:00	**(Invited) Directed self-assembly of block copolymers for sub-10nm fabrication** *Shisheng Xiong, Fudan University, Shanghai*
15:00 - 17:30	Free time for discussions
17:30 - 18:00	Transfer to banquet restaurant
18:00 - 20:00	Reception & Banquet at Toukansou Restaurant

Thursday, May 23, 2019

07:00 - 08:00	Breakfast
	New Applications I **Session Chairs:** *Michael Shur, Rensselaer Polytechnic Institute*
08:00 - 08:30	**(Invited) Neuromorphic system using thin-film devices** *Mutsumi Kimura, Ryukoku University and Nara Institute of Science and Technology*
08:30 - 09:00	**(Invited) Stateful in-memory computing in emerging crossbar memories** *Kyung Min Kim, KAIST, Daejeon*
09:00 - 09:30	**(Invited) Memristive crossbar arrays for brain-inspired computing** *Qiangfei Xia, University of Massachusetts, Amherst*
09:30 - 10:00	**(Invited) Emerging applications of TFTs enabled by novel device architectures** *Kai Wang, Sun Yat-sen University, Guanzhou*
10:00 - 10:30	Coffee Break
	New Applications II **Session Chairs:** *Olivier Bonnaud, University of Rennes 1, GIP-CNFM* *Mamoru Furuta, Kochi University of Technology*
10:30 - 11:00	**(Invited) Nano-resistors based devices - effects of size and structure on performance** Yue Kuo, Texas A&M University, College Station
11:00 - 11:30	**(Invited) Performance enhancement of SSI-LEDs and geometrically confinement of lighting dots by using patterned wafer approaches** *Shengli Wu, Yiwei Liu, Xiaoning Zhang, Can Yang, Lingguang Liu, Yaogong Wang, Gang Niu, Xi'an Jiaotong University, Xi'an*
11:30 - 12:00	**(Invited) Microsystems for thermal energy powering** *Takahito Ono, Tohoku University, Sendai*
12:00 - 12:30	**(Invited) Chemiresistive and resistive switching semiconductor based sensor for biomolecule detection** *Hyun Ho Lee, Myongji University, Cheoin*
12:30 - 12:40	Conclusions / Next Conference
12:40 - 13:40	Lunch and Departures

Poster Presentations (Monday, May 20; 20:00 - 21:00)

Chairs: *Mutsumi Kimura*, Ryukoku University
Feng Yan, Hong Kong Polytechnic University

1. **Set voltage distribution stabilized by constructing an oxygen reservoir in resistive random access memory**
   Chih-Yang Lin, National Sun Yat-sen University; Chih- Hung Pan, National Sun Yat-sen University; Po-Hsun Chen, Chinese Naval Academy; Ting- Chang Chang, National Sun Yat-sen University

2. **Investigation of degradation caused by charge trapping at etching-stop layer under AC gate-bias stress for InGaZnO thin film transistors**
   Ting-Chang Chang, Mao-Chou Tai, Yu-Ching Tsao, National Sun Yat-sen University; Po-Wen Chang, National United University

3. **Effect of different a-InGaZnO TFTs channel thickness upon self-heating stress**
   Ting-Chang Chang, National *Sun Yat-sen* University; Po-Wen Chang, National United University; Yu-Ching Tsao, National *Sun Yat-sen* University; Mao-Chou Tai, National *Sun Yat-sen* University

4. **Mechanism of thermal field and electric field in resistive random access memory using the high/low-k side wall structure**
   Yi-Ting Tseng, National Sun Yat-sen University; Ting-Chang Chang, National Sun Yat-sen University; Po-Hsun Chen, Chinese Naval Academy; Chih-Cheng Shih, National Sun Yat-sen University

5. **Influence of electrode thermal conductivity on resistive switching behavior during reset process**
   Cheng-Hsien Wu, National Sun Yat -Sen University; You-Lin Xu, National Sun Yat -Sen University; Shih-Kai Lin, National Tsing Hua University; Tsung-Ming Tsai, National Sun Yat-Sen University; Ting-Chang Chang*, National Sun Yat-Sen University*

6. **The reliability of amorphous-InGaZnO$_4$ thin film transistor influence by self-heating stress at high temperature under compressive strain**
   Yu-Ching Tsao, Ting-Chang Chang, Yu-Lin Tsai, Hong-Yi Tu, National Sun Yat-Sen University

7. **Analysis of IGZO crystalline structure and its stability by first-principles calculations**
   Tomonori Nakayama, Masahiro Takahashi, Tomosato Kanagawa, Toshimitsu Obonai, Kenichi Okazaki, and Shunpei Yamazaki, Semiconductor Energy Laboratory

8. **Bi-direction transmissible gate driver on array**
   Po-Tsun Liu, Guang-Ting Zheng, Chia-Heng Tu, Jin-Hao Huang, National Chiao Tung University

9. **A TCAD calibrated approach for on-state modeling of amorphous oxide semiconductor TFTs**
   Karl Hirschman, Glenn Packard, Rochester Institute of Technology; Robert Manley, Corning Inc.

10. **Effects of X-ray irradiation on the noise behavior of low-temperature polycrystalline silicon TFTs**
    Shan Yeh, Ya-Hsiang Tai, National Chiao Tung University, Hsinchu

11. **Reliability of plasma-etched copper lines on a glass substrate**
    Yue Kuo, Jia Quan Su, Mingqian Liu, Texas A&M University

12. **Gravitational level effects o optical properties of electrodeposited ZnO nanowire arrays**
    Y. Fukunaka, Waseda University; H. Osaki, Kyoto University; Y. Kanemitsu, Kyoto University; T. Homma, Waseda University

13. **A piecewise linear approximation for output characteristic for short-channel "extrinsic" mosfet with accounting of nonzero differential conductance in saturation regime and source parasitic resistance effect at high drain biases**
    Valentin Turin, Roman Shkarlat, Badriddin Rakhmatov, Orel State University after Ivan Turgenev, Russia; Gennady Zebrev, National Research Nuclear University "MEPHI", Russia; Chang-Hyun Kim, Gachon University, Republic of Korea; Benjamin Iñiguez, Rovira i Virgili University, Spain; Michael Shur, Rensselaer Polytechnic Institute, USA