Tentative Program

(3/28/17)

ULSIC vs TFT: 6th International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors

May 21-25, 2017

Schloss Hernstein
Hernstein, Austria

Conference Chair
Prof. Yue Kuo
Texas A&M University, USA

Conference Co-Chair
Prof. Olivier Bonnaud
University of Rennes I, France

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Sunday, May 21, 2017

16:00 - 17:30  Conference Check-in
17:30 - 19:00  Wine-Tasting Reception
19:00 - 20:00  Dinner
20:00 - 21:30  Free communication
Monday, May 22, 2017

07:30 - 08:30  Breakfast

08:30 - 08:40  Introductions  
Yue Kuo, Conference Chair  
Norman Li, ECI Liaison

IC + TFT Technologies

Session Chairs: Yue Kuo, Texas A&M University, USA  
               Olivier Bonnaud, IETR Univ-Rennes 1, France

08:40 - 09:10  Gravimetric and biological sensors based on SAW and FBAR technologies  
William Milne, Cambridge University, United Kingdom  
Girish Rughoobur, Mario de Miguel Ramos, I.Miele, A.J.Flewitt, Cambridge University, United Kingdom; T.Mirea, M.Clement, J.Olivares, B. Diaz-Duran, J.Sangradora, E.Iborra Universidad Politcnica de Madrid, Spain

09:10 - 09:40  TFT & ULSIC: Interfacing large-area thin-film sensor arrays with CMOS circuits  
Sigurd Wagner, Princeton University, USA  
Yasmin Afsar, Tiffany Moy, Josue Sanz-Robinson, Warren Rieutort-Louis, Yingzhe Hu, Liechao Huang, James C. Sturm, Naveen Verma, Princeton University, USA

09:40 - 10:10  Large scale graphene integration for silicon technologies  
Andreas Mai, IHP, Germany  
Marco Lisker, Mindaugas Lukosius, Grzegorz Lupina, IHP, Germany

10:10 - 10:40  SiGeSn/GeSn hetero- and multiple quantum well structures for optoelectronics on Si  
Detlev Grützmacher, Forschungszentrum Jülich, Germany  
Nils von den Driesch, Daniela Stange, Dan Buca, Forschungszentrum Jülich, Germany

10:40 - 11:10  Coffee Break

TFT non-display applications

Session Chairs: Gennadi Bersuker, The Aerospace Corporation, USA  
                Sigurd Wagner, Princeton University, USA

11:10 - 11:40  Neuromorphic application of oxide semiconductors  
Mutsumi Kimura, Ryukoku University, Japan  
Tokiyoshi Matsuda, Ryukoku University, Japan; Tomoya Kameda, Yasuhiko Nakashima, Nara Institute of Science and Technology, Japan
Monday, May 22, 2017 (continued)

11:40 - 12:10  
**Brain-like synapse thin-film transistors using oxide semiconductor channels and solid electrolytic gate insulators**  
*Sung-Min Yoon*, Kyung Hee University, South Korea  
*Yeo-Myeong Kim, Eom-Ji Kim*, Kyung Hee University, South Korea

12:10 - 12:40  
**Visible and near-infrared photo-detector combining polysilicon TFT and PbS quantum dots**  
*Tayeb Mohammed-Brahim*, Rennes 1 University, France  
*Emmanuel Jacques*, Rennes 1 University, France; *Xiang Liu, Lei Wei*, Southeast University, China

12:40 - 14:00  
**Lunch**

14:00 - 14:30  
**Oxide TFTs for digital holography**  
*Chi-Sun Hwang*, ETRI, South Korea

14:30 - 14:50  
**Low-power display system enabled by combining oxide semiconductor and neural network technologies**  
*Hitoshi Kunitake*, Semiconductor Energy Laboratory Co., Ltd., Japan  
*Shintaro Harada, Fumika Akasawa, Yuki Okamoto, Takashi Nakagawa, Takeshi Aoki, Seiichi Yoneda, Hiroki Inoue, Munehiro Kozuma, Takayuki Ikeda, Yoshiyuki Kurokawa, Shunpei Yamazaki*, Semiconductor Energy Laboratory Co., Ltd., Japan

15:00 - 19:00  
**ad hoc sessions / Free time**

19:00 - 20:00  
**Dinner**

20:00 - 21:00  
**Poster Session**

21:00 - 22:30  
**Panel Discussion: IC vs. TFT Applications**
Tuesday, May 23, 2017

07:30 - 08:30  Breakfast

2D & Novel devices

Session Chairs: William Milne, Cambridge University, United Kingdom
Chi-Sun Hwang, ETRI, South Korea

08:30 - 09:00  Gap engineering and reliability study for 2D electronics
Kosuke Nagashio, The University of Tokyo, Japan

09:00 - 09:30  Integration of 2D materials for advanced devices: Challenges and opportunities
Robert M. Wallace, University of Texas at Dallas, USA

09:30 - 10:00  Photoemission study of gate dielectrics on gallium nitride
Seiichi Miyazaki, Nagoya University, Japan
Nguyen Xuan Truyen, Akio Ohta, Nagoya University, Japan

10:00 - 10:30  Multifunctional amorphous metal oxide thin films – Structure transformation for various functions
Yue Kuo, Texas A&M University, USA

10:30 - 11:00  Coffee Break

Flexible and memory TFTs

Session Chairs: Junichi Murota, Tohoku University, Japan
Andrew Flewitt, Cambridge University, United Kingdom

11:00 - 11:30  Oxide thin film transistors for flexible devices
Yukiharu Uraoka, Nara Institute of Science and Technology, Japan
Juan Paolo Bermundo, Mami Fujii, Mutsumori Ueno, Yasuaki Ishikawa, Nara Institute of Science and Technology, Japan

11:30 - 12:00  Low-temperature processed InGaZnO MES-FET for flexible device applications
Mamoru Furuta, Kochi University of Technology, Japan
Shinsuke Hashimoto, Kenichiro Hamada, Yusaku Magari, Kochi University of Technology, Japan

12:00 - 12:30  Oxide semiconductor based charge trap device for vertically integrated NAND flash memory
Cheol Seong Hwang, Seoul National University, South Korea

12:30 - 13:00  Oxide thin films for sustainable, multifunctional and flexible electronics
Pedro Barquinha, CEMOP-UNINOVA, Portugal
Pydi Bahubalindruni, Okhla Industrial Estate, India

13:00 - 13:30  Boxed Lunch available
Tuesday, May 23, 2017 (continued)

13:30 - 18:30  Excursion/ad hoc sessions

19:00 - 20:00  Dinner

20:00 - 20:30  TFT and ULSI technologies: The parallel evolution of the research and the higher education in France  
Olivier Bonnaud, University of Rennes 1 & GIP-CNFM, France

20:30 - 21:00  Devices in advanced technology nodes: Application-specific characterization  
Gennadi Bersuker, The Aerospace Corporation, USA

21:00 - 22:30  Panel Discussion: Challenges in solid state science & technology learning
Wednesday, May 24, 2017

07:30 - 08:30 Breakfast

**Fabrication, reliability, materials I**

**Session Chairs:** Olivier Bonnaud, IETR Univ-Rennes 1, France
Mamoru Furuta, Kochi University of Technology, Japan

08:30 - 09:00 *Atomically controlled processing for dopant segregation in CVD silicon and germanium epitaxial growth*
Junichi Murota, Tohoku University, Japan
Yuji Yamamoto, Ioan Costina, IHP, Germany; Bernd Tillack, IHP and TU Berlin, Germany; Vinh Le Thanh, Aix Marseille University, France; Roger Loo, Matty Caymax, imec, Belgium

09:00 - 09:30 *Carrier density dependent energy band-gap and phonon frequency in Ge*
Akira Toriumi, University of Tokyo, Japan

09:30 - 10:00 *Electrically detected magnetic resonance in SiC MOSFETs utilizing multiple techniques*
Patrick M. Lenahan, Pennsylvania State University, USA
Mark A. Anders, Pennsylvania State University, USA

10:00 - 10:30 *Recent key developments in nanoscale reliability and failure analysis techniques for advanced nanoelectronics devices*
Kin Leong Pey, Singapore University of Technology and Design, Singapore
A. Ranjan, S. Mei, Singapore University of Technology and Design and A*STAR, Singapore; N. Raghavan, K. Shubhakar, Singapore University of Technology and Design, Singapore; M. Bosman, S.J. O’Shea, A*STAR, Singapore

10:30 - 11:00 Coffee Break

**Fabrication, reliability, materials II**

**Session Chairs:** Akira Toriumi, University of Tokyo, Japan
Patrick M. Lenahan, Pennsylvania State University, USA

11:00 - 11:30 *Model prediction of stochastic effects of plasma-induced damage in advanced electronic devices*
Koji Eriguchi, Kyoto University, Japan

11:30 - 12:00 *Advances in large PECVD processing technology up to Gen 11 for TFT LCD and OLED*
Yi Cui, Applied Materials, Inc., USA
Beom Soo Park, Gaku Furuta, Jinhoon Cho, Soo Young Choi, Robin Tiner, Allen Lau, Suhail Anwar, Applied Materials, Inc., USA
12:00 - 12:30  **Printed Poly-Si TFTs on paper via Liquid-Si**  
Ryoichi Ishihara, Delft University of Technology, Netherlands  
*Miki Trifunovic, Paolo Sberna, Delft University of Technology, Netherlands; Tatsuya Shimoda, Japan Advanced Institute of Science and Technology, Japan*

12:30 - 14:00  Lunch

14:00 - 14:30  **Role of carrier injection in degradation of amorphous oxide films**  
Alexander Shluger, University College London, United Kingdom  
*David Gao, Jack Strand, Oliver Dicks, University College London, United Kingdom; Moloud Kaviani, WPI-Advanced Institute for Materials Research, Japan*

14:30 - 15:00  **Equilibrium mobility in IGZO TFT: Existence of the intermediate boolchand phase?**  
Dieter G. Ast, Cornell University, USA

15:00 - 17:30  Free time for recreation

17:30 - 18:30  **Panel Discussion: Challenges in giga and nano fabrication /Free Discussions**

19:00 - 21:00  Reception & Banquet
Thursday, May 25, 2017

07:30 - 08:30  Breakfast

IC Memories

Session Chairs: Michael Shur, Rensselaer Polytechnic Institute, USA
                Yukiharu Uraoka, Nara Institute of Science and Technology, Japan

08:30 - 09:00  Single defect characterization at Si/SiO\textsubscript{2} interface
                Toshiaki Tsuchiya, Shimane University, Japan

09:00 - 09:30  Trapping mechanism of charge trap capacitor with Al\textsubscript{2}O\textsubscript{3}/High-k/Al\textsubscript{2}O\textsubscript{3} multilayer
                Toshihide Nabatame, National Institute for Materials Science, Japan

09:30 - 10:00  Two-terminal vertical thyristor based capacitorless memory cell using latch-up characteristics
                Min-Won Kim, Hanyang University, South Korea
                Seung-Hyun Song, Sang-Dong Yoo, Tae-Hun Shim, Jea-Gun Park, Hanyang University, South Korea

10:00 - 10:30  Advanced measurement techniques for the characterization of ReRAM devices
                Albert Crespo-Yepes, Universitat Autonoma Barcelona, Spain
                M. Nafria, R. Rodriguez, M. Porti, J. Martin-Martinez, S. Claramunt, X. Aymerich, Universitat Autonoma Barcelona, Spain

10:30 - 11:00  Coffee Break

TFT Devices

Session Chairs: Dieter G. Ast, Cornell University, USA
                Toshihide Nabatame, National Institute for Materials Science, Japan

11:00 - 11:30  Thin film transistor modeling: Frequency dispersion
                Michael Shur, Rensselaer Polytechnic Institute, USA

11:30 - 12:00  Instability mechanisms in amorphous oxide semiconductors leading to a threshold voltage shift in thin film transistors
                Andrew J. Flewitt, Cambridge University, United Kingdom
                Kham M. Niang, Cambridge University, United Kingdom

12:00 - 12:30  Improvement in carrier mobility of metal oxide thin-film transistor by a microstructure modification
                Jae Kyeong Jeong, Hanyang University, South Korea
                Yeonwoo Shin, Sang Tae Kim, Hanyang University, South Korea
Thursday, May 25, 2017 (continued)

12:30 - 13:00  Embedded oxide semiconductor memories: A key enabler for low-power ULSI
Takahiko Ishizu, Semiconductor Energy Laboratory Co., Ltd., Japan
Tatsuya Onuki, Shuhei Nagatsuka, Momoyo Yamaguchi, Atsuo Isobe,
Yoshinori Ando, Daisuke Matsubayashi, Kiyoshi Kato, Semiconductor Energy
Laboratory Co., Ltd., Japan; Hai Biao Yao, Chi Chang Shuai, Hung Chan Lin,
United Microelectronics Corporation (UMC), Taiwan

13:00 - 13:10  Conclusions / Next Conference

13:10 - 14:30  Lunch and Departures
**Poster Presentations**

*Chair: Tayeb Mohammed-Brahim, Rennes 1 University, France*

1. **Spin-orbit coupling-driven magnetization switching in W and Ta/cofeb/mgo layer for ultralow power spin memory applications**  
   Jin Pyo Hong, Hanyang University/Physics semiconductor, South Korea  
   JeaGun Park, Hanyang University, South Korea

2. **Synaptic plasticity and memory functions mimicked in a a-InGaZnO based thin film transistor**  
   T. P. Chen, Nanyang Technological University, Singapore  
   H.K. Li, Nanyang Technological University, Singapore

3. **Effect of high-k seed-layer on ferroelectric Hf$_x$Zr$_{1-x}$O$_2$ thin film**  
   Takashi Onaya, Meiji University and National Institute for Materials Science, Japan  
   Toshihide Nabatame, NIMS and CREST, Japan Science and Technology Agency (JST), Japan; Kazunori Kurishima, Meiji University and NIMS, Japan; Naomi Sawamoto, Atsushi Ogura, Meiji University, Japan; Akihiko Ohi, Naoki Ikeda, Toyohiro Chikyow, NIMS, Japan

4. **Negative bias stress instability in C-doped In-Si-O thin film transistors**  
   Kazunori Kurishima, Meiji University and National Institute for Materials Science, Japan  
   Toshihide Nabatame, Takio Kizu, Kazuhito Tsuagoshi, Akihiko Ohi, Naoki Ikeda, Toyohiro Chikyow, NIMS, Japan; Takashi Onaya, Meiji University and NIMS, Japan; Atsushi Ogura, Meiji University, Japan

5. **Atomic layer deposition: Low temperature process well adapted to ULSI and TFT technologies**  
   Ahmad Chaker, University Grenoble Alpes, CNRS, France  
   Pierre Szkutnik, Patrice Gonon, Christophe Vallée, Ahmad Bsiesy, University Grenoble Alpes, CNRS, France