

Program

**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

NOTES

- Technical sessions will be in the Studio.
- Meals will be held in the Panorama Restaurant.
- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Speakers – Please ensure your talk adheres to your given time allotment. Talks that go over their allotment reduce time for valuable discussion and can disrupt the conference program.
- Turn your cellular telephones to vibrate or off during technical sessions.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
- Please do not smoke at any conference functions.
- Please write your name in the front of this program booklet so it can be returned if misplaced.

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.Sangrador, 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
- 12:45 - 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
- 14:50 - 15:10 **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
- 15:10 - 19:00 *ad hoc sessions / Free time*

(Optional) Tour of historic Schloss Hernstein 15:15 – 16:15 (conducted by Peter Glaser)
Meet at lobby reception at 15:15
- 19:00 - 20:15 Dinner
- 20:15 - 21:45 **Panel Discussion: IC vs, TFT Applications** (followed by social hour)

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, Mutsunori Uenuma, 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 Bahubalindrani, Okhla Industrial Estate, India

13:15 - 13:30 Boxed Lunch (pick up in reception lobby)

Tuesday, May 23, 2017 (continued)

- 13:30 - 18:30 Excursion to Vienna / *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** (followed by social hour)

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, Jinhyun Cho, Soo Young Choi, Robin Tiner, Allen Lau, Suhail Anwar, Applied Materials, Inc., USA

Wednesday, May 24, 2017 (continued)

- 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
boolehand phase?**
Dieter G. Ast, Cornell University, USA
- 15:00 - 17:30 Free time for recreation / discussions
- 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/SiO₂ interface**
Toshiaki Tsuchiya, Shimane University, Japan

09:00 - 09:30 **Trapping mechanism of charge trap capacitor with Al₂O₃/High-k/Al₂O₃ multilayer**
Toshihide Nabatame, National Institute for Materials Science, Japan

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

10:00 - 10:30 **Advanced measurement techniques for the characterization of ReRAM devices**
Albert Crespo-Yepes, Universitat Autònoma de Barcelona, Spain
M. Nafria, R. Rodriguez, M. Porti, J. Martin-Martinez, S. Claramunt, X. Aymerich, Universitat Autònoma de 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
- 13:15 - 14:30 Lunch and Departures