Program

International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors

(ULSIC VS TFT 8)

May 14-18, 2023

Grand Park Hotel
Otaru (Sapporo), Japan

Conference Chair

Yue Kuo
Texas A&M University, USA

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Previous conferences in this series

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors
July 29-Aug 3, 2007
Barga, Italy
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Michael Shur, Rensselaer Polytechnic Institute, USA
Dieter Ast, Cornell University, USA

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors II
July 5-10, 2009
Xi'an, China
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Michael Shur, Rensselaer Polytechnic Institute, USA
Dieter Ast, Cornell University, USA
William Milne, Cambridge University, UK
Shaozhen Xiong, Nankai University, China

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors III
June 26-July 1, 2011
Hong Kong, China
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Gennadi Bersuker, Sematech, USA

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors IV
July 8-11, 2013
Grenoble, France
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Gennadi Bersuker, Sematech, USA
C. Claeys, IMEC, Belgium

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors V
June 14-18, 2015
Lake Tahoe, California, USA
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Gennadi Bersuker, Sematech, USA
Olivier Bonnaud, University of Rennes, France

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors VI
May 21-25, 2017
Hernstein, Austria
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Olivier Bonnaud, University of Rennes, France

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors VII
May 19-23, 2019
Kyoto, Japan
Conference Chairs:
Yue Kuo, Texas A&M University, USA
Prof. Junichi Murota, Tohoku University, Japan
Prof. Yukiharu Uraoka, Nara Advanced Institute of Science and Technology

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Sunday, May 14, 2023

17:30 – 19:00	Conference Check-in (Foyer outside Jukai Room, 5th Floor)
19:00 – 19:30	Welcome Reception (Foyer outside Rysei Room, 5th Floor)
19:30 – 20:30	Dinner (Ryusei Room)
20:30 – 21:30	Free communication

Locations and Notes

- *Technical Sessions will be in Jukai Room.*
- *Meal locations are noted in the program.*
- *Covid-19 precautions: Covid-19 has not gone away and we request that you be mindful of those who may be particularly vulnerable. Please bring your own test kits and masks. ECI will have a limited number of masks on hand. Masks are not required but we encourage you to use them particularly during poster sessions as there is typically a great deal of close-up discussion. If you are not feeling well, please remain in your room.*
- *Audiotaping, videotaping and photography of presentations are prohibited.*
- *Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).*
- *Speakers – Please leave at least 3 minutes for questions*
- *Please do not smoke at any conference functions.*
- *Turn your mobile phones 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.*
- *Emergency Contact Information: Because of privacy concerns, ECI does not collect or maintain emergency contact information for conference participants. If you would like to have this information available in case of emergency, please use the reverse side of your name badge.*

Monday, May 15, 2023

06:30 – 08:00 **Breakfast** (Terrace Brasserie Restaurant)

08:00 – 08:05 **Open remark**
Yue Kuo, Texas A&M University

Session: General Topics
Chair: Yue Kuo, Texas A&M University

08:05 – 08:30 **Invited**
Challenge to next-generation VLSI with VFET using oxide semiconductor and 3D structure
Shunpei Yamazaki, Semiconductor Energy Laboratory Co., Ltd

08:30 – 08:55 **Invited**
ULSI and TFT technologies joint forces to meet the future challenges of a pervasive digital society
Olivier Bonnaud, University of Rennes

Session: Semiconductor Materials
Chairs: Kenji Nomura, University of California San Diego
Laurie E. Calvet, LPICM, CNRS-Ecole Polytechnique
Shinji Migita, AIST

08:55 – 09:20 **Invited**
Atomic-order surface reaction of reactant gas on group IV semiconductor (100) surface
Junichi Murota, Tohoku University

09:20 – 09:45 **Invited**
Formation and luminescence studies of Ge/Si core-shell quantum dots
Seiichi Miyazaki, Katsunori Makihara, Yuki Imai, Nagoya University

09:45 – 10:10 **Invited**
Epitaxy and heterostructure of germanium tin-related group-IV alloy semiconductors for future electronic and optoelectronic applications
Osamu Nakatsuka, Masashi Kurosawa, Shigehisa Shibayama, Mitsuo Sakashita, Nagoya University

10:10 – 10:40 Coffee Break

10:40 – 11:00 **Crystallinity of In-Ga-Zn-oxide (IGZO) in CAAC-IGZO vertical FET**
Tomonori Nakayama, Yukinori Shima, Toshikazu Ono, Nao Sorida, Naoki Okuno, Hitoshi Kunitake, Shunpei Yamazaki, Semiconductor Energy Laboratory Co., Ltd.

11:00 – 11:20 **Spinel, an overlooked crystalline phase of Igzo**
Hendrik F.W. Dekkers, Akhilesh Kumar Mandal, Evangelos Aggiannis, Adrian Vaisman, Chasin Romain Delhougne, Attilio Belmonte, Gouri Sankar Kar, Interuniversity Microelectronics Centre (imec)

Monday, May 15, 2023 (continued)

Session: P-channel Oxide Materials for TFTs
Chair: Olivier Bonnaud, University of Rennes

11:20 – 11:45 **Invited**
Progress of p-channel oxide-TFT development and how we improve the performances
Kenji Nomura, University of California San Diego

11:45 – 12:10 **Invited**
P-channel metal oxide thin film transistors for flexible CMOS logic: Challenges and opportunities
Andrew Flewitt, Kham Niang, Daisy Gomersall, Jake Meeth, Niels van Fraassen, Sanggil Han, University of Cambridge; James Parish, Andrew Johnson, University of Bath

12:10 – 14:00 Lunch (Ryusei Room)

Session: Dielectrics
Chairs: Cheol Seong Hwang, Seoul National University
Junichi Murota, Tohoku University

14:00 – 14:25 **Invited**
What can we do with ferroelectric gate?
Eisuke Tokumitsu, Japan Advanced Institute of Science and Technology

14:25 – 14:50 **Invited**
Material challenges in HfO2-based ferroelectric memory devices
Min Hyuk Park, Seoul National University

14:50 – 15:15 **Invited**
Ferroelectric phase transformation accelerated in nanolaminate HfO2-ZrO2 thin films
Shinji Migita, The National Institute of Advanced Industrial Science and Technology (AIST)

15:15 – 15:45 Coffee Break

15:45 – 16:10 **Invited**
Ternary amorphous oxide semiconductor material toward 3D-integrated ferroelectric devices
Takanori Takahashi, Mutsunori Uenuma, Nara Institute of Science and Technology; Masaharu Kobayashi, University of Tokyo; Yukiharu Uraoka, Nara Institute of Science and Technology

16:10 – 16:35 **Invited**
Microfabrication of BiTeSb thermoelectric devices for applications to IoT sensors
Takahito Ono, Tohoku University

16:35 – 18:30 Free Communication

18:30 – 20:30 Dinner (Ryusei Room)

20:30 – 21:30 Panel Discussion: Challenges in TFT Materials

Tuesday, May 16, 2023

06:30 – 08:00 **Breakfast** (Terrace Brasserie Restaurant)

Session: Devices and Circuits I
Chairs: Hitoshi Kunitake, Semiconductor Energy Laboratory Co., Ltd
I-Chun Cheng, National Taiwan University
Radu A. Sporea, University of Surrey

08:00 – 08:25 **Invited**
HfZrO-based ferroelectric capacitors and FETs for ultralow-power signal processing
Shinichi Takagi, Kasidit Toprasertpong, Eishin Nako, Xuan Luo, Mitsuru Takenaka, Ryosho Nakane, The University of Tokyo

08:25 – 08:50 **Invited**
Contact effects towards mainstream thin-film transistor applications
Radu A. Sporea, University of Surrey

08:50 – 09:15 **Invited**
Latch-up issue between high-voltage circuit domain and low-voltage circuit domain in TFT LCD driver IC fabricated with BCD process
Ming-Dou Ker, Zi-Hong Jiang, National Yang Ming Chiao Tung University

09:15 – 09:40 **Invited**
Poly-oxide Tft for flexible electronics
Jin Jang, Kyung Hee University

09:40 – 10:05 **Invited**
ALD of robust amorphous oxide TFTS with turn on at the Boltzmann limit
Rebecca L. Peterson, Christopher R. Allemang, Tonglin L. Newsom, Tae H. Cho, Neil P. Dasgupta, University of Michigan

10:05 – 10:30 Coffee Break

10:30 – 10:55 **Invited**
TFT circuits for driving sensors and actuators on flat panels
Florian De Roose, Nikolas Papadopoulos, Raf Appeltans, Paul Heremans, Interuniversity Microelectronics Centre (imec)

10:55 – 11:20 **Invited**
CMOS inverters and circuits based on oxide thin-film transistors
I-Chun Cheng, Shu-Ming Hsu, Yun-Shiuan Li, Wei-Chen Li, Feng-Yu Tsai, Jian-Zhang Chen, National Taiwan University

11:20 – 11:40 **Device layout dependence of PBTI in back-gated IGZO TFTs**
Pietro Rinaudo, Adrian Chasin, Jacopo Franco, Ben Kaczer, Ingrid de Wolf, Gouri Kar, imec and Katholieke Universiteit Leuven

11:40 – 13:00 Lunch (Ryusei Room)

Tuesday, May 16, 2023 (continued)

Session: Devices and Circuits II
Chairs: Mamoru Furuta, Kochi University of Technology
Po-Tsun Liu, National Yang Ming Chiao Tung University

13:00 – 13:25 **Invited**
Vertical channel-all-around IGZO FET for low latency, high-density 2T0C 3D DRAM application
Di Geng, Chuanke Chen, Xinlv Duan, Ling Li, Institute of Microelectronics of the Chinese Academy of Sciences

13:25 – 13:50 **Invited**
Circuit architecture and pixel array driving methods for AMOLED and Mini/Micro-LED displays
Chih-Lung Lin, National Cheng Kung University

13:50 – 14:15 **Invited**
An atomistic understanding of the oxygen vacancies in Pt/TiO2/Ti resistive random access memory: *Ab initio* study
Jung-Hae Choi, Taeyoung Jeong, Korea Institute of Science and Technology; Cheol Seong Hwang, Seoul National University

14:15 – 14:40 **Invited**
An overview of the three-dimensionally stacked dynamic random access memory
Cheol Seong Hwang, Seoul National University

14:40 – 15:10 Coffee Break

15:10 – 15:30 **Tri-layer self-aligned structure indium gallium zinc oxide thin film transistor with optical synaptic plasticity**
Tsung-Che Chiang, Zhen-Hao Li, Jing-Zhong Deng, Po-Tsun Liu, National Yang Ming Chiao Tung University; Yue Kuo, Texas A&M University

15:30 – 15:55 **Invited**
Ultrathin organic transistors toward next-generation skin electronics
Sunghoon Lee, Tomoyuki Yokota, Takao Someya, The University of Tokyo

15:55 – 16:15 **GAP-type low-temperature polycrystalline silicon thin film transistors for light sensing photo-transistor application**
Jo-Lin Chen, Tsung-Che Chiang, Zhen-Hao Li, Yu-Ting Tsai, Po-Tsun Liu, National Yang Ming Chiao Tung University; Yue Kuo, Texas A&M University

16:15 – 18:00 Free Communication

18:00 – 20:00 Dinner (Ryusei Room)

20:00 – 21:30 **Poster session (Remove posters at 21:30)**
Chairs: Jen-Sue Chen, National Cheng Kung University

Wednesday, May 17, 2023

06:30 – 08:00 **Breakfast** (Terrace Brasserie Restaurant)

Session: Processes
Chairs: Rebecca L. Peterson, University of Michigan
Chih-Lung Lin, National Cheng Kung University

08:00 – 08:25 **Invited**
New development on plasma-based copper etch at room temperature
Yue Kuo, Texas A&M University

08:25 – 08:50 **Invited**
Solid-phase crystallization of hydrogen-doped indium oxide for low-temperature processed TFTs
Mamoru Furuta, Kochi University of Technology

08:50 – 09:10 **Base pressure controlled fabrication of high-mobility In2O3 thin film transistors**
Yusaku Magari, Prashant Ghediya, Hui Yang, Hokkaido University; Yuqiao Zhang, Jiangsu University; Yasutaka Matsuo, Hiromichi Ohta, Hokkaido University

09:10 – 09:30 **Solution processed ultrawide bandgap insulator to semiconductor conversion of amorphous gallium oxide via fermi level control**
Juan Paolo Bermundo, Nara Institute of Science and Technology; Diki Purnawati, Universitas Gadjah Mada; Paul Rossener Regonia, University of the Philippines Diliman; Kazushi Ikeda, Yukiharu Uraoka, Nara Institute of Science and Technology

09:30 – 09:55 **Invited**
Developing low-temperature defect passivation technology with supercritical fluid technology
Po-Hsun Chen, R.O.C. Naval Academy; Ting-Chang Chang, Pei-Yu Wu, Jian-Jie Chen, Chuan-Wei Kuo, Sheng-Yao Chou, Yu-Bo Wang, Hung-Ming Kuo, National Sun Yat-Sen University

09:55 – 10:25 Coffee Break

Session: Novel TFT Applications
Chairs: Jin Jang, Kyung Hee University

10:25 – 11:50 Panel Discussion: Challenges in TFT Applications

11:50 Pick up boxed lunches (Foyer outside of Jukai Room)

12:30 – 18:30 Optional Excursion
- Sapporo Beer Museum Tour
- Sapporo JR Tower Observatory T38 Tour

18:30 – 19:00 Reception (Foyer outside Rysei Room, 5th Floor)

19:00 – 21:00 **Banquet and Poster Award Announcement** (Ryusei Room)

21:00 – 22:00 Free Communication

Thursday, May 18, 2023

06:30 – 08:00 **Breakfast** (Terrace Brasserie Restaurant)

Session: Novel TFT Applications
Chairs: Yukiharu Uraoka, NAIST
Florian De Roose, imec

08:00 – 08:25 **Invited**
Spiking neuron circuits in ULSIC vs TFT technologies
Laurie E. Calvet, LPICM, CNRS-Ecole Polytechnique; Zonglong Li, Centre de Nanosciences et Nanotechnologies; Benjamin Iniguez, University Rovira i Virgili; Kruno Romanjek, CEA-LITEN

08:25 – 08:50 **Invited**
Metal-oxide thin-film transistor: An enabling technology for smart sensor construction and 3-D monolithic integration
Zhihe Xia, Yushen Hu, Tengteng Lei, Man Wong, The Hong Kong University of Science and Technology

08:50 – 09:15 **Invited**
Temporal information processing for in-sensor computing based on amorphous IGZO phototransistor
Jen-Sue Chen, Ching-Hsiang Yang, Li-Chung Shih, National Cheng Kung University

09:15 – 09:40 **Invited**
TFT-based active sensors and sensor interfaces
Kai Wang, Sun Yat-sen University

09:40 – 10:10 Coffee Break

10:10 – 10:35 **Invited**
Organic electrochemical transistors for sensing applications
Feng Yan, The Hong Kong Polytechnic University

10:35 – 11:00 **Invited**
Droplets driving and sensing pixel circuits for thin film transistor-based digital microfluidics
Dongping Wang, Chunyu Chang, Chinese Academy of Sciences; Yingbo Wei, Jun Yu, Arokia Nathan, Shandong University; Hanbin Ma, Chinese Academy of Sciences

11:00 – 11:25 **Invited**
Mesoporous titania based synaptic device characteristics
Hyun Ho Lee, Myongji University

11:25 – 11:50 **Invited**
Characteristics of oxide TFT using atomic-layer deposited InO_x-based metal oxide channel
Toshihide Nabatame, Riku Kobayashi, Kazuhito Tsukagoshi, National Institute for Materials Science

11:50 – 12:00 End of Meeting Remark

12:00 Lunch (Ryusei Room)

Poster Presentations

International Conference on Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors

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Engineering Conferences International

Poster Presentations

1. **Extract coefficients of thermal expansion of TaN thin film by tuning the N_2 gas flow in the PVD process**
   Yao-Zih Lai, Weileun Fang, National Tsing Hua University, Yu-Chen Hsin, Industrial Technology Research Institute

2. **Highly sensitive broadband phototransistors based on gradient tin/lead mixed thin film perovskites**
   Hok-Leung Loi, Feng Yan, The Hong Kong Polytechnic University

3. **Ultra-sensitive and portable organic electrochemical transistors for noninvasive saliva glucose monitoring**
   Zeyu Zhao, Feng Yan, The Hong Kong Polytechnic University

4. **Flexible Ion-selective biosensors for sweat analysis**
   Zhiyuan Tian, Feng Yan, The Hong Kong Polytechnic University

5. **Vertical oxide semiconductor field-effect transistor with extremely low off-state current**
   Takeya Hirose, Tomonori Nakayama, Masataka Nakada, Manabu Sato, Tomoaki Atsumi, Masahiro Takahashi, Satoru Saito, Hitoshi Kunitake, Hideaki Shishido, Takanori Matsuzaki, Shunpei Yamazaki, Semiconductor Energy Laboratory Co., Ltd.

6. **Analysis of carrier injection under high temperature AC operation in top gate IGZO TFTs**
   Kuan-Ju Zhou, Ting-Chang Chang, National Sun Yat-Sen University. Po-Hsun Chen, Military Academy. Bo-Shen Huang, National Sun Yat-Sen University. Simon M. Sze, National Yang Ming Chiao Tung University

7. **Clean dry etching of Cu and Ni alloy metal thin film by reactive proton assisted etching**
   MunPyo Hong, Donghoon Kim, Sangheon Lee, Minyoung Kim, Sungyoun Lee, Jin Nyoung Jang, Jong Hwa Lee, Chiwoo Kim, Sang-Gab Kim, Korea University

8. **Room temperature gas sensing with a hybrid poly-Si/ZnO TFT cell**
   Horng-Chih Lin, Jen-Chi Liao, Ping-Che Liu, Pei-Wen Li, National Yang Ming Chiao Tung University

9. **Donor activation in boron and phosphorus implanted self-aligned bottom-gate Igzo Tfts**
   Eli Powell, Muhammad Kabir, Rahnuma Chowdhury, Karl Hirschman, Rochester Institute of Technology. Robert Manley, Bin Zhu, Corning Incorporated

10. **Ambipolar oxide thin-film transistor-based artificial synapses**
    Chihsin Huang, Kenji Nomura, University of California San Diego

11. **Hafnium oxide-based ferroelectric thin-film transistor with a-InGaZnO channel fabricated at temperatures <= 350°C**
    Che-Chuan Lee, Chun-Wei Chang, Min-Hung Lee, I-Chun Cheng, National Taiwan University

12. **P-type tin monoxide thin-film transistors on cellulose nanopaper substrates**
    You-Hong Zhang, Pu-Yuan Lin, Feng-Cheng Chang, I-Chun Cheng, National Taiwan University

13. **Electrical performance of amorphous IGZO thin-film transistor on cellulose nanopaper substrate**
Zi-Fan Cao, Chih-Han Tseng, Feng-Cheng Chang, I-Chun Cheng, National Taiwan University