



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

CONFERENCE PROGRAM

Conference Chair: Bich Yen Nguyen

General Chair: Yuichiro Mitani

Executive Chair: Thuy B. Dao

Local Arrangement Chair: John Stone

Keynote Speaker Chair: Aaron Thean

Tutorial Chair: Kenji Okada

Publicity & Award Chair: Mariam Sadaka

Publication Chair: Vern Baumberger

Treasurer: Dina H. Triyoso

Secretary: Koji Eriguchi



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Technical Program Committee Members

Jan Ackaert, ON Semiconductors
Serge Bardy, NXP
Lorenzo Cerati, ST Microelectronics
Adrian Chasin, imec
Kin P. (Charles) Cheung, NIST
Xi Chen, Qualcomm
Stefano D'Amico, University of Salento
Thuy B. Dao, NXP
Thomas Ernst, CEA/LETI
Bao Fang, Qualcomm
Koji Eriguchi, Kyoto University
Philippe Galy, ST Microelectronics
Steve Heinrich-Barn, Texas Instruments
Hideto Hidaka, Renesas
Rouwaida Kanj, American Univ. of Beirut
John Stone, NXP
Dong X. Mai, ICDREC
Kenji Okada, TowerJazz Panasonic
Semiconductor

Vern Baumberger, GNostics
Paul Grudowski, NXP
Yuichiro Mitani, Toshiba
Bich-Yen Nguyen, Soitec
Fabio Pellizzer, Micron
Jurgen Pille, IBM
Shivam Priyadarshi, Qualcomm
Mariam Sadaka, Soitec
Ashoka Sathanur, Philips
Andrea Scarpa, NXP
Mirko Scholz, imec
Xuan-Tu Tran, VNU-UET
Dina Triyoso, GLOBALFOUNDRIES
Xin Lin, NXP
Nuo Xu, Samsung
Liang Men, Apple
Mo L. Dang, ICDREC
Wenke Weinreich, IMEC
Akif Sultan, GLOBALFOUNDRIES



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

This meeting is sponsored by:



Central Texas Section



SECURE CONNECTIONS
FOR A SMARTER WORLD



SECURE CONNECTIONS
FOR A SMARTER WORLD



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Conference Program Overview

Wednesday, May 24th, 2017

| | |
|--|---------------------|
| Opening remarks (Bich-Yen Nguyen) | 09:00 AM – 09:10 AM |
| Keynote: Dr. Philippe Flatresse, ST Microelectronics | 09:10 AM – 09:55 AM |
| Keynote: Dr. Ron Martino, NXP | 09:55 AM – 10:40 AM |
| Coffee Break | 10:40 AM – 11:00 AM |
| Session A: Advanced Transistors/Materials (Chairs: Thuy Dao and Dina Triyoso) | 11:00 AM – 12:15 PM |
| Workshop A | 12:15 PM – 01:00 PM |
| Lunch | 01:00 PM – 02:00 PM |
| Session B: Advanced Memory Technologies (Chairs: Hideto Hidaka, Olivier Webber) | 02:00 PM – 02:50 PM |
| Session C: RF, Analog and Mixed-Signal (Chairs: Stefano D'Amico and Andrea Scarpa) | 02:50 PM – 03:50 PM |
| Coffee Break | 03:50 PM – 04:00 PM |
| Session D: SoC, DFM, CAD (Chairs: Rouwaida Kanj and Stephen Heinrich-Barn) | 04:00 PM – 05:00 PM |
| Workshop B, C & D | 05:00 PM – 06:00 PM |
| Reception at Salt Lick BBQ-Driftwood | 06:45 PM – 08:45 PM |



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Conference Program Overview

Thursday, May 25th, 2017

| | |
|--|---------------------|
| Opening remarks (Yuuichiro Mitani) | 09:00 AM – 09:10 AM |
| Keynote: Dr. Yang Du, Qualcomm..... | 09:10 AM – 09:55 AM |
| Keynote: Dr. Mark Rodder, Samsung..... | 09:55 AM – 10:40 AM |
| | |
| Coffee Break | 10:40 AM – 11:00 AM |
| Session E: Focus Session on IoT and Autonomous Car | |
| (Chairs: Mariam Sadaka, Philippe Flatresse) | 11:00 AM – 12:00 AM |
| Lunch | 12:00 AM – 01:00 PM |
| Session F: Low Power and 3D Integration | |
| (Chairs: Xuan-Tu Tran and Paul Grudowski)..... | 01:00 PM – 02:00 PM |
| Session G: Emerging Technology | |
| (Chairs: Thomas Ernst, Louis Hutin)..... | 02:00 PM – 02:50 PM |
| Coffee Break | 02:50 PM – 03:10 PM |
| Session H: Quantum Computing and Advanced Materials | |
| (Chairs: Philippe Galy)..... | 03:10 PM – 03:35 PM |
| Session I: Reliability | |
| (Chair: Yuuichiro Mitani and Kochi Eriguchi)..... | 03:35 PM – 04:00 PM |
| Workshop F, G, H, & I | 04:00 PM – 05:00 PM |
| Awards, Closing Remarks and ICICDT 2018 Announcement | 05:00 PM – 05:30 PM |
| | |
| Post Conference Meeting for TPC | 05:30 PM – 08:00 PM |



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Conference Program

Wednesday, May 24th, 2017

9:00 AM Welcome and opening remarks – Bich-Yen Nguyen

Keynote

Wednesday, May 24th, 2017

9:10 AM *Keynote- Leveraging Body Bias in Automotive and IoT applications*, Dr. Philippe Flatresse – (ST Microelectronics)

9:55 AM *Keynote-Advanced Technology for Automotive Cockpits, Industrial Human-Machine-Interface and IoT Systems – Optimization of Technology – Architecture – Design* – Dr. Ron Martino (VP, NXP)

10:40 AM: Coffee Break

Session A – Advanced Transistors and Materials

Wednesday, May 24th, 2017

Session Chairs: Thuy Dao

11:00 AM *Invited - III-V-based low power CMOS devices on Si platform*, S. Takagi, C.-Y. Chang, D. Ahn, M. Noguchi, T. Gotow, K. Nishi, S.-H. Kim, S. H. Yoon, C. Yokoyama and M. Takenaka, *The University of Tokyo, Japan*



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

11:15 AM **Layout Engineering to Suppress Hysteresis of Negative Capacitance FinFET**, Eunah Ko, Jaesung Jo, Changhwan Shin (1) and Bich-Yen Nguyen (2), *1: University of Seoul, Korea; 2: Soitec. USA*

11:25 AM **Invited - FDSOI material enabling CMOS technology disruption from 65nm to 12nm and beyond**, W. Schwarzenbach, M. Sellier, B.-Y. Nguyen, C. Girard, C. Maleville, *Soitec, France*

11:40 AM **Characterization of atomic layer deposited low-k spacer for FDSOI high-k metal gate transistor**, D.H. Triyoso, G.R. Mulfinger, K. Hempel, H. Tao, F. Koehler, L. Kang, A. Kumar, T. McArdle, J. Holt, A.L. Child, S. Straub, F. Ludwig, Z. Chen, J. Kluth, and R. Carter, *GLOBALFOUNDRIES, USA*

11:50 AM **Invited - Nonlinear Optics with fully integrated transition metal oxides**, Alex Demkov, *University of Texas-Austin*

12:05 PM **Microstructure and ferroelectricity of BaTiO₃ thin films on Si for integrated photonics**, Kristy J. Kormondy (1), Youri Popoff (2), Marilyne Sousa (2), Felix Eltes (2), Daniele Caimi (2), Marta D. Rossell (3), Manfred Fiebig (4), Patrik Hoffmann (5, 6), Chiara Marchiori (2), Michael Reinke (5, 6), Morgan Trassin (4), Alexander A. Demkov (1), Jean Fompeyrine (2), and Stefan Abel (2), *1: University of Texas-Austin, 2: IBM Research, 3,5: Swiss Federal Laboratories, 4: ETH Zurich, 6:EPFL*

12:15 PM - 01:00 PM Workshop Sessions A

01:00 PM - 02:00 PM Lunch



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Session B – Advanced Memory Technologies

Wednesday, May 24nd, 2017

Session Chair: Hideto Hidaka and Olivier Webber

- 2:00 PM *Invited* - **SRAM Designs for 5nm Node and Beyond: Opportunities and Challenges**, T. Huynh-Bao, J. Ryckaert, A. Spessot, D. Verkest, A. Mocuta, *IMEC, Belgium*
- 2:15 PM **An Approximate Embedded SRAM for Low-Power Multimedia Applications**, Samira Ataei and James E. Stine, *Oklahoma State University, Stillwater, USA*
- 2:25 PM **Dedicated Technology Threshold voltage tuning for 6T SRAM beyond N7**, Mohit Kumar Gupta (1, 2), Pieter Weckx (2), Stefan Cosemans (2), Pieter Schuddinck (2), Rogier Baert (2), Doyoung Jang (2), Yasser Sherazi (2), Praveen Raghavan (2), Alessio Spessot (2), Anda Mocuta (2), Wim Dehaene (1, 2), *1: KU Leuven, 2: IMEC, Belgium*
- 2:35 PM *Invited* - **NRAM Status and Prospects**, David Gilmer, *Nantero, USA*

Session C – RF, Analog and Mixed-Signal

Wednesday, May 24nd, 2017

Session Chairs: Stefano D'Amico and Andrea Scarpa

- 2:50 PM **Capacitor Rearrangement Mismatch Calibration in SAR ADCs for Resolution Enhancement**, Fan, Hua (1); Maloberti, Franco (2); Li, Dagang (3); Hu, Daqian (3); Cen, Yuanjun (3); Heidari, Hadi (4); *1: University of Electronic Science and Technology of China, People's Republic of China, 2: University of Pavia; 3: Chengdu Sino Microelectronics Technology Co.,Ltd, 4: University of Glasgow*
- 3:00 PM **A 123-dB SNDR, Low Power and High Performance Delta-Sigma Modulator**, Nga Ngo Thi Thu, Hoa Nguyen An, *Integrated Circuit Design Research and Education Center, Vietnam National University Ho Chi Minh city, Ho Chi Minh City, Vietnam*



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

- 3:10 PM **Systematic Approach to Optimal SC Converter Synthesis for Multi Voltage-Gain-Ratio Applications**, Mahnashi, Yaqub; Peng, Fang; *Michigan State University, USA*
- 3:20 PM **Wideband Inductorless CMOS RF Front End For LTE Receivers**, Badr, Eman (1), Shawkey, Heba (4); Ismail, Yehea (2, 3); Zekry, Abdelhalim (1); *1: Faculty of Engineering Ain Shams University, Cairo, 2: American University in Cairo, 3: Zewail City for Science and Technology, Giza, 4: Electronics Research Institute (ERI), Giza, Egypt*
- 3:30 PM **-95.4dBc/Hz@10kHz and 11.5mW Frequency Synthesizer for GPS RF Receiver**, Xuan Dong Mai, Hoang Duc Ngo, *Integrated Circuit Design Research and Education Center, Vietnam National University Ho Chi Minh city, Ho Chi Minh City, Vietnam*
- 3:40 PM **Fluids energy harvesting system with low cut-in velocity piezoelectric MEMS**, Biccario G.E. (1, 2); De Vittorio M. (1, 2); D'Amico S. (2); *1: CBN – Center for Biomolecular Nanotechnologies, IIT – Istituto Italiano di Tecnologia, Lecce, Italy, 2: Dipartimento di Ingegneria dell'Innovazione – Università del Salento, Lecce, Italy*
- 3:50 PM - 4:00 PM Coffee Break

Session D: SoC, DFM. CAD

Wednesday, May 24nd, 2017

Session Chairs: Rouwaida Kanj and Steve Heinrich-Barna

- 4:00 PM *Invited* - **Statistical Circuit Performance Dependency Analysis via Sparse Relevance Kernel Machine**, Honghuang Lin (1), Peng Li (2), Asad Khan (3), *1: Texas Instruments, 2: Texas A&M University, USA*
- 4:15 PM *Invited* - **Process Variation Aware STT-RAM simulation Tool: NVSim-VXs**, Enes Eken (1), Linghao Song (1), Ismail Bayram (1), Cong Xu (2), Wujie Wen (3), Y. Xie (4), Y. Chen (1), *1: University of Pittsburgh, USA, 2: Hewlett Packard Labs, USA, 3:*



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Florida International University, USA; 4: University of California at Santa Barbara, USA

- 4:30 PM **Toward GDBIMOS for thin silicon ESD protection in advanced FDSOI CMOS technologies**, De Conti, Louise (1, 2, 3); Bedecarrats, Thomas (1, 2, 3); Vinet, Maud (3); Cristoloveanu, Sorin (2); Galy, Philippe (1); *1: STMicroelectronics, 2: IMEP, 3 Parvis Louis Néel, 3: CEA LETI, France*
- 4:40 PM **A resistance model of integrated octagonal-shaped Hall sensor using JFET compact model**, Skalsky, Milos (1); Banas, Stanislav (2); Panko, Vaclav (2); *1: ON Semiconductor, USA, 2: ON Semiconductor, Czech Republic*
- 4:50 PM **Yield and Energy Tradeoffs of an NVLatch Design using Radial Sampling**, Issa, Adam (1); Kanj, Rouwaida (1); Chehab, Ali (1); Joshi, Rajiv (2); *1: American university of Beirut, Lebanon, 2: IBM TJ Watson Labs. USA*
- 5:00 PM – 6:00 PM: Workshop Sessions B, C & D
- 6:45 PM – **Reception at Salt Lick BBQ in Driftwood**



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Thursday, May 25th, 2017

9:00 AM Opening remarks – Yuichiro Mitani

Keynote

9:10 AM *Keynote- IoT: fueling the next wave of industrial IC innovations*, Dr. Yang Du
(Senior Director, *Qualcomm*)

9:55 AM *Keynote- Technology Scaling Challenges to System-Level Opportunities* - Dr.
Mark Rodder (SVP, *Samsung*)

10:40 AM Coffee Break

Session E – Focus Session- IoT and Autonomous Car

Thursday, May 25th, 2017

Session Chairs: Mariam Sadaka, Philippe Flatresse

11:00 AM *Invited - SOTB (Silicon on Thin Buried Oxide): More than Moore technology for IoT and Automotive*, Takumi Hasegawa, Yoshiki Yamamoto, Hideki Makiyama, Hiroki Shinkawata, and Shiro Kamohara, *Renesas Electronics, Japan*

11:30 AM *Invited – Fully Depleted Device Design for Ultra Low Power & IoT applications*, Olivier Webber, *CEA-Leti, France*

12:00 AM - 01:00 PM

Lunch



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Session F – Low Power and 3D Technologies

Thursday, May 25th, 2017

Session Chairs: Xuan-Tu Tran, Paul Grudowski

- 1:00 PM *Invited* - **A 910nW Delta Sigma Modulator using 65nm SOTB Technology for Mixed Signal IC of IoT Applications**, Ishibashi, Koichiro (1); Kikuchi, Junya (1); Sugii, Nobuyuki (2); *The University of Electro-Communications, Japan, 2: Low-power Electronics Association & Project*
- 1:15 PM **Power Consumption Estimation using VNOC2.0 Simulator for a Fuzzy-Logic based Low Power Network-on-Chip**, Phan, Hai-Phong (1); Tran, Xuan-Tu (1); Yoneda, Tomohiro (2); *1: VNU - University of Engineering and Technology, Vietnam, 2: National Institute of Informatic*
- 1:25 PM **Low Power Fast Wakeup Flash Memory System for Embedded SOCs**, Ramanan, Karthik; Williams, Jacob, *NXP Semiconductor, USA*
- 1:35 PM **Low Power Adiabatic Logic Based on 2PC2AL**, Han, Mei; Takahashi, Yasuhiro; Sekine, Toshikazu, *Gifu University, Japan*
- 1:45 PM *Invited* - **Innovative and 3D Stacking Micro Electro Mechanical Systems (I-MEMS) for Power Saving**, Kiyoshi Mori (1), Ziep Tran (1), Giang Dao (1), Michael Ramon (1), Jason Woo (2), Peng Lu (2), *1: INOSO, Austin, Texas, 2: University of California, Los Angeles, California, USA.*



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Session G – Emerging Technology

Thursday, May 25th, 2017

Session Chair: Thomas Ernst

- 2:00 PM *Invited - Electronic, Thermal, and Unconventional Applications of 2D Materials*, Eric Pop, *Stanford University, USA*
- 2:15 PM *Invited - Integrated electrical sensing for high-throughput bioanalytics*, Carlotta Guiducci, *EPFL, Swiss*
- 2:30 PM: **Dadda Multiplier Designs Using Memristors**, Guckert, Lauren Elise; Swartzlander, Jr., Earl E.; *University of Texas at Austin, USA*
- 2:40 PM: **Design considerations for optimization of pull-instability margin in electrostatic N/MEM relays**, Giulia Usai (1), Louis Hutin (1), Jose Luis Muñoz-Gamarra (1), Thomas Ernst (1), Maud Vinet (1), Philip X.-L. Feng (2), *1: CEA Leti, France, 2: Case School of Engineering Case Western Reserve University, USA*
- 2:50 PM – 3:10 PM Coffee Break

Session H – Quantum Computing and Advance Materials/Applications

Thursday, May 25th, 2017

Session Chair: Philippe Galy

- 3:10 PM *Invited - SOI CMOS Technology for Quantum Information Processing: a path towards quantum bits and control electronics co-integration?*, Louis Hutin, *CEA-LETI, France*
- 3:25 PM **Advances of the development of a ferroelectric field-effect transistor on Ge(001)**, Patrick Ponath^a, Agham Posadas^a, Michael Schmidt^b, Paul Hurley^b, Ray Duffy^b, Jian Wang^c, Chadwin Young^c, Alexander A. Demkov^a, *The University of Texas at Austin*, ^b*Tyndall National Institute, Cork, Ireland*, ^c*The University of Texas at Dallas, USA*



International Conference on IC Design and Technology (ICICDT)



May 23rd – 25th, 2017
Austin, Texas, USA
www.icicdt.org

Session I: Reliability

Thursday, May 25th, 2017

Session Chair: Yuichiro Mitani, Koji Eriguchi

- 3:35 PM *Invited* - **Interfacial Transition Layer in Thermally grown SiO₂ Film on 4H-SiC**,
Ryu Hasunuma and Kikuo Yamabe, *University of Tsukuba, Japan*
- 3:50 AM **Circuit-level Simulation Methodology for Random Telegraph Noise by Using Verilog-AMS**, Takuya Komawaki (1), Michitarou Yabuuchi (1), Ryo Kishida (1), Jun Furutay (1), Takashi Matsumoto (2), Kazutoshi Kobayashi (1), *1: Kyoto Institute of Technology, 2: University of Tokyo, Japan*
- 4:00 PM Workshop Sessions F, G, H & I
- 5:00 PM: Best student paper award, Closing Remarks & Presentations of ICICDT 2018.
- 5:30 PM Post Conference Meeting for TPC