IEEE ELECTRON DEVICES SOCIETY

imw 2018

10th International Memory Workshop

May 13th – 16th 2018

The Westin Miyako, Kyoto, Japan

Keage, Sanjo, Higashiyama-ku Kyoto,
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Summary of Events

Sunday, 5/13

Registration	7:00AM – 5:00PM
Tutorial	8:30AM – 11:45AM
Lunch Break (provided)	11:45AM – 1:45PM
Tutorial	1:45PM– 4:45PM

Monday, 5/14

Registration	7:00AM – 6:00PM
Opening remarks	8:30AM – 8:50AM
Session #1	8:50AM – 11:20AM
Committee Luncheon	12:00PM – 2:00PM
Lunch Break (on your own)	
Session #2	2:00PM – 3:40PM
Panel discussion	4 :00PM – 5:30PM
Reception	5:30 PM - 8:30PM
Poster Session	6:00PM – 8:30PM

Tuesday, 5/15

Registration	7:00AM – 5:00PM
Session #3	8:30AM – 11:30AM
Lunch Break (on your own)	11:30AM – 2:00PM
Session #4	2:00PM – 5:00PM
Banquet (provided)	7:00PM – 9:00PM

Wednesday, 5/16

Registration	7:00AM – 12:00PM
Session #5	8:30AM– 11:10AM
Lunch Break (provided)	11:10 AM – 1:00PM
Session #6	1:00 PM – 2:40PM
Award & Closing Remarks	2:40 PM – 3:30PM

Sunday May 13th, 2018

Tutorial Registration on site: 7:00AM – 5:00PM

Tutorials **8:30AM-4:45 PM**

Chairs: Alfonso Maurelli, STMicroelectronics, Italy
Anirban Roy, NXP, Netherlands

PART I – 3D NAND and Embedded Memories
8:30AM – 11:45AM

Tomoya Saito, Renesas, « Split-Gate MONOS embedded Flash Technology for Automotive Applications »

Igor Kouznetsov, Cypress, « Embedded Flash for Consumer and Industrial Applications in the age of IoT »

Sean Kang, Applied Materials, « Materials, Processes, Equipment Perspectives of 3D NAND Technology and Its Scaling »

Geert Van den bosch, IMEC, « Understanding and improving conduction in 3D NAND channels »

Lunch, provided (11:45 – 1:45)

PART II - Neuromorphic Memories
1:45PM– 4:45PM

Damien Querlioz, Univ. Paris-Sud, « Correspondence between emerging memories and neuromorphic computing: the case of spintronic devices»

Philippe Talatchian, CNRS, « Neuromorphic Computing with Spintronic Nano-Oscillators »

Dmitri Strukov, UC Santa Barbara, « Opportunities and challenges for neurocomputing with nonvolatile memory devices »

Tian-Sheuan Chang, National Chiao Tung University, « Current status and future outlook of AI accelerator: from digital to in-memory computing»

Tuo-Hung Hou, National Chiao Tung University, «RRAM-based neuromorphic computing: Device and algorithm co-design»

Poster Session

Monday May 14th, 2018 6:00 PM – 8:30 PM

[P1] Si Joon Kim, The University of Texas at Dallas, “Ferroelectric TiN/Hf0.5Zr0.5O2/TiN Capacitors with Low-Voltage Operation and High Reliability for Next-Generation FRAM Applications”

[P2] Hangbing Lv, “Switching and Failure Mechanism of Self-selective Cell in 3D VRRAM by RTN-based Defect Tracking Technique”

[P3] Roger Lo, Macronix International Co., Ltd., “Study of Thyristor-Mode Dual-Channel NAND Flash Devices”

[P4] Juseop Park, Samsung Electronics, “A Built-In Self Test Compensating Process-Voltage Variation in Data Paths of High Performance DRAMs”

[P5] Fiona Wang, Rambus Inc. “DRAM Retention at Cryogenic Temperatures”

[P6] Yuri Tkachev, Silicon Storage Technology, “The Analysis of Erase Voltage Variability in 70-nm Split-Gate Flash Memory Arrays”

[P7] Manan Suri, Indian Institute of Technology – Delhi, “High-Quality PUF Extraction from Commercial RRAM using Switching-Time Variability”

[P8] Nhan Do, Silicon Storage Technology, A subsidiary of Microchip Technology Inc “Scaling of Split-Gate Flash Memory with 1.05V Select Transistor for 28nm Embedded Flash Technology”

[P9] S.H. Ku, Macronix International Co., “Error Characterization and ECC Usage Relaxation beyond 20nm Floating Gate NAND Flash Memory”

[P10] Gilbert Sassine, CEA-LETI, “Optimizing programming energy for improved RRAM reliability for high endurance applications”

[P11] Mitsue Takahashi, National Institute of Advanced Industrial Science and Technology, “High-Endurance Ferroelectric NOR Flash Memory Using (Ca,Sr)Bi2Ta2O9 FeFETs”

[P12] Yi Li, Huazhong University of Science and Technology, “Implementation of Functionally Complete Boolean Logic and 8-bit Adder in CMOS Compatible 1T1R RRAMs for In-Memory Computing”

[P13] Mrinmoy Dutta, Chang Gung University, “Cu filament based resistive switching and oxidation-reduction through dopamine sensing in novel Cu/MoS2/TiN structure”

[P14] Shogo Matsumoto, Graduate School of Informatics, Kyoto University, “RRAM/CMOS-Hybrid Architecture of Annealing Processor for Fully Connected Ising Model”

[P15] Julien Tranchant, Institut des Matériaux Jean Rouxel (IMN), Université de Nantes, CNRS, “Mott memory devices based on the Mott insulator (V1-xCrx)2O3”

Monday May 14th, 2018

Registration 7:00 AM - 6:00 PM

Session #1 8:30 AM – 11:20 AM Invited keynotes

Chairs: **Gabriel Molas, CEA LETI, France**
Akira Goda, Micron, USA

8:30 AM Gabriel Molas, Opening Remarks
8:50 AM **[1-1]**Satoshi Inaba, Toshiba Memory "3D Flash Memory for Data-intensive Applications"
9:20 AM **[1-2]** Gurtej S. Sandhu, Micron "Future of DRAM"

9:50 AM Break (Refreshments Provided)

10:20 AM **[1-3]** Hai Wang, NXP, "Challenges in Automotive Memory Solutions"
10:50 AM **[1-4]** Stefan Müller, FMC, « Ferroelectric HfO2 and its Impact on the Memory Landscape »
11:20 AM Lunch Break (on your own)
12:00 PM Committee Luncheon

Session #2 2PM – 3:40 PM PCM and selectors

Chairs: **Wataru Otsuka, SONY, Japan**
TBD

2:00 PM **[2-1]** Gabriele Navarro, LETI, "Phase-Change Memory: Performance, Roles and Challenges", ***invited***
2:25 PM **[2-2]** Anthonin Verdy, CEA-LETI, "High Temperature Stability and Performance Analysis of N-doped Ge-Se-Sb based OTS Selector Devices"
2:50 PM **[2-3]** Jean-Jacques Fagot, STMicroelectronics, "Low Cost Diode as Selector Device for Embedded Phase Change Memory in Advanced FD-SOI Technology"
3:15 PM **[2-4]** Marinela Barci, IMEC, "Engineering and Stack Optimization of Cu-based Selector Devices for Low Power SCM Applications"

3:40 PM Break (Refreshments Provided)

Panel discussion 4:00 PM – 5:30 PM

In-Memory Computing

Moderator: Zvonimir Bandic, Western Digital, USA

Reception: 5:30 PM

Chair: Gill Lee, Applied Materials, USA

Sponsor: Applied Materials, Inc., USA

Poster Session: 6:00 PM – 8:30 PM

Chair: Gill Lee, Applied Materials, USA

6:00 PM Poster Introduction

(See the front page for the list of poster papers)

Tuesday May 15th, 2018

Registration 7:00 AM - 5:00 PM

Session #3 8:30 AM – 11:30 AM RRAM and Emerging Memories

Chairs: **Pawan Singh, Cypress, USA**
Damien Deleruyelle, INSA de Lyon**, France**

8:30 AM **[3-1]** Kazuhiro Ohba, SONY, "Cross point Cu ReRAM with BC doped Selector", ***invited***
8:55 AM **[3-2]** Janaki Radhakrishnan, IMEC & KU Leuven, "On the key impact of composition of Ge-Te and Ge-Se electrolytes on CBRAM properties"
9:20 AM **[3-3]** Masashi Arita, Hokkaido University, "Oxygen distribution around filament in Ta-O resistive RAM fabricated using 40 nm CMOS technology"

9:45 AM Break (Refreshments Provided)

10:15 AM **[3-4]** Subhali Subhechha, imec/KU Leuven, imec/KU Leuven, "Understanding endurance in TiN/a-Si/TiOx/TiN RRAM devices"
10:40 AM **[3-5]** Mahendra Pakala, Applied Materials, "Materials & Processes for Emerging Memory", ***invited***

Session #3 (continued) Embedded Memory (Late News)

11:05 AM **[3-6]** James Pak, Cypress Semiconductor Corporation, "40nm & 22nm Embedded Charge Trap Flash for Automotive Applications", ***Late News***
11:30 AM Lunch (On your own)

Session #4 2:00 PM – 5:00 PM MRAM and Memory Periphery

Chairs: **Gwan-Hyeob Koh, Samsung, Korea**
Tomoya Sanuki, Toshiba Memory, Japan

2:00 PM **[4-1]** Yiming Huai, Avalanche, "High density 3D Cross-point STT-MRAM ", ***invited***
2:25 PM **[4-2]** Luc Tillie, CEA-LETI, "Temperature limits of single and composite storage layer with different thicknesses and capping materials for p-STT-MRAM applications"
2:50 PM **[4-3]** Hideo Sato, Center for Innovative Integrated Electronic Systems, Tohoku University, "1T-1MTJ type embedded STT-MRAM with advanced low-damage and short-failure-free RIE technology down to 32 nm MTJ patterning"
3:15 PM Break (Refreshments Provided)

3:45 PM **[4-4]** Bharat Bhushan, GLOBALFOUNDRIES Singapore Pte. Ltd., "Enhancing Magnetic Immunity of STT-MRAM with Magnetic Shielding"
4:10 PM **[4-5]** Won Ho Choi, Western Digital Research, "A Comprehensive Study on DDR4 MRAM and ReRAM Power Estimation using a Parameterized NVM Power Calculator"
4:35 PM **[4-6]** Alessio Spessot, IMEC, "Cost effective FinFET platform for Stand Alone DRAM 1Y and beyond memory periphery"

Banquet 7:00 PM - 9:00 PM (provided)

Wednesday May 16th, 2018

Registration 7:00 AM - 12:00 PM

Session #5 8:30 AM – 11:10 AM RRAM and Neuromorphic

Chairs: **Hangbing Lv, IME, China**
Wei-Chen Chen, Macronix, Taiwan

8:30 AM **[5-1]** Satoru Ito, Panasonic, "ReRAM technologies for embedded memory and further applications", ***invited***
8:55 AM **[5-2]** Yoshiaki Deguchi, Chuo University, "Error-Reduction Controller Techniques of TaOx-based ReRAM for Deep Neural Networks to Extend Data-Retention Lifetime by Over 1700x"
9:20 AM **[5-3]** Qiangfei Xia, University of Massachusetts Amherst, In-Memory Computing with Memristor Arrays"

9:45 AM Break (Refreshments Provided)

10:15 AM **[5-4]** Toshitsugu Sakamoto, NEC, "Atom switch with improved cycle endurance using field enhancement for nonvolatile SoC"
10:40 AM **[5-5]** Marco Sforzin, Micron, "Self-Referenced Read methodology for EMs"

11:10 AM Lunch (Provided)

Session #6 1:00 PM – 2:40 PM 3D NAND and Embedded

Chairs: **Tomoya Sanuki, Toshiba Memory, Japan**
Rino Micheloni, Microsemi, Italy

1:00 PM **[6-1]** Hung-Sheng Chang, Macronix, "System Performance Analysis of Bit-Alterable 3D NAND Flash Devices for High-Performance Solid-State Drive (SSD) Applications"
1:25 PM **[6-2]** Yung Chun Lee, Macronix, "Study of Counter-Pulse (CP) Programming Method to Improve the Vt Distribution for 3D Charge-Trapping NAND Flash Devices"
1:50 PM **[6-3]** Yoshiaki Deguchi, Chuo University, "3D-NAND Flash Solid-State Drive (SSD) for Deep Neural Network Weight Storage of IoT Edge Devices with 700x Data-retention Lifetime Extention"
2:15 PM **[6-4]** Igor Kouznetsov, Cypress Semiconductor, "40 nm Ultralow-Power Charge-Trap Embedded NVM Technology for IoT Applications"

2:40 PM – 3:30 PM
Best Paper Award announcement
Closing Remarks & Adjourn