

# Non-Volatile Memory Technology Symposium, 2013

August 12 - 14, 2013

University of Minnesota, Minneapolis, MN

## NOTES

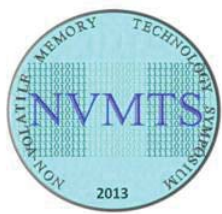
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Monday, August 12

8:20 AM	<b>Jian-Ping Wang</b> , <i>University of Minnesota</i> Welcome and Opening Remarks	
8:30 AM	<b>Keynote Speaker</b> <b>Gurtej Sandhu</b> , <i>Micron</i> Emerging Memory Technology Landscape	A-1
SESSION 1: FLASH		
9:10 AM	<b>Akira Goda</b> , <i>Micron</i> Recent Progress and Future Directions in NAND Flash Scaling	A-2
SESSION 2: MRAM 1		
9:35 AM	<b>Jian-Ping Wang</b> , <i>University of Minnesota</i> Challenges and Opportunities of Magnetoresistive Based Memory and Logic and their Integration	A-3
10:00 AM	<b>Kaushik Roy</b> , <i>Purdue University</i> Robust Low-Power Multi-Terminal STT-MRAM	A-4
10:25 AM	COFFEE BREAK	
SESSION 3: MRAM 2		
10:45 AM	<b>Jean-Pierre Nozieres</b> , <i>Spintech, CEA/CNRS/UJF</i> Thermally Assisted Switching STT MRAM	A-5
11:10 AM	<b>Naoharu Shimomura</b> , <i>Toshiba</i> High Speed and Low Current STT-MRAM for Normally-Off Computing	A-6
11:35 AM	<b>Romney Katti</b> , <i>Honeywell</i> MRAM: Magneto-Resistive Random Access Memory	A-7
12:00 PM	<b>An Chen</b> , <i>GLOBALFOUNDRIES</i> Selector Devices for Emerging Memory Architectures	A-8
12:25 PM	<b>Lunch</b> Lunch will be held at the McNamara Alumni Center, please see the campus map located in the Quick Reference Guide in the front pocket of your program.	

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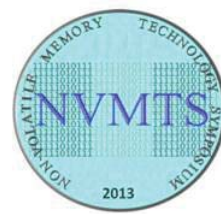


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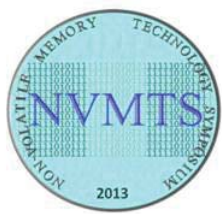
University of Minnesota, Minneapolis, MN



Monday, August 12

SESSION 4: RRAM 1		
1:30 PM	<b>Gabriel Molas</b> , <i>Advanced Memory Technology</i> Investigation of Resistive Memories (RRAM) Potentialities - Switching Phenomena and Retention Performances	B-1
1:55 PM	<b>Stephan Tappertzhofen</b> , <i>Aachen University, Institute of Solid State Research</i> New Insights into Redox Based Resistive Switches	B-2
2:20 PM	<b>Huaqiang Wu</b> , <i>Tsinghua University, China</i> AlO <sub>x</sub> /WO <sub>x</sub> Bilayer Resistive Random Access Memory	B-3
2:55 PM	<b>James Bain</b> , <i>Carnegie Mellon University</i> Mechanism of Localized Electrical Conduction at the Onset of Electroforming in TiO <sub>2</sub> Based Resistive Switching Devices	B-4
3:20 PM	<b>Javen Lin</b> , <i>Rice University</i> SiO <sub>x</sub> Resistive Memory Device: Invisible Memory and 1D-1R 1 kbit Integration Application	B-5
3:45 PM	COFFEE BREAK	
SESSION 5: FERAM		
4:05 PM	<b>Akihito Sawa</b> , <i>AIST</i> Resistive Switching Memory Effect in a BiFeO <sub>3</sub> Ferroelectric Diode	B-6
4:30 PM	<b>Alexei Gruverman</b> , <i>University of Nebraska, Lincoln</i> Ferroelectric Memories Based on Resistive Switching	B-7
4:55 PM	<b>Edwin Kan</b> , <i>Cornell University</i> Ferroelectric Memories	B-8
5:20 PM	<b>Yukihiro Kaneko</b> , <i>Panasonic</i> A Dual-Channel Ferroelectric-Gate Field-Effect Transistor	B-9
6:00 PM	<b>Poster Session &amp; Social Hour</b> , McNamara Alumni Center Groups A, B, E, and F will be presenting posters at today’s session.	
7:30 PM	<b>Dinner</b> , McNamara Alumni Center	

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Tuesday, August 13

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8:30 AM	<b>Keynote Speaker</b> <b>Hongsik Jeong</b> , <i>Samsung</i> Evolution of PRAM Application with Challenging Technologies	C-1
SESSION 6: PCRAM		
9:10 AM	<b>Rong Zhao</b> , <i>Singapore University of Technology and Design</i> Manipulating Material Interfaces for Low current PCRAM	C-2
9:35 AM	<b>Xiangshui Miao</b> , <i>Hongzhong Univ. of Science and Technology</i> Chalcogenide Memristors for Neuromorphic Computing	C-3
10:00 AM	<b>Jaakko Akola</b> , <i>Tampere University of Technology, Finland</i> DFT Simulations of the Crystallization of the Phase-Change Material Ge <sub>2</sub> Sb <sub>2</sub> Te <sub>5</sub> : Insights on Nucleation and Percolation	C-4
10:25 AM	COFFEE BREAK	
SESSION 7: RRAM 2		
10:45 AM	<b>Eilam Yalon</b> , <i>Technion, Israel Institute of Technology</i> Heat Dissipation Mechanisms in Resistive Switching Devices	C-5
11:10 AM	<b>I-Wei Chen</b> , <i>University of Pennsylvania</i> CMOS-Compatible Nanometallic RRAM Devices	C-6
11:35 AM	<b>Bin Yu</b> , <i>State University of New York</i> Resistive Switching Behavior in Two-Dimensional Highly Crystalline Layered Dielectric	C-7
12:00 PM	<b>Ru Huang</b> , <i>Peking University</i> Resistive Switching in Organic Memory Devices for Extended Flexible Applications	C-8
12:25 PM	<b>Group Photo and Lunch</b> Please gather on the stairs of the main entrance to Tate Lab for a quick group photo. Lunch will then be held in the Mississippi River Room located on the 3rd level of Coffman Memorial Union. The NVMTS Planning Committee will be meeting in conference room 304.	



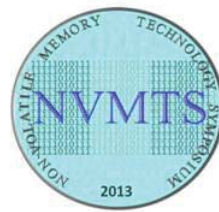
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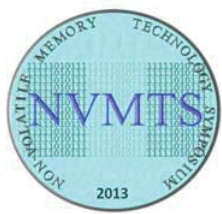
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Tuesday, August 13

SESSION 8: SIMULATION AND NEW CONCEPTS MEMORY		
1:45 PM	<b>Dmitri Nikonov</b> , <i>Intel</i> Simulation and Benchmarking of Spintronic Memory and Logic	D-1
2:10 PM	<b>Takahiro Hanyu</b> , <i>Tohoku University, Japan</i> Towards a Nonvolatile VLSI Processor Using MTJ/MOS-Hybrid Logic-in-Memory Architecture	D-2
2:35 PM	<b>Luping Shi</b> , <i>Tsinghua University, China</i> Recent Development of Artificial Cognitive Memory	D-3
3:10 PM	<b>Dorothee Petit</b> , <i>University of Cambridge</i> Magnetic Ratchet for 3-Dimensional Memory and Logic	D-4
3:35 PM	<b>Alex Shukh</b> , <i>Spingate Technology</i> Non-Volatile Spin Logic	D-5
4:10 PM	<b>Poster Session</b> , McNamara Alumni Center Groups B, C, and P will present posters at today's session. Poster Award Judgment and Decision Making	
6:00 PM	Bus Departs from McNamara Alumni Center to Dinner Venue	
6:15 PM	Dinner Cruise on Mississippi River, Social Hour	
7:30 PM	Dinner Cruise on Mississippi River, Dinner	
9:30 PM	Bus Returns to The Commons Hotel	

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Wednesday, August 14

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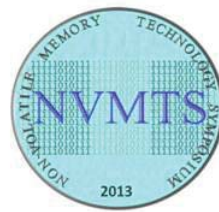
8:30 AM	<b>Keynote Speaker</b> <b>William Gallagher</b> , <i>IBM Watson Research Center</i> Emerging Nonvolatile Memories from an Enterprise System Company Perspective	E-1
SESSION 9: MRAM 3		
9:10 AM	<b>Kang Wang</b> , <i>University of California, Los Angeles</i> Voltage Controlled Spintronics for Nonvolatile Nanoelectronics	E-2
9:35 AM	<b>Wei-Gang Wang</b> , <i>University of Arizona</i> Voltage Induced Unipolar Switching in Magnetic Tunnel Junctions with Tunable Energy Barrier	E-3
10:00 AM	<b>Christian Binek</b> , <i>University of Nebraska, Lincoln</i> Voltage-controlled Exchange Bias for ultra-low power MRAM Applications	E-4
10:25 AM	COFFEE BREAK	
SESSION 10: MEMORY IN LOGIC		
10:45 AM	<b>Behtash Behin-Aein</b> , <i>GLOBALFOUNDRIES</i> Reconfigurable Spin Switch for Digital/Analog Computing	E-5
11:10 AM	<b>Tetsuo Endoh</b> , <i>Tohoku University, Japan</i> Spintronics Based NV-Memory/Logic for Low Power Systems	E-6
11:35 AM	<b>Dmitri Strukov</b> , <i>University of California, Santa Barbara</i> Neuromorphic Computing with Memristive Circuits	E-7
12:00 PM	Award Presentation	
12:15 PM	<b>Lunch</b> Lunch will be held in Rapson Hall	



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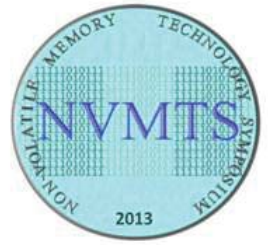


Wednesday, August 14

SESSION 11: MRAM 4		
1:30 PM	<b>Seung H. Kang</b> , <i>Qualcomm Technologies</i> Embedded STT-MRAM: Tailoring Attributes for Mobile Systems	F-1
1:55 PM	<b>Andrew Kent</b> , <i>New York University</i> Orthogonal Spin Transfer Torque MRAM	F-2
2:20 PM	<b>Shigemi Mizukami</b> , <i>Tohoku University, Japan</i> Mn-Based Magnetic Alloys and Magnetic Tunnel Junctions for STT-MRAM Applications	F-3
2:55 PM	<b>Joseph Davies</b> , <i>NVE Technology</i> NVE technology summary: MRAM and beyond	F-4
3:20 PM	<b>Masashi Sahashi</b> , <i>Tohoku University, Japan</i> Study on Electrical and Magnetic Performances of Thin Film $\text{Cr}_2\text{O}_3/\text{Fe}_2\text{O}_3$ Sesquioxide with ME Effect	F-5
3:45 PM	<b>Mahendra Pakala</b> , <i>Applied Materials</i> Processing of Perpendicular MTJ Stack for STT-MRAM Applications	F-6
4:10 PM	<b>Yong Jiang</b> , <i>Beijing University of Science and Technology</i> Perpendicular magnetization in Co-based full Heusler alloy films	F-7
4:35 PM	<b>Jian-Ping Wang and Luping Shi</b> Closing Remarks	
4:45 PM	<b>End of Conference</b> Thank you for your participation!	
5:15 PM	<b>Tour of TCF Bank Football Stadium</b> Please sign up with the conference staff by Tuesday afternoon.	

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