

# 9<sup>th</sup> Annual Non-Volatile Memory Technology Symposium

## November 11-14, 2008 Pacific Grove, California

Tuesday, November 11, 2008	Wednesday, November 12, 2008			
	7:30-8:30 AM	Breakfast, Crocker Dining Hall	2:05	Phase Change Materials with Artificial Structure for Memory (Invited), <b>Luping Shi</b> , <i>Data Storage Institute</i>
3:00 - 9:00 PM Registration/Check-in, Kiln Room	8:45	Welcome and Opening Remarks, Fred Farr Forum Room		<b>SESSION: Ion conducting Chair: Chakku Gopalan</b> , <i>Adesto Technologies</i>
3:45-5:45 PM Non-Volatile Memory Tutorial, Kiln Room	Fred Farr Forum Room	<b>SESSION: Phase Change I Chair: Ilya Karpov</b> , <i>Intel</i>	2:35	Status and Challenges in Ionic Memories, (Invited) <b>An Chen</b> , <i>AMD</i>
6:00 -7:00 PM Dinner, Crocker Dining Hall	8:50	Phase Change Memory: Technology Status and the Path Forward (KEYNOTE), <b>Stephen J. Hudgens</b> , <i>Ovonyx</i>	3:05	Coupled ionic and electronic transport model of thin-film semiconductor memristive behavior, <b>Dmitri B. Strukov</b> , <i>Hewlett-Packard</i> , <b>D. B. Strukov</b> , <b>J. L. Borghetti</b> , and <b>R. S. Williams</b> .
7:00 - 9:00 PM Reception (No-Host Bar), Kiln Room	9:35	A 4-Mbit Non-Volatile Chalcogenide Random Access Memory Designed for Space Applications: Project Status Update, <b>John C. Rodgers</b> , <i>BAE Systems</i> , <b>J. Maimon</b> , <b>T. Storey</b> , <b>D. Lee</b> , <b>T. Conway</b> , <b>B. Li</b> , <b>M. Graziano</b> , <b>L. Rockett</b> and <b>K. Hunt</b>	3:30	<b>Break, Kiln Room</b>
	10:00	<b>Break, Kiln Room</b>	3:45	Metal Filament Formation in Amorphous Silicon, <b>David Schoen</b> (Student), <i>Stanford University</i> , <b>D. Schoen</b> , <b>S. Meister</b> , <b>G. Diankov</b> , <b>Y. Cui</b>
	10:15	Impact of short SET pulse sequence on Electronic Switching in Phase Change Memory Arrays, <b>Andrea Chimenton</b> , <i>University of Ferrara</i> , <b>A. Chimenton</b> , <b>C. Zambelli</b> , <b>P. Olivo</b>	4:05	Research on switching property of an oxide/CuS hybrid memory, <b>Jaeyun Yi</b> , <i>Hynix Semiconductor Inc.</i> , <b>J. Yi</b> , <b>S. Kim</b> , <b>S. Chung</b> , <b>S.-J. Hong</b> , <b>S.-W. Park</b> , <b>Y. Nishi</b>
	10:40	Optimization of Phase Change RAM Write Performance for Large Memory Array, <b>Jan Boris Philipp</b> , <i>Qimonda</i> , <b>J. B. Philipp</b> , <b>B. Ruf</b> , <b>C. Rüster</b> , <b>D. Andres</b> , <b>P. Majewski</b> , <b>M. Kund</b> , <b>T. D. Happ</b> and <b>R. Bergmann</b>	4:30	Memory devices activated by reversible ionic motion, <b>Ju. H. Krieger</b> , <i>Academgorodoc</i>
	11:05	Recovery and other effects of annihilation of high current density filaments after switching in chalcogenide alloys, <b>S. A. Kostylev</b> , <i>Onyx International Consulting LLC</i>	4:55	From micrometric to nanometric scale switching of CuTCNQ-based non-volatile memory structures, <b>Maryline Thomas</b> , <i>IM2NP</i> , <b>M. Thomas</b> , <b>D. Deleruyelle</b> , <b>T. Keвер</b> , <b>A. Demolliens</b> , <b>Ch. Turquat</b> , <b>Ch. Muller</b> , <b>U. Böttger</b> , <b>R. Waser</b>
	11:30	Phase Change Memory Parameters: Effects of Atomic Transformations (Invited), <b>Ilya Karpov</b> , <i>Intel</i> , <b>D. Kau</b> , <b>G. Spadini</b> , <b>V. Karpov</b>		<b>SESSION: Ferroelectric Chair: Jiyoung Kim</b> , <i>University of Texas, Dallas</i>
	12:00 to 1:00	<b>Break for Lunch, Crocker Dining Hall</b>	5:20	Architectures and operation modes of acousto-ferroelectric memory devices, <b>Ju. H. Krieger</b> , <i>Academgorodoc</i>
	1:15	Nanowire Phase Change Memory (Invited), <b>Ritesh Agarwal</b> , <i>University of Pennsylvania</i>	5:45	<b>Break before dinner</b>
	1:45	<i>In situ</i> and <i>ex situ</i> TEM study of switching in lateral phase-change memory cells, <b>Stefan Meister</b> (Student), <i>Stanford University</i> , <b>S. Meister</b> , <b>S Kim</b> , <b>D. Schoen</b> , <b>P. Wong</b> and <b>Y. Cui</b>	6:00 to 7:00	<b>Dinner, Crocker Dining Hall</b>
			7:30 - 9:00	<b>After Dinner Social (No-Host Bar), Kiln Room</b>

**Thursday, November 13, 2008**

7:30-8:15 AM	Breakfast, Crocker Dining Hall	
Fred Farr Forum Room	SESSION: Phase Change II Chair: Luping Shi, Data Storage Institute	1:00 Scalable Non-Volatile Cross-Point Memory Technology based on Oxide Dual-Layer Memory Elements (Invited), Rene Meyer, Unity Semiconductor, R. Meyer, W. Kinney, L. Schloss, J. Casperson Brewer, R. Lambertson, and D. Rinerson
8:30	Phase Change Materials by Design: Status and Perspectives (Invited), Matthias Wuttig, RWTH Aachen	1:30 Electroforming mechanism of metal/oxide/metal memristive switches, J. J. Yang, Hewlett-Packard, J. J. Yang, F. Miao, D. Ohlberg, M. D. Pickett, J. Borghetti, J. Strachan, D. Stewart, R. S Williams
9:00	Local Structural Order of the Amorphous Phases of Ge-Sb-Te Phase-Change-Memory Alloys, Dave Baker, Colorado School of Mines, P. Craig Taylor, David C. Bobela	1:55 Oxide based RRAM for high density and Metal electrode effects on the resistive switching property of NiO, Chang Bum Lee, Samsung, C. B. Lee, B. S. Kang, A. Benayad, M. J. Lee, S.-E. Ahn, K. H. Kim, C. J. Kim and Y. Park
9:20	In situ Characterization of a Phase-Change Memory Device by TEM-STM, Dongkyu Cha (Student), University of Texas at Dallas, D. Cha, S. J. Ahn, S.Y. Park, M.J. Kim, H. Horii, S.O. Park, U. I. Jung and J. Kim	2:20 Thermal properties of TiO <sub>2</sub> conduction and memristive switching, Julien L. Borghetti, Hewlett-Packard, J. L. Borghetti, D. B. Strukov, M. Pickett, J. J. Yang, D. R. Stewart, R. S. Williams
9:40	Theoretical Study of <sup>121</sup> Sb NMR in Crystalline and Amorphous Sb <sub>2</sub> Te <sub>3</sub> and G <sub>2</sub> Sb <sub>2</sub> Te <sub>5</sub> , Art Edwards, Air Force Research Laboratory, A. H. Edwards, D. Bobela, P. C. Taylor, D. Baker, M. Paesler and K.A. Campbell	2:45 Fast resistance switching of TiO <sub>2</sub> thin films for non-volatile memory applications (RRAM), Carsten Kuegeler, Research Centre Juelich, C. Kuegeler, C. Nauenheim, R. Rüdiger, and R. Waser
10:05	Break, Kiln Room	3:10 Spatially-resolved, X-ray based spectroscopy of metal/oxide/metal switches, John Paul Strachan, Hewlett-Packard, J.P. Strachan, J. J. Yang, J. Borghetti, G. Ribeiro, D. Stewart, R. S. Williams
10:20	Characterizing the Chemical and Structural Effects of Processing on Nitrogen Doped Ge <sub>2</sub> Sb <sub>2</sub> Te <sub>5</sub> , (Student) Joseph Washington, North Carolina State University, J. Washington, E. A. Joseph, J.L. Jordan-Sweet, C.-F. Chen, A. Pyzyna, R. Dasaka, A. Schrott, Y. Zhang, C. Lam, D. Miller, S. Raoux, B. Ravel, and J. Woicik	3:35 Break, Kiln Room
10:40	Snappack and Overprogramming Modeling in ANSYS, Frederick T. Chen, Industrial Technology Research Institute, F. T. Chen, J.-T. Yeh, D.-S. Chao, Y.-C. Chen, M.-J. Kao and M.-J. Tsai	3:50 Nanoscale resistive switching in thin films of SrTiO <sub>3</sub> and TiO <sub>2</sub> , Ruth Muenstermann, Research Center Juelich, R. Muenstermann, R. Dittmann, K. Szot, T. Menke, S. Mi, C. L. Jia, P. Meuffels and R. Waser
11:05	Thermal Phenomena in Phase Change Memory Devices (Invited), Kenneth Goodson, Stanford University	4:15 Switching dynamics of TiO <sub>2</sub> crossbar devices for resistance change memory, Matthew Pickett, Hewlett-Packard, J. Borghetti, J. Yang, D. Stewart, S. Williams
	SESSION: Metal Oxide Chair: Darrell Rinerson, Unity Semiconductor	SESSION: Design, New Concepts and Reconfigurable Electronics Chair: Kris Campbell, Boise State University
11:35	First-principle study of resistance switching in rutile TiO <sub>2</sub> with oxygen vacancy, Seong-Geon Park (Student), Stanford University, S.-G. Park, B. M.-K., and Y. Nishi	4:40 Reconfigurable nanodevice family combining memristive switching and rectification, J. J. Yang, Hewlett-Packard, J. J. Yang, J. Borghetti, D. Murphy, D. R. Stewart and R. S. Williams
11:55 to 12:50	Break for Lunch, Crocker Dining Hall (Lunch served 12 to 1)	5:05 Towards an ultra-low power, high density and non-volatile Ternary CAM, Mourad El Baraji, CROCUS Technology, M. El Baraji, V. Javerliac and N. Berger, G. Prenat
	SESSION: Metal Oxide, Cont'd, Chair: Darrell Rinerson, Unity Semiconductor	5:30 Building True Logic NVM With Automotive-Level Reliability, Andrew Horch, Virage Logic Inc, B. Wang, T. Gilliland, A. Horch, M. Niset, T.-J. Hu and T. Humes
		6:00 to 7:00 Dinner, Crocker Dining Hall

<b>Friday, November 14, 2008</b>	
<b>7:30-8:15 AM</b>	<b>Breakfast, Crocker Dining Hall</b>
<b>Fred Farr Forum Room</b>	<b>SESSION: FLASH</b> <i>Chair: Jake Baker, Boise State University</i>
<b>8:30</b>	Challenge and Future of NAND Flash memory (Invited), <b>Jaesung Sim, Samsung</b>
<b>9:00</b>	Pitch Fragmentation Induced Odd/Even Effects in a 36nm Floating Gate NAND Technology, <b>Florian Beug, Qimonda, M. F. Beug, T. Hoehr, T. Müller, R. Reichelt, L. Müller-Meskamp, P. Geiser, T. Geppert, L. Bach, U. Bewersdorff-Sarlette, O. Kenny, S. Brandl, T. Marschner, S. Parascandola, S. Meyer, S. Riedel, M. Specht, D. Manger, R. Knöfler, K. Knobloch, P. Kratzert, C. Ludwig and K.-H. Küsters</b>
<b>9:20</b>	Metal Control Gate for Sub-30nm Floating Gate NAND Memory, <b>Florian Beug, Qimonda, N. Chan, M. F. Beug, R. Knoefler, T. Mueller, M. Ackermann, S. Riedel, M. Specht, C. Ludwig and A. T. Tilke</b>
<b>9:45</b>	A full TCAD simulation and 3D parasitic capacitances extraction in 90nm NAND Flash memories, <b>Jérémy Postel-Pellerin (Student), IM2NP, J. Postel-Pellerin, P. Canet F. Lalande, R. Bouchakour, F. Jeuland, B. Bertello and B. Villard</b>
<b>10:05</b>	<b>Break, Kiln Room</b>
<b>10:20</b>	Degradation behavior of TANOS memory devices in retention mode, <b>Hokyung Park, SEMATECH, H. Park, G. Bersuker, N. Goel, D. Gilmer, D. Heh, C. Y. Kang, H.-H. Tseng, P. Kirsch, and R. Jammy</b>
<b>10:45</b>	Accurate program simulation of TANOS charge trapping devices, <b>Thomas Melde (Student), Qimonda, N. Chan, M. F. Beug, R. Knoefler, T. Mueller, M. Ackermann, S. Riedel, M. Specht, C. Ludwig and A. T. Tilke</b>
<b>11:05</b>	Investigation of a new Three Bit Cell concept, <b>Jean-René Raguét (Student), IM2NP and STMicroelectronics, J.-R. Raguét, P. Calenzo, D. Deleruyelle, R. Laffont, A. Guiraud, R. Bouchakour, V. Bidal, P. Boivin, J.-M. Mirabel</b>
<b>11:25</b>	Abstracting and Verifying Flash Memories, <b>Sandip Ray, University of Texas at Austin, S. Ray and J. Bhadra</b>
<b>11:50</b>	A novel Flash EEPROM Diagnosis Methodology based on I-V Signatures extraction, (Student) <b>Jeremy Plantier, IM2NP, H. Aziza, J. Plantier, J.M. Portal, C. Reliaud, O. Ginez and D. Nee</b>
<b>12:10 to 1:00</b>	<b>Lunch, Crocker Dining Hall</b>
<b>12:30</b>	<b>End of Conference</b>