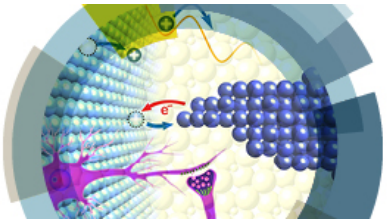
New Memory Paradigms: Memristive Phenomena and Neuromorphic Applications

Faraday Discussion



15–17 October 2018, Aachen, Germany

Monday 15 October

11:30	Registration, Tea and Coffee	
12:00	Lunch	
12:45	**Welcome and Introductions** Ilia Valov, *Chair of Scientific Committee* Dr Doris Klee, *Vice-Rector of RWTH Aachen University*	
12:55	**Outline of Discussion Format** Ruth Zadik and Alex Heaffey, *Royal Society of Chemistry Publishing Editors*	
13:00	**Introductory Lecture** (Session Chair: Mazakazu Aono) Rainer Waser *RWTH Aachen University and Forschungszentrum Jülich, Germany*	
	Session 1 - Electrochemical metallization ReRAMs (ECM): Experiments and modelling (Session Chairs: Michael Kozicki and Phil Bartlett)	
14:00	**Resistivity control by the electrochemical removal of dopant atoms from a nanodot** Tsuyoshi Hasegawa, Wataru Hiraya, Nozomi Mishima, Takaaki Shima, Seishiro Tai, Tohru Tsuruoka and Ilia Valov *Waseda University, Japan*	**Paper 20182**
14:05	**Interfacial redox processes in memristive devices based on valence change and electrochemical metallization** Yuchao Yang, Keqin Liu, Liang Qin, Xiaoxian Zhang, Jiadi Zhu, Xinhao Sun, Ke Yang, Yimao Cai and Ru Huang *Peking University, China*	**Paper 20688**
14:10	**Impact of radiation induced crystallization on programmable metallization cell electrical characteristics and reliability** Yago Gonzalez-Velo, Arshey Patadia, Hugh J. Barnaby and Michael N. Kozicki *Arizona State University, USA*	**Paper 20941**
14:15	Discussion	
15:30	Afternoon tea	
16:00	**Key material parameters driving CBRAM device performances** Ludovic Goux, Janaki Radhakrishnan, Attilio Belmonte, Thomas Witters, Wouter Devulder, Augusto Redolfi, Shreya Kundu, Michel Houssa and Gouri Sankar Kar *Imec, Belgium*	**Paper 20183**
16:05	**Impact of oxide and electrode materials on the switching characteristics of oxide ReRAM devices** Elia Ambrosi, Alessandro Bricalli, Mario Laudato and Daniele Ielmini *Politecnico di Milano, Italy*	**Paper 20952**
16:10	**Bio-inspired protonic memristor devices based on metal complexes with proton-coupled electron transfer** Masa-aki Haga, Yusuke Hiruma and Kai Yoshikawa *Chuo University, Japan*	**Paper 21182**
16:15	Discussion	
17:30	Lightning presentations (by invitation of the scientific committee)	
18:00	Poster Session and Wine Reception	
19:30	Close of day	

Tuesday 16 October

	Session 2 - Valence change ReRAMs (VCM): Experiments and modelling (Session Chairs: Mazakazu Aono and Ilia Valov)	
09:00	**The interplay between structure and function in redox-based resistance switching** Tony Kenyon, Manveer Singh Munde, Wing H. Ng, Mark Buckwell, Dovydas Joksas and Adnan Mehonic *University College London, UK*	**Paper 20185**
09:05	**Electrochemically prepared oxides for resistive switching memories** Monica Santamaria, A. Zaffora, F. Di Quarto, H. Habazaki and I. Valov *Palermo University, Italy*	**Paper 22510**
09:10	**On the universality of the *I-V* switching characteristics in non-volatile and volatile resistive switching oxides** Dirk J. Wouters, Stephan Menzel, Jonathan A. J. Rupp, Tyler Hennen and Rainer Waser *RWTH Aachen University, Germany*	**Paper 20845**
09:15	**The ultimate switching speed limit of redox-based resistive switching devices** Stephan Menzel, Moritz von Witzleben, Viktor Havel and Ulrich Böttger *Forschungszentrum Juelich GmbH, Germany*	**Paper 20846**
09:20	Discussion	
11:00	Morning Tea	
11:30	**Spectroscopic elucidation of ionic motion processes in tunnel oxide-based memristive devices** Regina Dittmann, Christoph Bäumer, Thomas Heisig, Benedikt Arndt, Katharina Skaja, Francesco Borgatti, Francesco Offi, Federico Motti, Giancarlo Panaccione, Rainer Waser, Stephan Menzel *Peter Grünberg Institute, Germany*	**Paper 20184**
11:35	**Chemically addressed switching measurements in graphene electrode memristive devices using *in situ* XPS** Itir Köymen, Pınar Aydoğan Göktürk, Coşkun Kocabaş and Şefik Süzer *Bilkent University, Turkey*	**Paper 20811**
11:40	**Local crystallographic shear structures in *a*[201] extended mixed dislocations of $SrTiO_3$ unraveled by atomic-scale imaging using transmission electron microscopy and spectroscopy** Hongchu Du, Chun-Lin Jia and Joachim Mayer *Research Centre Juelich GmbH, Germany*	**Paper 21139**
11:45	Discussion	
13:00	Lunch	
	Session 3 - Phase-change memories (PCM): Experiments and modelling (Session Chairs: Daniele Ielmini and Phil Bartlett)	
14:00	**Priming effects in the crystallization of the phase change compound GeTe from atomistic simulations** Marco Bernasconi, Silvia Gabardi, Gabriele G. Sosso and Joerg Behler *University of Milano-Bicocca, Italy*	**Paper 20186**
14:05	**Structural transition pathway and bipolar switching of the GeTe-Sb_2Te_3 superlattice as interfacial phase-change memory** Hisao Nakamura and Nobuki Inoue *AIST, Japan*	**Paper 21143**
14:10	***Ab initio* phase diagrams of Hf-O, Zr-O and Y-O: a comparative study** Konstantin Z. Rushchanskii, Stefan Blügel and Marjana Ležaić	**Paper 20937**

	Peter Grünberg Institut, Forschungszentrum Jülich GmbH and JARA, Germany	
14:15	Discussion	
15:30	Afternoon Tea	
16:00	**Towards a 3D GeSbTe phase change memory with integrated selector by non-aqueous electrodeposition** Kees de Groot, Ruomeng Huang, Gabriela P. Kissling, Reza Kashtiban, Yasir J. Noori, Katarina Cicvarić, Wenjian Zhang, Andrew L. Hector, Richard Beanland, David C. Smith, Gillian Reid and Philip N. Bartlett *University of Southampton, UK*	**Paper 20190**
16:05	**Exploiting nanoscale effects in phase change memories** Martin Salinga and Benedikt Kersting *RWTH Aachen University, Germany*	**Paper 20855**
16:10	**Training fully connected networks with resistive memories: impact of device failures** Geoffrey W. Burr, Louis P. Romero, Stefano Ambrogio, Massimo Giordano, Giorgio Cristiano, Martina Bodini, Pritish Narayanan, Hsinyu Tsai and Robert M. Shelby *IBM Research-Almaden, USA*	**Paper 20189**
16:15	Discussion	
17:30	Close of sessions	
18:30	Pre-Dinner Drinks – Ratskellar, Aachen	
19:00	Conference Dinner - Ratskellar, Aachen	

Wednesday 17 October

	Session 4 - Synaptic and neuromorphic functions (Session Chairs: Wei Lu and Daniele Ielmini)	
09:00	**RRAM-based synapse devices for neuromorphic systems** Hyunsang Hwang, K. Moon, S. Lim, J. Park, C. Sung, S. Oh, J. Woo and J. Lee *POSTECH, Republic of Korea*	**Paper 20188**
09:05	**Computing of temporal information in spiking neural networks with ReRAM synapses** Wei Wang, G. Pedretti, V. Milo, R. Carboni, A. Calderoni, N. Ramaswamy, A. S. Spinelli and D. Ielmini *Politecnico di Milano, Italy*	**Paper 20947**
09.10	**Synaptic dynamics in complex self-assembled nanoparticle networks** Simon Brown, S. K. Bose, S. Shirai, J. B. Mallinson *University of Canterbury, New Zealand*	**Paper 20500**
09:15	Discussion	
10:30	Morning Tea	
11:00	**A neuromorphic systems approach to in-memory computing with non-ideal memristive devices: from mitigation to exploitation** Giacomo Indiveri, Melika Payvand, Manu V. Nair and Lorenz K. Muller *University of Zurich and ETH Zurich, Switzerland*	**Paper 21180**
11:05	**Spike sorting using non-volatile metal-oxide memristors** Themis Prodromakis *University of Southampton, UK*	**Paper 20850**
11:10	**Neuromorphic computation with spiking memristors: habituation, experimental instantiation of logic gates and a novel sequence-sensitive perceptron model** Ella M. Gale *University of Bristol, UK*	**Paper 20867**
11:15	Discussion	

12:30	**Concluding Remarks Lecture** (Session Chair: Phil Bartlett) R. Stanley Williams *Hewlett Packard Labs, USA*
13:10	**Acknowledgements**
13:15	**Close of meeting and Lunch**

Presenting authors are indicated in the programme by an underline. The affiliation is for the presenting author. If the presenting author of your paper has changed since abstract selection please email events@rsc.org. Please note that this is a draft programme and timings may change.