

## 2019 RRAM/MRAM Workshop Program

### DAY 1: October 17<sup>th</sup>, 2019

8:15-8:45 Registration

8:45-9:00 Welcome (Attilio Belmonte, imec)

Session 1 (imec Auditorium): Selectors <i>Chairman: Christian Witt (Global Foundries)</i>			
9:00-9:30	Daniele Garbin	imec	Ovonic Threshold Switch Selector: Pathways Towards Improved Endurance Performance
9:30-10:00	Dirk Wouters	RWTH Aachen	Cr-doped V <sub>2</sub> O <sub>3</sub> as a versatile threshold switching device

10:00-10:30 Coffee break

Session 2 (imec Auditorium): Fundamental Understanding of RRAM <i>Chairman: Yangyin Chen (Western Digital)</i>			
10:30-11:00	Stephan Menzel	FZ Juelich	Multiscale Modeling of VCM-based and ECM-based ReRAMs
11:00-11:30	Alexander L. Shluger	University College London	Atomistic models of switching mechanisms in RRAM
11:30-12:00	Susanne Hoffman-Eifert	FZ Juelich	Enabling analog switching behavior in filamentary VCM-type ReRAM devices

12:00 – 13:00 Lunch break

Session 3 (imec Tower 2A Event Room): MRAM physics – from conventional to exploratory <i>Chairwoman: Alice Mizrahi (CNRS, Thales)</i>			
13:00-13:30	Simon Van Beek	imec	Impact of self-heating on reliability predictions in STT-MRAM
13:30-14:00	Robert Carpenter	imec	Enabling low-energy MRAM using double spin torque

14:00 – 14:30 Coffee break

Session 4 (imec Tower 2A Event Room): Memories for Machine Learning <i>Chairman: Kevin Garello (imec)</i>			
14:30-15:00	Stefan Cosemans	imec	Energy Efficient DNN Inference with Analog in-Memory Computing: from circuit architecture to device options and requirements.
15:00-15:30	Daniele Ielmini	Politecnico di Milano	RRAM for In-Memory Computing
15:30-16:00	Alice Mizrahi	CNRS, Thales	Stochastic nanomagnets for bio-inspired computing

16:00 – 17:15 Panel Discussion (imec Tower 2A Event Room):

Topic: Which memory technology is suitable for Machine Learning Applications?

Moderator: Gouri Sankar Kar (imec)

Panelists: Myung Hee Na (imec), Dirk Wouters (RWTH Aachen), John R. Jameson (Adesto Technologies), Yangyin Chen (Western Digital)

19:30 – 22:30 – Dinner at the Faculty Club ([Google Maps link](#))

## DAY 2: October 18<sup>th</sup>, 2019

Session 5 (imec Auditorium): Device Physics <i>Chairman: Sergiu Clima (imec)</i>			
9:00-9:30	David Cooper	University of Grenoble	<i>In-situ electron microscopy of RRAM And MRAM devices</i>
9:30-10:00	Regina Dittmann	FZ Juelich	<i>Sub-filamentary networks and their dynamics as source of cycle-to-cycle variability in ReRAM devices</i>
10:00-10:30	Eric Pop	Stanford University	<i>Probing the Nanoscale Limits of Resistance Switching in Some Oxides</i>

10:30 – 11:00 Coffee break

Session 6 (imec Auditorium): Advancement in MRAM technologies <i>Chairman: S N Piramanayagam (NTU Singapore)</i>			
11:00-11:30	Kevin Garello	imec	<i>Spin-orbit torques MRAM for low power embedded memories: from fundamentals to technology integration pathways</i>
11:30-12:00	Stuart Parkin	Max Planck Institute, Halle	<i>Heusler alloys and half-metals for MRAM applications</i>

12:00 – 13:00 Lunch Break / Poster Session

13:00 – 13.30 Imec Cleanroom tour

Session 7 (imec Auditorium): Memories for Machine learning – part 2 <i>Chairman: Daniele Leonelli (Huawei)</i>			
13:30-14:00	S N Piramanayagam	Nanyang Technological University, Singapore	<i>Domain-wall based devices for neuromorphic computing</i>
14:00-14:30	Peng Huang	Peking University	<i>Neuromorphic Computing Based on Binary OxRRAM Devices</i>

14:30 – 15:00 Coffee break / Poster Session

Session 8 (imec Auditorium): RRAM and beyond <i>Chairman: Eric Lee (Macronix)</i>			
15:00-15:30	Monica Burriel	University of Grenoble	<i>Interfacial Switching in perovskite-based nanoionic devices</i>
15:30-16:00	John R. Jameson	Adesto Technologies	<i>Te-based CBRAM as an enabler for low-power memory, security... and of course AI</i>
16:00-16:30	Umberto Celano	imec	<i>HfO<sub>2</sub> beyond RRAM, identifying ferroelectricity in doped hafnia</i>

16:30 - 16:45 Workshop Closure

16:45 – 18:00 – Poster Session