

# **2023 International Conference on Simulation of Semiconductor Processes and Devices (SISPAD 2023)**

**Kobe, Japan  
27-29 September 2023**



**IEEE Catalog Number: CFP23SSD-POD  
ISBN: 979-8-3503-1368-0**

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IEEE Catalog Number:	CFP23SSD-POD
ISBN (Print-On-Demand):	979-8-3503-1368-0
ISBN (Online):	978-4-86348-803-8

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# SISPAD 2023 Program

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Wednesday, September 27, 2023

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## Opening (Hall A+B)

9:00 - 9:10 Opening Remarks  
Satofumi Souma (Kobe Univ.)

## Plenary Session (Hall A+B)

Chairpersons: Hideki Minari (Sony Semiconductor Solutions)  
Hajime Tanaka (Osaka Univ.)

- PL-1** 9:10 - 9:55 [invited talk]  
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Chairpersons: Junichi Hattori (AIST)  
Kentaro Kukita (Kioxia)

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**Thursday, September 28, 2023**

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## Session 5: Interface and Reliability/Variability (Hall A)

Chairpersons: Hiu-Yung Wong (San Jose State Univ.)

Nobuhiko Nakano (Keio Univ.)

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Andrea Padovani<sup>1</sup>, Paolo La Torraca<sup>1</sup>, Luca Larcher<sup>2</sup>, Jack Strand<sup>3</sup>, Alexander Shluger<sup>3</sup> (<sup>1</sup>University of Modena and Reggio Emilia, <sup>2</sup>Applied Materials, <sup>3</sup>University of College London) .....93

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### Night Cruise Session

- 16:30 Get together at the conference venue
- 16:50 Bus transfer to the embarkation point of the cruise ship
- 17:45 Departure of the cruise ship “Royal Princess” from Kobe port
- 18:30 Return to the embarkation point of the cruise ship at Kobe port

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## Friday, September 29, 2023

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### Session 9: Transport (Hall A)

Chairpersons: Denis Rideau (STMicroelectronics)  
Shunsuke Koba (Kobe City Col. Tech.)

<b>9-1</b>	9:00 - 9:30 <b>[invited talk]</b> Density functional theory calculation for carrier scattering at 4H-SiC(0001)/SiO <sub>2</sub> interface Kazuma Yokota <sup>1</sup> , Nahoto Funaki <sup>1</sup> , Mizuho Ohmoto <sup>1</sup> , Mitsuharu Uemoto <sup>1</sup> , <u>Tomoya Ono</u> <sup>1</sup> , ( <sup>1</sup> Kobe University) .....	293
<b>9-2</b>	9:30 - 9:50 Ab initio Self-consistent GW Calculations in Non-Equilibrium Devices: Auger Recombination and Electron-Electron Scattering <u>Leonard Deuschle</u> <sup>1</sup> , Jonathan Backman <sup>1</sup> , Mathieu Luisier <sup>1</sup> , Jiang Cao <sup>1</sup> ( <sup>1</sup> Integrated Systems Lab., ETH Zurich, Switzerland) .....	297

<b>9-3</b>	9:50 - 10:10	Full-band Quantum Simulations of Semiconductor Devices based on Empirical Pseudopotential Hamiltonians in the Presence of Phonon Scattering and Non-Radiative Recombination <u>Alessandro Pilotto</u> <sup>1</sup> , Adel M’Foukh <sup>1</sup> , Philippe Dollfus <sup>1</sup> , Jérôme Saint-Martin <sup>1</sup> , Marco Pala <sup>1</sup> ( <sup>1</sup> Université Paris-Saclay, CNRS, C2N) .....	301
	10:10 - 10:30	Coffee Break (Meeting Room 1)	
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<b>9-6</b>	11:10 - 11:30	Resolving Inconsistencies between Discretizations for the Density Operator and the Wigner Function <u>Alan Abdi</u> <sup>1</sup> , Dirk Schulz <sup>1</sup> (1.TU Dortmund) .....	313

## Session 10: Memories (Hall B)

Chairpersons: Kentaro Kukita (Kioxia)  
Jeff Wu (TSMC)

<b>10-1</b>	9:10 - 9:30	A Fully Coupled Multi-Physics Model to Simulate Phase Change Memory Operations in Ge-rich Ge <sub>2</sub> Sb <sub>2</sub> Te <sub>5</sub> Alloys <u>Robin MIQUEL</u> <sup>1,2,3</sup> , Thomas CABOUT <sup>1</sup> , Olga CUETO <sup>2</sup> , Benoit SKLENARD <sup>2</sup> , Mathis PLAPP <sup>3</sup> ( <sup>1</sup> STMicroelectronics, <sup>2</sup> Univ. Grenoble Alpes, CEA, Leti, <sup>3</sup> Lab. de Physique de la Matière Condensée, Ecole Polytechnique, CNRS, Institut Polytechnique de Paris) .....	317
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10:10 - 10:30 Coffee Break (Meeting Room 1)

**10-4** 10:30 - 10:50

On the Plausibility of Thermodiffusion as the Primary Mechanism for Unipolar Resistive Switching in Metal-Oxide-Metal Memristive Devices

Kristof Lange<sup>1</sup>, Rainer Waser<sup>1,2,3</sup>, Stephan Menzel<sup>2</sup> (<sup>1</sup>Inst. of Materials in Electrical Engineering II (IWE 2), RWTH Aachen Univ., <sup>2</sup>Peter Grünberg Inst. (PGI-7), Forschungszentrum Jülich GmbH, <sup>3</sup>Peter Grünberg Inst. (PGI-10), Forschungszentrum Jülich GmbH) .....329

**10-5** 10:50 - 11:10

Advanced TCAD Modeling of HfO<sub>2</sub>-based ReRAM: Coupling Redox Reactions and Thermal Effects

Youssef Hirchaou<sup>1</sup>, François Triozon<sup>2</sup>, Wolfgang Goes<sup>1</sup>, Carl Hylin<sup>1</sup>, Philippe Blaise<sup>1</sup>, Jing Li<sup>2</sup> (<sup>1</sup>Silvaco-France, <sup>2</sup>Univ. Grenoble Alpes, CEA, LETI) .....333

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Study of Self-Heating and its Effects in SOT-STT-MRAM

Tomas Hadamek<sup>1</sup>, Nils Petter Jørstad<sup>1</sup>, Wolfgang Goes<sup>3</sup>, Siegfried Selberherr<sup>2</sup>, Viktor Sverdlov<sup>1</sup> (<sup>1</sup>Christian Doppler Laboratory for Nonvolatile Magnetoresistive Memory and Logic at the Institute for Microelectronics, TU Wien, <sup>2</sup>Institute for Microelectronics, TU Wien, <sup>3</sup>Silvaco Europe Ltd., Cambridge, United Kingdom) .....337

11:30 - 13:00 Lunch Break (Castilla, Ariston Hotel 5F / Valencia, Ariston Hotel 2F)

## Session 11: Quantum Computing and Spintronics (Hall A)

Chairpersons: Hajime Tanaka (Osaka Univ.)  
Satofumi Souma (Kobe Univ.)

**11-1** 13:00 - 13:20

Variability in Si/SiGe and Si/SiO<sub>2</sub> Spin Qubits due to Interfacial Disorder

Lukas Cvitkovich<sup>1</sup>, Dominic Waldhör<sup>1</sup>, Yann-Michel Niquet<sup>2</sup>, Tibor Grasser<sup>1</sup> (<sup>1</sup>Institute for Microelectronics, Technische Universität Wien, <sup>2</sup>Univ. Grenoble Alpes, CEA, IRIG-MEM-L Sim) .....341

**11-2** 13:20 - 13:40

Improving the tight-binding description of spin-orbit interaction in Si/Ge heterostructure for qubits applications

Gaëtan Veste<sup>1</sup>, Esteban A. Rodríguez-Mena<sup>2</sup>, Benoit Sklénard<sup>1</sup>, Jing Li<sup>1</sup>, Yann-Michel Niquet<sup>2</sup> (<sup>1</sup>Univ. Grenoble Alpes, CEA, Leti, <sup>2</sup>Univ. Grenoble Alpes, CEA, IRIG-MEM-L Sim) .....345

- 11-3** 13:40 - 14:00  
 Robust Sub-Kelvin Simulations of Quantum Dot Charge Sensing  
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- 11-4** 14:00 - 14:20  
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- 11-5** 14:20 - 14:40  
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Nils Petter Jørstad<sup>1,2</sup>, Wolfgang Goes<sup>3</sup>, Siegfried Selberherr<sup>2</sup>, Viktor Sverdlov<sup>1,2</sup> (<sup>1</sup>Christian Doppler Lab. for Nonvolatile Memory and Logic, <sup>2</sup>TU Wien, Inst. of Microelectronics, <sup>3</sup>Silvaco Europe Ltd.) .....357

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Chairpersons: Tatsuya Kunikiyo (Renesas)  
 Lado Filipovic (TU Wien)

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 Self-Consistent Monte Carlo Device Simulation of Capture-Excitation Processes of Carriers  
Futo Hashimoto<sup>1</sup>, Toma Suzuki<sup>1</sup>, Hideki Minari<sup>1</sup>, Nobuya Nakazaki<sup>1</sup>, Jun Komachi<sup>1</sup>, Nobuyuki Sano<sup>2</sup>  
 (<sup>1</sup>Sony Semiconductor Solutions Corp., <sup>2</sup>Univ. of Tsukuba) .....361
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 (<sup>1</sup>STMicroelectronics, Technology and Design Platforms, France, <sup>2</sup>STMicroelectronics, Imaging Division, France) .....373



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Naveen Kumar<sup>1</sup>, César Pascual García<sup>2</sup>, Ali Rezaei<sup>1</sup>, Ankit Dixit<sup>1</sup>, Asen Asenov<sup>1</sup>, Vihar Georgiev<sup>1</sup>  
(<sup>1</sup>University of Glasgow, <sup>2</sup>Luxembourg Institute of Science and Technology) .....[377](#)

### **Closing (Hall A)**

14:50 - 15:00 Closing Remarks

Satofumi Souma (Kobe Univ.)