



Neuronics Conference 2025 (Neuronics25)

Tsukuba, Japan, 2025 June 17th - 20th

Conference organizers: Takashi Tsuchiya, Chu-Chen Chueh, Sabina Spiga and Jung-Yao Chen

Conference Program

June 17th - Day 1 (Tuesday) 1	
13:30 - 14:20	Registration open
14:20 - 14:30	Tutorials Opening
	Tutorials Session Chair: Takashi Tsuchiya
14:30 - 15:20	<u>Pei-Chun Chen</u> (<i>National Cheng Kung University</i>)
Session-K1	From Membrane Potentials to Memory: A Neuroscientist's Guide to the Brain for Neuromorphic Engineers
15:20 - 16:10	<u>Sabina Spiga</u> (<i>Consiglio Nazionale delle Ricerche (CNR), Istituto per la Microelettronica e Microsistemi (IMM)</i>)
Session-K2	Memristive Materials and Devices for Neuromorphic Computing: state of the art and perspectives
16:10 - 17:00	<u>Stephan Menzel</u> (<i>Peter Gruenberg Institute (PGI-7), Forschungszentrum Jülich GmbH</i>)
Session-K3	Physical modelling of memristive devices
17:00 - 17:50	<u>Akira Hirose</u> (<i>Department of Electrical Engineering and Information Systems, The University of Tokyo</i>)
Session-K4	Physical reservoir computing: Its position in information processing and future prospects

June 18th - Day 2 (Wednesday) 2	
08:45 - 09:00	Neuronics25 Opening
	Session 1.1 Chair: Sabina Spiga
09:00 - 09:30	<u>J. Joshua Yang</u> (<i>University of Southern California, Los Angeles, CA 90089, USA</i>)
1.1-I1	Drift and diffusive memristors for analog and neuromorphic computing
09:30 - 10:00	<u>Elliot Fuller</u> (<i>Sandia National Laboratories, Materials Physics Department</i>)
1.1-I2	Building next generation analog computers: materials, devices and systems
10:00 - 10:30	<u>Sayani Majumdar</u> (<i>Tampere University</i>), Kapil Bhardwaj
1.1-I3	Ultra-low power Edge Intelligence utilizing Ferroelectric Neuromorphic hardware
10:30 - 11:15	Coffee Break
	Session 1.2 Chair: Sayani Majumdar
11:15 - 11:45	<u>Kazuya Terabe</u> (<i>Research Center for Materials Nanparchitectonics (MANA), National Institute for Materials Science (NIMS)</i>), Daiki Nishioka, Wataru Namiki, Tohru Tsuruoka, Takashi Tsuchiya
1.2-I1	ELECTRONICS and NEUROMORPHIC TECHNOLOGY ENHANCEMENT THROUGH IONIC NANOARCHITECTONICS
11:45 - 12:00	<u>Rou-Yi Li</u> (<i>Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, Taipei 106, Taiwan</i>), Wei-Ting Liao, Qun-Gao Chen, Ignacio Sanjuán, Ning-Cian Hsiao, Antonio Guerrero, Chu-Chen Chueh, Wen-Ya Lee
1.2-O1	Realization of Patternable Neuromorphic Device based on Photo-Curable Polymer Electrolyte-Gated Organic Field-Effect Transistors
12:00 - 12:15	<u>Elena Salagre</u> (<i>Sandia National Laboratories, Livermore, CA, USA</i>), Mahnaz Islam, Timothy D. Brown, Sangheon Oh, Sanjana Goyal, Fatima Jardali, Michelle Smeaton, Katherine L. Jungjohann, Allison Arabelo, Alec A. Talin, Patrick Shamberger, Suhas Kumar, Elliot J. Fuller, Yeonju Yu, Eric Pop
1.2-O2	Imaging Current Collapse and Localized Spiking Dynamics in Spin-crossover Oxide-based Artificial Neurons
12:15 - 12:30	<u>Yanbo Xie</u> (<i>Northwestern Polytechnical University</i>)
1.2-O3	Resistance-restorable nanofluidic memristor and neuromorphic chip
12:30 - 13:00	<u>Asal Kiazadeh</u> (<i>CENIMAT/j3N, NOVA University Lisbon, Caparica, Portugal.</i>), Jonas Deuermeier, Pedro Barquinha, Rodrigo Martins, Elvira Fortunato
1.2-I2	Flexible Electronics on Amorphous Oxide Semiconductor Devices: TFTs and RRAMs
13:00 - 14:30	Lunch
	Session 1.3 Chair: Takashi Tsuchiya
14:30 - 15:00	<u>Takuya Matsumoto</u> (<i>Osaka University</i>)
1.3-I1	In-materia neuromorphic computation using molecular networks
15:00 - 15:30	<u>Hirofumi Tanaka</u> (<i>Kyushu Institute of Technology, Research Center for Neuromorphic AI Hardware, Kitakyushu, Japan</i>)
1.3-I2	Development and Application of Physical Reservoir Devices based on Random Network of Nanomaterials for Future Intelligent Systems
15:30 - 15:45	<u>Hisashi Shima</u> (<i>National Institute of Advanced Industrial Science and Technology (AIST)</i>), Yasuyuki Kusaka
1.3-O1	Electrochemical Physical Reservoir Device Fabricated via High-precision Reverse-offset Printing of Ionogel Patterns
15:45 - 16:00	<u>Elena Feltri</u> (<i>Istituto Italiano di Tecnologia, Center for Nano Science and Technology, 20134, Milan, Italy</i>), Mario Caironi, Saverio Ricci
1.3-O2	Food For Thoughts or Thoughts Made of Food? Edible Synapses and Neurons with High Operational and Environmental Stability
16:00 - 16:30	<u>Francesca Borghi</u> (<i>University of Milano</i>)
1.3-I3	Reprogrammability and Learning in Self-Assembled Nanostructured Systems
19:30 - 21:30	Social Dinner

June 19th - Day 3 (Thursday) 3

Session 2.1

Chair: Takashi Tsuchiya

09:00 - 09:30	<u>Ilia Valov</u> (<i>Physical Chemistry, Research Centre Jülich</i>)
2.1-11	Electrochemical-based artificial neurons and synapses - processes and materials design
09:30 - 09:45	<u>Daiki Nishioka</u> (<i>International Center for Young Scientists (ICYS), National Institute for Materials Science (NIMS)</i>), Hina Kitano, Wataru Namiki, Kazuya Terabe, Takashi Tsuchiya
2.1-01	Development of Ion-Gating Reservoir Computing for Efficient Neuromorphic Information Processing
09:45 - 10:00	<u>Zacharie Jehl</u> (<i>Polytechnic University of Catalonia</i>), Sergio Giraldo, Myeongok Kim, Taizo Kobayashi
2.1-02	Zero-energy and wavelength tunable neuromorphic visual computing with photocurrent-based memory in ZnMgO/Se synapses
10:00 - 10:30	<u>Juan Bisquert</u> (<i>Instituto de Tecnología Química (ITQ). Universitat Politècnica de València- Consejo Superior de Investigaciones Científicas (UPV-CSIC). 46022 València, Spain</i>)
2.1-12	Dynamical properties of neuromorphic memristors and oscillators

10:30 - 11:15 **Coffee Break**

Session 2.2

Chair: Ilia Valov

11:15 - 11:45	<u>Saptarshi Das</u> (<i>The Pennsylvania State University</i>)
2.2-12	AI for 2D Materials and 2D Materials for AI
11:45 - 12:00	<u>Jonas Deuermeier</u> (<i>CENIMAT/i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, Caparica, Portugal</i>), Tomás Mingates, Daniel Neves, Dorina Papanastasiou, Miguel Franco, Adam Kelly, Joseph Neilson, Jonathan M. Coleman, Luís Mendes, João Vaz, Sérgio Matos, Mohamed Ghatas, Luís M. Pessoa, Emanuel Carlos, Elvira Fortunato, Rodrigo Martins, Asal Kiazadeh
2.2-01	Memristors from MoS ₂ by liquid-liquid interface assembly
12:00 - 12:15	<u>Ziad Mohamed</u> (<i>School of Engineering & Innovation, The Open University, Milton Keynes, MK7 6AA, UK</i>), Nicholas Power, James Bowen,
2.2-02	Zahra Golrokhi, Vikram Goolaup
	MXene-based Memristive Devices for Enhanced Synaptic Functionality
12:15 - 12:30	<u>Shaochuan Chen</u> (<i>National Institute for Materials Science (NIMS), 1-1 Namiki, Tsukuba, Ibaraki 305-0044, Japan.</i>)
2.2-03	Ionic effects in memristive devices for bio-inspired computing
12:30 - 13:00	<u>GANGLI WANG</u> (<i>Georgia State University</i>)
2.2-11	Single Conical Nanopore and Anodized Aluminum Oxide Membrane Ionic Memristors

13:00 - 14:30 **Lunch**

Session 2.3

Chair: Jung-Yao Chen

14:30 - 15:00	<u>Donato Francesco Falcone</u> (<i>IBM Research Europe - Zurich</i>), Victoria Clerico, Wooseok Choi, Folkert Horst, Matteo Galetta, Antonio La Porta,
2.3-11	Bert Jan Offrein, Valeria Bragaglia
	On-Chip Training and Inference using Analog CMO/HfO _x ReRAM Artificial Synapses
15:00 - 15:30	<u>Yoshifumi Nishi</u> (<i>Corporate Research & Development Center, Toshiba Corporation</i>)
2.3-12	Learning method for analog spiking neural network hardware and application of resistive change devices
15:30 - 15:45	<u>Wataru Namiki</u> (<i>Research Center for Materials Nanoarchitectonics (MANA), National Institute for Materials Science (NIMS)</i>), Daiki Nishioka, Yuki Nomura, Kazuo Yamamoto, Kazuya Terabe, Takashi Tsuchiya
2.3-01	Performance improvement of spin wave-based physical reservoir computing, achieved with combining of ionics and spintronics
15:45 - 16:00	<u>Jiaxuan Chen</u> (<i>Department of Electrical Engineering and Information Systems, The University of Tokyo</i>), Yicheng Song, Akira Hirose
2.3-02	Proposal of Passband Signal Learning Based on Analytic-Signal Input-Output Modeling for Spin-Wave Reservoir Computing
16:00 - 16:30	<u>Jiyong Woo</u> (<i>Kyungpook National University</i>)
2.3-13	Oxide-based Threshold Switches for Oscillatory Neural Networks and Probabilistic Computing
16:30 - 17:00	<u>Yong-Young Noh</u> (<i>Department of Chemical Engineering, Pohang University of Science and Technology (POSTECH), Pohang, South Korea</i>)
2.3-14	Development of p-type transistors for neuromorphic circuits

17:00 - 18:30 **Poster Session**

June 20th - Day 4 (Friday) 4	
	Session 3.1 Chair: Chu-Chen Chueh
09:00 - 09:30	<u>Hao-Wu Lin</u> (<i>Department of Materials Science and Engineering, National Tsing Hua University, Hsinchu, Taiwan</i>)
3.1-I1	Halide Perovskites and Cesium Halides Memristors
09:30 - 09:45	<u>So-Yeon Kim</u> (<i>Instituto de Tecnología Química (ITQ). Universitat Politècnica de València- Consejo Superior de Investigaciones Científicas (UPV-CSIC). 46022 València, Spain</i>), Bisquert Juan
3.1-O1	Operating Mechanisms and Dynamic Physical Models for Halide Perovskite-based Memristors and Neuromorphic Computing
09:45 - 10:00	<u>Ning-Cian Hsiao</u> (<i>Department of Chemical Engineering and Biotechnology, National Taipei University of Technology, Taipei 106, Taiwan</i>),
3.1-O2	Qun-Gao Chen, Hsin-Chiao Tien, Wen-Ya Lee
	Perovskite Triboelectric Nanogenerator for Tactile Sensing Artificial Synaptic Transistor Applications
10:00 - 10:30	<u>Peter C. Y. Chen</u> (<i>Dept. Photonics, National Cheng Kung University</i>)
3.1-I2	Halide Perovskites Memristor
10:30 - 11:15	Coffee Break
	Session 3.2 Chair: Sabina Spiga
11:15 - 11:45	<u>Gina Adam</u> (<i>The George Washington University</i>)
3.2-I1	Hippocampus-inspired Hardware Technologies for Neuromorphic Computing
11:45 - 12:15	<u>Chu-Chen Chueh</u> (<i>Department of Chemical Engineering National Taiwan University, TW</i>)
3.2-I2	Material Design for Synaptic Transistors: From Conjugated Polymers to Two-Dimensional Perovskites
12:15 - 12:30	Neuronics 25 Closing and Awards Ceremony