European Materials Research Society

2025 Spring Meeting

May 26 - 30 | Strasbourg Convention Centre

View symposium details

SYMPOSIUM E

Neuromorphic computing and adaptive sensing: material challenges, advances and future prospects

Oral sessions : VARSOVIE - GROUND FLOOR
Poster sessions : ETOILE - FIRST FLOOR

Symposium Organizers:

Ayan Roy CHAUDHURI (Main organizer), Materials Science Centre, Indian Institute of Technology Kharagpur, India

Sayani MAJUMDER, Tampere University, Information Technologies and Communication Sciences, Finland

Sreetosh GOSWAMI, Centre for Nano Science and Engineering, Indian Institute of Science, India

Thomas FISCHER, University of Cologne, Institute of Inorganic and Materials Chemistry Germany

Vikas RANA, Forschungszentrum Juelich GmbH, Germany

Symposium Sponsors:

Selected contributions will be invited to submit a paper to a special issue in Advanced Electronic Materials (Wiley). All submitted papers will undergo a peer-review process.

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Monday May 26

EO1 Phase Change and Vanadium Oxide based Materials for Neuromorphic Applications

Chairperson(s): DITTMANN Regina

ROY CHAUDHURI Ayan

View session abstracts

08:30	2669	Tailoring Phase Change Materials for Neuromorphic Applications: The Role of Metavalent Bonding **WUTTIG Matthias (Invited)**
09:00	1666	Influence of the Ge/Sb disorder on the electronic conductivity of GeSbTe crystals for phase-change memories and neuromorphic devices **GAUBERT Pierre**
09:15	2296	Phase Change Materials and Resistive RAM for Oscillatory Neural Network Implementation **Lahkar Simanta**
09:30	784	Stochastically stable W:VO2 micro-resistor oscillators for artificial neurons **CHITNIS Ujjwal**
09:45	534	VOx-Based Mott Memristor Exhibiting Leaky Integrate-and-Fire Neuronal Dynamics for Neuromorphic Spike Encoding **SHIH Li-Chung**

Monday May 26

EO2 Metal Oxides for Neuromorphic Applications I

Chairperson(s): FISCHER Thomas

WUTTIG Matthias

View session abstracts

10:30	1665	Prospects and challenges of area-dependent memristive devices for neuromorphic computing **DITTMANN Regina (Invited)**
11:00	863	Emergent phenomena exploited at oxide heterointerfaces for unconventional computing **BANERJEE Tamalika (Invited)**
11:45	1508	All HfOx resistive switches with conducting oxygen vacancy exchange layer and self-limited oxide layer **SCHREYER Philipp**

Monday May 26

EO3 Metal Oxides for Neuromorphic Applications II

Chairperson(s): BANERJEE Tamalika

ROY CHAUDHURI Ayan

View session abstracts

13:45	2510	Resistance switching memristive devices for future unconventional computing **SPIGA Sabina (Invited)**
14:15	970	A Neural Ordinary Differential Equation Model of a Solid Electrolyte FET applied to Reservoir Computing **DE SOUZA Maria Merlyne (Invited)**
14:45	698	Memcapacitive Switching and Impedance Spectroscopy of Hafnium Oxide Memristors **YADAV Deepika**
15:00	1228	Evolution of interface trap density of Hf0.5Zr0.5O2 MFIM capacitors during fatigue and recovery using capacitance - conductance method **SRIVARI Padma**
15:15	1254	Low threshold-field induced resistive state switching in titanate spinel: Candidate for energy-efficient artificial neuron **MAJI Priyanka**
15:30	1506	Volatile amorphous-SrTiO3 devices with tunable decay time for event-based sensing **SPITHOURIS Dimitrios**

Monday May 26

EO4 Novel materials in Neuromorphic Systems

Chairperson(s): FISCHER Thomas

SPIGA Sabina

View session abstracts

16:30	661	Programmable Volatility in Neuromorphic Devices: A Step Forward to Dynamic Neural Networks **KULKARNI Giridhar U. (Invited)**
17:00	492	Printable volatile memristors based on Lead-free perovskites for neuron emulation **ROGDAKIS Konstantinos**
17:15	1012	Lead-free All-Inorganic Halide Perovskite Thin Films for Neuromorphic Device Applications **MHASKAR Chinmayee**
17:30	174	Advancing Halide Perovskite RRAMs: From Enhanced Stability to Multifunctional Applications **PODDAR Swapnadeep**

17:45	1782	Comparison of amorphous hafnium oxide and hexagonal boron nitride as an insulating layer in Ag-based volatile ECM cells **HOFFMANN-EIFERT Susanne**
18:00	28	Adaptive metal-organic frameworks for opto-electronic devices **MILICHKO Valentin**
18:15	2353	Polyoxometalates - Molecular Redox Capacitors with Neuromorphic Potential **MONAKHOV Kirill**

Tuesday May 27

E05 Metal Oxides for Neuromorphic Applications III

Chairperson(s): KULKARNI Giridhar u.

MAJUMDAR Sayani

View session abstracts

08:30	510	Towards Neuromorphic Computing With HfO_2 Based Memristive Devices **WENGER Christian (Invited)**
09:00	2712	Investigating Conducting Filaments in $(V_{0.95}Cr_{0.05})_2O_3$ Mott Insulator for Resistive Switching Applications **BLOND Nathanael**
09:15	2845	Oxygen vacancy formation energetics in MgO-based high entropy oxides from DFT and experimental validation **AIDHY Dilpuneet**
09:30	3102	Indium-Gallium-Zinc Oxide (IGZO) Optoelectronic Memristor for Neuromorphic Vision Sensors **ELIAS PEREIRA Maria**
09:45	459	Light Sensing and Encoding Using IGZO Transistor for Color Image Recognition in Spiking Neural Network **HUANG Ya-Chi**

Tuesday May 27

E06 Ferroelectric Materials for Neuromorphic Applications

Chairperson(s): RANA Vikas

WENGER Christian

View session abstracts

10:30	1210	Ferroelectric Tunnel Junctions **ALEXE Marin (Invited)**
11:00	1529	Ferroelectric Field-Effects for Neuromorphic Hardware **BÉGON-LOURS Laura (Invited)**

11:30	780	High endurance ferroelectric superlattice HfO_2-ZrO_2 for CMOS back-end integration in neuromorphic hardware **LI Xinye**
11:45	1458	Optical neuromorphics at single wavelength excitation using photoferroelectrics **KUNDYS Bohdan**

Tuesday May 27

E07 Novel Materials and Processes for Neuromorphic Applications

Chairperson(s): BÉGON-LOURS Laura

MAJUMDAR Sayani

View session abstracts

13:45	3010	Bio-inspired time varying networks for novel computing primitives **KOHLSTEDT Hermann (Invited)**
14:15	3168	Neuromorphic Computing Accelerator with Molecular Memristor Crossbars **BHAT Navakanta (Invited)**
14:45	3167	A tale of struggle or How to optimize electric characterization on the nm scale **KLASEN Alexander**
15:00	564	2D Electrochemical Random-Access Memories (ECRAM) for Neuromorphic Computing **HAMEDI Max**
15:15	2042	In Situ TEM on Off-Stoichiometric $SrTiO_3$ **Zhou Dan**
15:30	2291	Inkjet printed IGZO memristors with volatile and non-volatile switching **FRANCO Miguel**
15:45	2351	External Magnetic Field Assisted Chemical Vapor Deposition for Structure and Morphology Control of Functional Thin Films **FISCHER Thomas**
16:00	340	Hybrid sp2 /sp3-bonded Carbon Interfaces Consisting of Boron-doped Carbon Nanowalls, Graphene, and Diamond Thin Film for Opto-Neuromorphic ('Memristor') Devices **GUPTA Sanju**

Tuesday May 27

E08 Layered Materials for Adaptive Sensing and Neuromorphic Applications I

Chairperson(s): KOHLSTEDT Hermann

RANA Vikas

View session abstracts

16:30	13	Graphene and 2D materials for neuromorphic computing and bio-inspired sensing **DAS Saptarshi (Invited)**
17:00	829	Layered Materials for Resistive Switching and Memory Devices **DAUS Alwin (Invited)**
17:30	490	On-chip learning with organic neuromorphic and biohybrid systems **VAN DE BURGT Yoeri (Invited)**
18:00	681	Strain and Charge Carrier Density Shift in Monolayer MoS_2 under Electrical Stress **KURTASH Vladislav**
18:15	1062	Epitaxial Bi_2O_2Se/Bi_2O_5Se Thin Films: Unveiling Resistive Switching Dynamics for Advanced Memory Applications **CHEN Yen Jung**

Wednesday May 28

E09 Layered Materials for Adaptive Sensing and Neuromorphic Applications II

Chairperson(s): DAS Saptarshi

RANA Vikas

View session abstracts

08:30	2668	A Reality Check on Neuromorphic Circuits **VENKATESAN Thirumalai (Invited)**
09:00	2016	Current driven exploration of h-BN based inkjet-printed ReRAM: new opportunities for endurance, computation in memory and security applications **CIRERA Albert**
09:15	2444	Tellurene nanosheets for memristive applications **MOLLE Alessandro**
09:30	2655	Low energy, forming & compliance-free HfOxSy/ HfS_2 memristors for ML & Neuromorphic Computing **XHAMENI Aferdita**
09:45	2840	Tunable Electrical and Optoelectronic Properties of 2D Materials for Advanced Device Applications **DI BARTOLOMEO Antonio**

Wednesday May 28

E10 Molecular Materials for Neuromorphic Appllications I

Chairperson(s): GOSWAMI Sreetosh

VENKATESAN Thirumalai

View session abstracts

10:30	2726	Single crystalline semiconductor oscillator for Oscillator-based computing **KIM Sanghyeon (Invited)**
11:00	502	High transconductance accumulation-mode vertical Organic Electrochemical Transistor **LUGINIESKI Marcos**
11:15	1248	Molecular effects on the electrical properties of nanostructured hybrid materials in a neuromorphic perspective **TRICARD Simon**
11:30	621	Van der Waals ferroelectric heterostructures for in-memory computing and emergent electronics **DAYEN Jean-Francois**
11:45	1157	Reconfigurable Optoelectronic MoS_2-based Memristors for Spiking Neural Networks **PANAGOPOULOU Chrysi**

Wednesday May 28

EP03 Poster Session 1

View session abstracts

13:45	01_1008	Non-volatile memory characteristics and artificial synaptic behaviors in two-dimensional materials via defect engineering **LEE Huiyeong**
13:45	02_1036	In-Situ TEM Observation of Structural Transition in High Entropy Alloy-Based Memristor **TSAI Jing-Yuan**
13:45	03_1037	A Reserve Computing Network based Reconfigurable Ferroelectric Artificial Synapse **LI Chunyang**
13:45	04_1048	Amorphous InGaSnO (a-IGTO) Thin Film Transistor with Modified Channel Layer for Neuromorphic Computing **KIM Sumi**
13:45	05_1107	Defects engineering for thin films of $(Sr,Ca)TiO_3$ solid solution epitaxially grown by metal organic vapor phase epitaxy **ABDELDAYEM Mohamed**
13:45	06_1145	Enhancing Linearity and Variability of HfO_2-Based Memristors via Lanthanum Doping **KIM Tae-Wook**

13:45	07_1159	Enhancing long-term memory in the ZnO-CNT nanocomposite optoelectronic synaptic device **LEE Seung Hun**
13:45	08_1161	Electrode-dependent WOx-based optoelectronic synapse devices for long-term memory in neuromorphic computing **JEON Dabin**
13:45	09_1178	Study on the Crystallization and Growth Mechanism in In-Sb-Te ternary alloy for phase change random access memory **PARK Jeong-Min**
13:45	10_1180	Physical reservoir computing platform with ZTO-based passive crossbar array for real-time applications **SILVA Carlos**
13:45	11_1282	Application of ferroelectric HZO capacitor array for in-memory computing **KIM Jiyoung**
13:45	12_1331	Effect of Thermal Annealing on Charge Trapping Characteristics and Synaptic Plasticity in Sol-Gel AlOx-Based Floating Gate Devices **BHISE Sneha**
13:45	13_1346	Evaluating Optical Stability Characteristics of Amorphous Oxide Synaptic Transistor for Neuromorphic Computing **SHIN Boram**
13:45	14_1347	Sb-doped Amorphous InGaSnO Thin Film Transistor toward Synaptic Transistor **SHIN Boram**
13:45	15_1377	Structural Phase Driven Multilevel Resistive Switching in HfO_2-based Memory Devices **PARIDA Tanmayee**
13:45	16_1423	ZnO tetrapod networks synthesis, functionalization for application in sensing and neuromorphic computing **RACKAUSKAS Simas**
13:45	17_144	Integrating Molecular Photoswitch Memory with Nanoscale Optoelectronics **ZAIATS Nelia**
13:45	18_1445	Filling the gaps: hybrid networks of metal nanoparticles and organic redox molecules **HOUARD Felix**
13:45	19_1601	Artificial Synaptic Behavior of Inorganic Cesium bismuth Halide Perovskite Thin Films **Chen Hung-Hsueh**
13:45	20_163	Relaxor ferroelectrics for neuromorphic computing **MA Haoyuan**
13:45	21_1728	Hamiltonian Monte Carlo methods for simulating CMOS back-end compatible ferroelectric devices **RANTA Rikhard**
13:45	22_1764	Interfacial Engineering Strategies to Boost Resistive Switching in V_2O_5 for Bio-Inspired Neuromorphic computing **KAUSHLENDRA Kumar**

13:45	23_1856	Axon Hillock Circuits in Organic Thin Film Technology **Kim Yerin**
13:45	24_1945	A Novel Supramolecular Mn(II)-Metallogel Based Synaptic Devices For The Application In Neuromorphic Computing **ROY Arpita**
13:45	25_1970	Electrode Engineering in Two-Dimensional $MoSe_2$ Resistive Switching Devices **GHOSH Kritika**
13:45	26_1971	Revealing Resistive Switching Behavior in Homoepitaxial growth of $SrTiO_3$ Based RRAM Device. **WANG Che-Hung**
13:45	27_2161	Modulation of Resistive Switching Characteristics in $CsPbBr_3$-based Memristors for Mimicking Biological Synapses for Neuromorphic Applications **SAHA Subham**
13:45	28_2259	Halide Perovskite-Based Memristor for Neuromorphic Computing Applications **ALAM Mizanur**
13:45	29_2290	A Novel Physics-accurate Simulation Scheme Helped Reveal the Underlying Mechanisms Governing the Forming Conditions of Bi-layer ReRAM devices **Lahkar Simanta**
13:45	30_232	2D MoTe2 Based Memristor and Memtransistor for Neuromorphic Computing **RADWAN Mohamed**
13:45	31_2365	Analysis of device damage in SiOx RRAM during formation **WANG Yiming**
13:45	32_2383	Ultra fast operation of VO_2 oscillators **POLLNER Zsigmond**
13:45	33_259	Natural Organic Fructose based Memristor for Sustainable Neuromorphic Computing Systems **ZHAO Feng**
13:45	34_2643	Feline eye–inspired Artificial Vision for Enhanced Camouflage Breaking under Diverse Light Conditions **KIM Min Su**
13:45	35_2662	High Entropy Oxide for Resistive Switching Applications **HEINEN Lukas**
13:45	36_2713	Pressure-dependent electrical and optoelectronic properties of $WS_2/PdSe_2$ heterostructures **VISCARDI Loredana**
13:45	37_2720	Variability in printed memristors: from awareness to an interdisciplinary solution **HU Hongrong**
13:45	38_2785	High photovoltaic response and memristive properties in ferroelectric doped PZT epitaxial thin films with Fe and Nb substitution **RENGIFO Miguel**

13:45	39_2932	Synthesis of Vanadium Oxide thin films for Resistive Random-Access Memory Application **YADAV Disha**
13:45	40_2941	Fully patterned solution-based ZTO memristors for reservoir computing applications **SILVA Carlos**
13:45	41_3106	Comparative Noise Diagnostics of Resistive Switching Systems: Impact of Geometries and Switching Mechanisms on Noise Characteristics **BLASCHEK Ákos Kristóf**
13:45	42_3118	Oxidation effects in $ZrSe_2$ flakes **INTONTI Kimberly**
13:45	43_610	Voltage-Modulated Short-Term Plasticity in Electrolyte-Gated IGZO Transistors for Enhanced Spatiotemporal Data Processing in Neuromorphic Systems **CHEN Yu-Chieh**
13:45	44_683	Hysteresis evolution with channel dimensions scaling in lateral MoS2 memristors **KURTASH Vladislav**
13:45	45_684	Hysteresis induced by deep level traps in MoS2/SiC based devices for neuromorphic applications **KURTASH Vladislav**
13:45	46_69	Reconfigurable logic and in-memory computing based on electrically controlled charge trapping in dielectric engineered two-dimensional semiconductor transistors **Tan Dongxin**
13:45	47_728	Oxide etching and design impact on analog memristor properties: shared bottom electrode vs. cross-point test structures **Koroleva Aleksandra**
13:45	48_737	Comparing programming schemes for cycling endurance and state stability in SiOx ReRAM **ABRAITIS Paulius**
13:45	49_855	High photovoltaic response and memristive properties in ferroelectric doped PZT epitaxial thin films with Fe and Nb substitution **RENGIFO Miguel**
13:45	50_869	Multi-stimuli responsive sensors for electronic skin applications **COCLITE Anna Maria**
13:45	51_881	Light-Stimulated Resistance Switching in SiOx-Based ReRAM Using a Metal-Insulator-Metal Structure **SANTOSA A A Ngurah Arymurti**
13:45	52_973	Broadband Optoelectronic Synapses through Defect-Engineering of Ultrathin Semiconducting 2D Bi_2Se_3 for Neuromorphic Computing **NANDI Sanju**
13:45	53_856	Understanding and Exploring Ionic Current Dynamics in Nanopores **DOMINIC Anumol**

13:45	54_3155	Memristive film deposition with PLD and the transfer from lab size to full wafer production **STEIN Wolfgang**
13:45	55_398	Voltage-Dependent Time Constant of Neuromorphic Organic Electrochemical Transistor for Programmable Neuromorphic Devices **YAMAMOTO Shunsuke**

Thursday May 29

E12 Molecular Materials for Neuromorphic Appllications II

Chairperson(s): DAUS Alwin

GOSWAMI Sreetosh

View session abstracts

08:30	162	In-Memory Optical and Humidity Sensing and Computing Using Charge-Based Devices **EL-ATAB Nazek (Invited)**
09:00	726	Dynamic Molecular Switches for Reconfigurable and Synapse-Like Electronics **NIJHUIS Christian (Invited)**
09:30	99	Molecular Memcapacitive Crossbar for energy efficient computing **GAUR Pallavi**
09:45	100	Physical Explanation of Linearity and Symmetry and Thousands of Analog States Using Molecular Kinetics **KUNDU Bidyabhusan**

Thursday May 29

E13 Neuromorphic and Adaptive Devices and Circuits

Chairperson(s): EL-ATAB Nazek

FISCHER Thomas

View session abstracts

10:30	882	BackPropagation-free Deep Reinforcement Learning for Privacy-Preserving Recommendation system via Memristor crossbars **YI Suin (Invited)**
11:00	326	Solid-State Oxide-Ion Synaptic Transistor for Neuromorphic Computing **LANGNER Philipp**
11:15	87	Multi-level Storage and Wide-range Nonvolatile Optoelectronic Memory Utilizing a Tellurene Floating Gate in a 2D van der Waals Heterostructure **BACH Thi Phuong Anh**
11:30	628	Reprogrammable hardware for data processing at the edge **BORGHI Francesca**
11:45	357	Oxide-Configured Neuristor for Neuromorphic Spiking and Synaptic Plasticity Regulation **CHEN Kuan-Ting**

Thursday May 29

E14 Neuromorphic and Adaptive Circuits and Systems

Chairperson(s): MAJUMDAR Sayani

YI Suin

View session abstracts

13:45 3042
Computing with Nonlinear Dynamics in Locally Active Memristor Oscillators
CORINTO Fernando (Invited)

14:15 3171
Universality of Memristor Cellular Nonlinear Networks
TETZLAFF Ronald (Invited)

14:45 861
Neuromorphic Memory Optocoupler Module: Emulating Long-term Memory to Permanent-term Memory Transition
CHEN Yusheng

15:00 1618
Unipolar Potentiation and Depression within Optically Active Memristive Devices Subthreshold Regime
VU Viet Cuong

15:15 2348
Neural information processing and time-series prediction with only two dynamical memristors
HALBRITTER András

15:30 3077
Applications of Memristors on Edge of Chaos for Energy-Efficient Bio-Inspired Electronics
ASCOLI Alon

15:45 3195
A High-Frequency Artificial Nerve Based on Homogeneously Integrated Organic Electrochemical Transistors
MA Wei

16:00 3026
Steady-state and non-steady-state noise dynamics of VO_2 memristors revealed by full cycle nonlinear noise spectroscopy measurements
BALOGH Zoltán

Thursday May 29

E15 Devices and Simulation for Neuromorphic Applications

Chairperson(s): ROY CHAUDHURI Ayan

TETZLAFF Ronald

View session abstracts

16:30 2833
Multiscale modeling augmented development of Self-rectifying non-volatile tunneling synapse
Pesic Milan (Invited)

17:00 1981
Neuromorphic and Ising Computing Using Spintronic Domain-Wall Devices and Spintronic Oscillators
BHOWMIK Debanjan (Invited)

17:30 1624
Including ferroelectric fatigue and recovery into a compact SPICE-compatible model
PAASIO Ella

17:45 2701
Opportunities of ZnO@SiC Composites for Neuromorphic Computing
KANJILAL Aloke

18:00 2405
Engineering the Switching Kinetics of Valence Change-Based Memristive Devices for Neuromorphic Computing
SARANTOPOULOS Alexandros

18:15 716
Oxide Interface-Based Reconfigurable Devices for Neuromorphic Computing Applications
PRADHAN Soumen