

| Day 0. Sat, November 9, 2024  |   |                          |  |                          |
|---|---|--------------------------|--|--------------------------|
| 19:00 - 21:00   | Welcome Reception                                     |                          |  |                          |
| Day 1. Sun, November 10, 2024   |   |                          |  |                          |
| Korean Time   |   | Registration and Opening |  |                          |
| 09:00 - 10:10   | Registration: Lobby                                   |                          |  |                          |
| 10:10 - 10:20   | MEMRISYS 2024 Welcome Greetings: Iliia Valov (Room 1) |                          |  |                          |
| 10:20 - 10:30   | MEMRISYS 2024 Opening: Cheol Seong Hwang (Room 1)     |                          |  |                          |
| Plenary session - Room 1  |   |                          |  |                          |
| 10:30 - 11:30   | Plenary   | Leon Chua                | Memristors on Edge of Chaos  | Chair: Cheol Seong Hwang |
| Room 1  |   |                          |  |                          |
| Session 1: Materials for Memristive/Emerging Devices; Chair: Iliia Valov  |   |                          |  |                          |
| 11:30 - 11:55   | Invited   | Alon Ascoli              | A Three-Element Second-Order Locally-Active Neuristor Reproducing the Cascade of Bifurcations, Underlying the Life Cycle of an Action Potential, in the Fourth-Order Hodgkin-Huxley Neuron Model |                          |
| 11:55 - 12:20   | Invited   | Kazuya Terabe            | Controlling ion transport at the atomic level to improve memristive devices  |                          |
| 12:20 - 12:35   | Oral  | Alejandro Schulman       | Towards True Multifunctional Devices: Memristive and Magnetoresistive Behaviors in MgO-Based Magnetic Tunnel Junctions   |                          |
| 12:35 - 12:50   | Oral  | Miklos Csontos           | Picosecond Femtojoule Resistive Switching in Nanoscale VO2 Memristors  |                          |
| 12:50 - 14:20   | Lunch Break   |                          |  |                          |
| Session 1: Materials for Memristive/Emerging Devices; Chair: Kazuya Terabe  |   |                          |  |                          |
| 14:20 - 14:45   | Invited   | Feng Miao                | Atomic Lego for future computing   |                          |
| 14:45 - 15:00   | Oral  | Jimin Lee                | Threshold Resistive Switching in SiOx/Vertically Aligned MoS2 Devices based on Silver (Ag) Ion Migration   |                          |
| 15:00 - 15:15   | Oral  | Soumi Saha               | Mimicking Somatic Behavior of Neurons Using Memristive Switching Characteristics of 2D SnS-based Integrate and Fire Model  |                          |
| 15:15 - 15:30   | Oral  | Sofia Cruces             | Forming-Free Threshold Resistive Switching in Sub-Micron Lateral 2D MoS2 Memristors  |                          |
| 15:30 - 15:50   | Coffee Break - Lobby                                  |                          |  |                          |
| Session 1: Materials for Memristive/Emerging Devices; Chair: Feng Miao  |   |                          |  |                          |
| 15:50 - 16:15   | Invited   | Georgios Sirakoulis      | Mycelium-Based Engineered Living Materials Coupled with Memristive Networks: A Promising Emerging Future   |                          |
| 16:15 - 16:30   | Oral  | Yujiao Dong              | Theoretical investigation on second-order locally active memristor and simplest memristive neuron  |                          |
| 16:30 - 16:45   | Oral  | Shima Hosseinzadeh       | Multi-level FTJs: From Noise Modelling to Analog Processing-in-Memory  |                          |
| 16:45 - 17:00   | Oral  | Dimitrios Spithouris     | Volatile amorphous-SrTiO3 devices for Time-Difference Encoder with tunable decay time  |                          |
| Room 2  |   |                          |  |                          |
| Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Carlo Ricciardi  |   |                          |  |                          |
| 11:30 - 11:55   | Invited   | Fernando Corinto         | Nonlinear Dynamics and Local Activity in Memristor Neuromorphic Circuits   |                          |
| 11:55 - 12:20   | Invited   | Can Li                   | Quantum-inspired annealing in analog memristor crossbars for optimization problems   |                          |
| 12:20 - 12:35   | Oral  | Hyongsuk Kim             | A Complementary Learning of Multilayer Neural Network Circuits   |                          |
| 12:35 - 12:50   | Oral  | Daiki Nishioka           | Physical reservoir computing based on few-molecule vibration dynamics achieved by surface-enhanced Raman scattering and ion-gating Stimuli   |                          |
| 12:50 - 14:20   | Lunch Break   |                          |  |                          |
| Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Fernando Corinto |   |                          |  |                          |
| 14:20 - 14:45   | Invited   | Heejun Yang              | Energy Intelligent Computing Devices Based on 2D Materials   |                          |
| 14:45 - 15:00   | Oral  | Alba Martinez            | Dynamic Charge Trap-based Memristor for Second-order Reservoir Computing   |                          |
| 15:00 - 15:15   | Oral  | Divyam Sharma            | Halide Perovskite Photovoltaics for In-Sensor Reservoir Computing  |                          |
| 15:15 - 15:30   | Oral  | HYEONJII LEE             | Wide Reservoir Computing Using MoS2-based Charge Trap Memory for Enhanced Computing Capacity   |                          |
| 15:30 - 15:50   | Coffee Break - Lobby                                  |                          |  |                          |
| Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Heejun Yang      |   |                          |  |                          |
| 15:50 - 16:15   | Invited   | Suin Yi                  | BackPropagation-free Deep Reinforcement Learning for Privacy-Preserving Recommendation system via Memristor crossbars  |                          |
| 16:15 - 16:30   | Oral  | Yue ZHOU                 | Memristive Photon-Emitting Neurons in Scalable 3D Neural Networks  |                          |
| 16:30 - 16:45   | Oral  | Janguk Han               | Graph Network-based Reservoir Computing with Memristive Crossbar Array   |                          |
| 16:45 - 17:00   | Oral  | Carlo Ricciardi          | Neuromorphic nanowire networks: how brain inspiration can improve computing performance  |                          |
| Room 3  |   |                          |  |                          |
| Session 3: Three terminal neuromorphic devices; Chair: Doo Seok Jeong   |   |                          |  |                          |
| 11:30 - 11:55   | Invited   | Peng Zhou                | Ultrafast flash memory towards scalable integration and ultimate scaling   |                          |
| 11:55 - 12:20   | Invited   | Daewoong Kwon            | Analog Reservoir Computing Utilizing IGZO Channel Ferroelectric-gated Transistors  |                          |
| 12:20 - 12:35   | Oral  | Yifei Yang               | A memmpolar transistor made from tellurium   |                          |
| 12:35 - 12:50   | Oral  | TBD                      | TBD  |                          |
| 12:50 - 14:20   | Lunch Break   |                          |  |                          |
| Session 4: Memristor-based Edge Computing Systems and Design; Chair: Jason Eshraghian                               |   |                          |  |                          |
| 14:20 - 14:45   | Invited   | Ming Liu                 | Resistive random access memory (RRAM): from fundamental research to industrial applications  |                          |
| 14:45 - 15:00   | Oral  | Gwangmin Kim             | Mott Neurons with Dual Thermal Dynamics for Spatiotemporal Computing   |                          |
| 15:00 - 15:15   | Oral  | Rotem Ben-Hur            | DART-PIM: DNA read mApping accelerator Using Processing-In-Memory  |                          |
| 15:15 - 15:30   | Oral  | Hakseung Rhee            | Probabilistic computing with NbOx metal-insulator transition-based stochastic oscillation  |                          |
| 15:30 - 15:50   | Coffee Break - Lobby                                  |                          |  |                          |
| Session 4: Memristor-based Edge Computing Systems and Design; Chair: Ming Liu                                       |   |                          |  |                          |
| 15:50 - 16:15   | Invited   | Jason Eshraghian         | A Pathway to Large-Scale Neuromorphic Memristive Systems   |                          |
| 16:15 - 16:30   | Oral  | ShengGuang Ren           | Self-rectifying Memristor for In-Memory Computing  |                          |
| 16:30 - 16:45   | Oral  | Do Hoon Kim              | Bayesian Learning of Monte Carlo DropConnect Neural Networks Based on Stochastic ISIM Devices  |                          |
| 16:45 - 17:00   | Oral  | Stefan Pechmann          | CMOS-integrated Multi-level Programming and Read-Out Circuitry including HFO2- based RRAM Arrays   |                          |
| Common  | 17:00 - 18:30   | Poster Session #1        |  |                          |

Parallel Sessions

| Day 2. Mon, November 11, 2024   |                          |                     |  |                      |
|---|--------------------------|---------------------|--|----------------------|
| Korean Time   | Registration             |                     |  |                      |
|   | Registration: Lobby      |                     |  |                      |
| 08:15 - 09:00   | Plenary session - Room 1 |                     |  |                      |
| 09:00 - 09:45   | Plenary                  | Huaqiang Wu         | Memristor-based computing-in-memory chips and applications: A hardware-software co-design  | Chair: Shinyun Choi  |
| 09:45 - 10:30   | Plenary                  | Iliia Valvov        | Material concepts for memristive devices – new fundamentals and applications   | Chair: Kyung Min Kim |
| <b>Room 1</b>   |                          |                     |  |                      |
| <b>Session 2: Two terminal neuromorphic devices; Chair: Atsuya Okazaki</b>  |                          |                     |  |                      |
| 10:30 - 10:55   | Invited                  | Peng Lin            | Modulation and application of ECRAM for Neuromorphic Computing   |                      |
| 10:55 - 11:20   | Oral                     | Wonbae Ahn          | Wafer-scale direct growth of nano crystalline h-BN for memristor-based physical reservoirs   |                      |
| 11:20 - 11:35   | Oral                     | Markus Fischer      | Confined filament growth in Ag-Nanoparticle Memristor  |                      |
| 11:35 - 12:05   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 2: Two terminal neuromorphic devices; Chair: Peng Lin</b>  |                          |                     |  |                      |
| 12:05 - 12:30   | Invited                  | Atsuya Okazaki      | Analog PCM-based accelerator for large deep neural networks  |                      |
| 12:30 - 12:45   | Oral                     | Kees de Groot       | High endurance back-end-of-line PECVD amorphous SiC single- and bi-layer Memristors for Neuromorphic Computing                                       |                      |
| 12:45 - 13:00   | Oral                     | See-On Park         | Ultra-Low Current Phase-Change Memory via Forming Phase-Changeable Nano-Filament   |                      |
| 13:00 - 14:30   | Lunch Break              |                     |  |                      |
| Steering committee meeting (including lunch)  |                          |                     |  |                      |
| <b>Session 3: Three terminal neuromorphic devices; Chair: Sangbum Kim</b>   |                          |                     |  |                      |
| 14:30 - 14:55   | Invited                  | Jang-Sik Lee        | Hafnia-based Ferroelectric Transistors for Memory and Neuromorphic Device Applications   |                      |
| 14:55 - 15:10   | Oral                     | Seokho Seo          | Development of gate injection-based field-effect synapse transistor with high reliability and linear conductance programmability for online training |                      |
| 15:10 - 15:25   | Oral                     | Yifei Yang          | Bio-realistic and versatile artificial dendrites made of anti-ambipolar transistors  |                      |
| 15:25 - 15:40   | Oral                     | Sahngik Mun         | High-Dimensional Physical Reservoir with Back-end-of-line Compatible Tin Monoxide Thin-Film Transistor   |                      |
| 15:40 - 16:10   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 3: Three terminal neuromorphic devices; Chair: Ronald Tetzlaff</b>   |                          |                     |  |                      |
| 16:10 - 16:35   | Invited                  | Sangbum Kim         | Neuromorphic Hardware with Phase Change Memory: Exploring Applications of Spiking Boltzmann Machines   |                      |
| 16:35 - 16:50   | Oral                     | yue gong            | Reconfigurable and nonvolatile bulk photovoltaics effect based on 2D ferroelectric memristors for machine vision                                     |                      |
| 16:50 - 17:05   | Oral                     | Wei Zhong           | Cu interconnect InSnZnO transistor for 2TOC DRAM   |                      |
| <b>Room 2</b>   |                          |                     |  |                      |
| <b>Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Huaqiang Wu</b> |                          |                     |  |                      |
| 10:30 - 10:55   | Invited                  | Joshua Yang         | Analog computing with high precision and programmability enabled by memristors   |                      |
| 10:55 - 11:20   | Invited                  | Yang Chai           | Next-Generation Computing Using Silicon Two-Terminal Resistive Switching Devices   |                      |
| 11:20 - 11:35   | Oral                     | Yoon Ho Jang        | Memristive Crossbar Array-based Probabilistic Graph Modeling   |                      |
| 11:35 - 12:05   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Joshua Yang</b> |                          |                     |  |                      |
| 12:05 - 12:30   | Invited                  | Ronald Tetzlaff     | Hybrid computing in memristive arrays  |                      |
| 12:30 - 12:45   | Oral                     | Hakcheon Jeong      | Memristor-based hardware platform for implementing of artificial intelligence algorithms   |                      |
| 12:45 - 13:00   | Oral                     | Stefano Brivio      | Processing of Information through the Complex Dynamic of a Nonlinear Memristive Circuit  |                      |
| 13:00 - 14:30   | Lunch Break              |                     |  |                      |
| Steering committee meeting (including lunch)  |                          |                     |  |                      |
| <b>Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Yang Chai</b>   |                          |                     |  |                      |
| 14:30 - 14:55   | Invited                  | Yuchao Yang         | Controlling ion transport at the atomic level to improve memristive devices  |                      |
| 14:55 - 15:10   | Oral                     | Zhongqiang Wang     | Emerging multimode memristor for neuromorphic sensory system   |                      |
| 15:10 - 15:25   | Oral                     | Xin Zheng           | Non-volatile Quantized Conductance Achieved by Electrochemical Polishing during Slow RESET Process in Memristive Devices                             |                      |
| 15:25 - 15:40   | Oral                     | Dimitrios Prousalis | Memristor Cellular Nonlinear Networks with noisy memristive synapses   |                      |
| 15:40 - 16:10   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc ); Chair: Yuchao Yang</b> |                          |                     |  |                      |
| 16:10 - 16:35   | Invited                  | Kyusang Lee         | Edge Intelligence towards Smart Sensing  |                      |
| 16:35 - 16:50   | Oral                     | Min Gu Lee          | Bio-inspired Memristor-Based Elementary Motion Detector  |                      |
| 16:50 - 17:05   | Oral                     | Kevin Portner       | In-Situ Actor-Critic Reinforcement Learning with Analog, Conductive Metal-Oxide Memristors   |                      |
| <b>Room 3</b>   |                          |                     |  |                      |
| <b>Session 6 : Memristor-based logic and systems; Chair: Doo Seok Jeong</b>   |                          |                     |  |                      |
| 10:30 - 10:55   | Invited                  | Masakazu Aono       | Present status of development of atomic switch   |                      |
| 10:55 - 11:20   | Invited                  | Seyoung Kim         | Analog AI Computation with Oxygen-Based ECRAM: Insights into Switching Mechanism and Cross-point Array Operations                                    |                      |
| 11:20 - 11:35   | Oral                     | Simon Brown         | Brain-like Computation with Percolating Networks of Nanoparticles  |                      |
| 11:35 - 12:05   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 6 : Memristor-based logic and systems; Chair: Masakazu Aono</b>  |                          |                     |  |                      |
| 12:05 - 12:30   | Invited                  | Doo Seok Jeong      | High-level computing-in-memory simulator   |                      |
| 12:30 - 12:45   | Oral                     | Pascal Stasner      | Improving Reliability by Lateral Filament Confinement in Nano-Scaled ReRAM Devices   |                      |
| 12:45 - 13:00   | Oral                     | Max Talanov         | Neuropunk revolution and AI energy consumption reduction   |                      |
| 13:00 - 14:30   | Lunch Break              |                     |  |                      |
| Steering committee meeting (including lunch)  |                          |                     |  |                      |
| <b>Session 4: Memristor-based Edge Computing Systems and Design; Chair: Zhongrui Wang</b>                             |                          |                     |  |                      |
| 14:30 - 14:55   | Invited                  | John Paul Strachan  | Mixed Memristor-CMOS circuits for content addressable memories and in-memory computing   |                      |
| 14:55 - 15:10   | Oral                     | Soo Hyung Lee       | In-materia Annealing and Combinatorial Optimization Based on Vertical Memristive Array   |                      |
| 15:10 - 15:25   | Oral                     | Yang Li             | Highly efficient neuromorphic deep learning enabled by binary-stochasticity  |                      |
| 15:25 - 15:40   | Oral                     | Woojoon Park        | Mott Memristor-Driven Memristive Hardware Framework for Explainable AI   |                      |
| 15:40 - 16:10   | Coffee Break - Lobby     |                     |  |                      |
| <b>Session 4: Memristor-based Edge Computing Systems and Design; Chair: John Paul Strachan</b>                        |                          |                     |  |                      |
| 16:10 - 16:35   | Invited                  | Zhongrui Wang       | Memristive computing: hardware-software co-optimization  |                      |
| 16:35 - 16:50   | Oral                     | Angela Slavova      | Bioinspired memristor CNN computations in cardiology and neurophysiology   |                      |
| 16:50 - 17:05   | Oral                     | Sariel Hodisan      | Transimpedance Amplifier with Automatic Gain Control Based on Memristors   |                      |
| Common  | <b>Poster Session #2</b> |                     |  |                      |
|   | <b>Banquet</b>           |                     |  |                      |

| Day 3. Tue, November 12, 2024  |                      |                                     |  |                          |
|--|----------------------|-------------------------------------|--|--------------------------|
| Korean Time  | Registration         |                                     |  |                          |
|  | Registration: Lobby  |                                     |  |                          |
| Plenary session - Room 1   |                      |                                     |  |                          |
| 09:00 - 09:45  | Plenary              | Daniele Ielmini                     | TBD  | Chair: Kyung Min Kim     |
| 09:45 - 10:30  | Plenary              | Seho Lee                            | Future Memory-centric Computation  | Chair: Cheol Seong Hwang |
| Editor session - Room 1  |                      |                                     |  |                          |
| 10:30 - 11:15  | Nat. Comm.           | Huang                               | Nature Communications Editorial Meet & Greet   | Chair: Shinhyun Choi     |
| 11:15 - 11:45  | Coffee Break - Lobby |                                     |  |                          |
| Room 1   |                      |                                     |  |                          |
| 11:45 - 13:05 Session 2: Two terminal neuromorphic devices; Chair: Daniele Ielmini   |                      |                                     |  |                          |
| 11:45 - 12:10  | Invited              | Qiangfei Xia                        | Tuning the dynamics of diffusive memristors for neuromorphic applications  |                          |
| 12:10 - 12:35  | Invited              | Hiroynki AKINAGA                    | Reliability of ReRAM Device Technologies for Neuromorphic Applications   |                          |
| 12:35 - 12:50  | Oral                 | Jongmin Bae                         | Ion Energy Barrier Modulation and Enhanced Reliability Effect through Fluorine Doping for Memristive Neuromorphic Systems                  |                          |
| 12:50 - 13:05  | Oral                 | David Maldonado                     | Comparative analysis on the conductance drift in HfO <sub>2</sub> -based RRAM devices  |                          |
| 13:05 - 14:30  | Lunch Break          |                                     |  |                          |
| 14:30 - 15:50 Session 2: Two terminal neuromorphic devices; Chair: Yoon Jang Chung   |                      |                                     |  |                          |
| 14:30 - 14:55  | Invited              | Sreetosh Goswami                    | A 14-bit molecular dot product engine  |                          |
| 14:55 - 15:20  | Invited              | Sabina Spiga                        | Understanding the fundamentals of volatile memristors for brain inspired computing   |                          |
| 15:20 - 15:35  | Oral                 | Si En Timothy Ng                    | Light-Emitting Neuronal Devices For Neuromorphic Control Systems   |                          |
| 15:35 - 15:50  | Oral                 | Ruomeng Huang                       | Mesoporous silica-based memristor for neuromorphic computing   |                          |
| 15:50 - 16:20  | Coffee Break - Lobby |                                     |  |                          |
| 16:20 - 17:30 Session 2: Two terminal neuromorphic devices; Sabina Spiga   |                      |                                     |  |                          |
| 16:20 - 16:45  | Invited              | Kyeong-Sik Min                      | Memristor crossbar circuits for low-power IoT devices  |                          |
| 16:45 - 17:00  | Oral                 | Swapnadeep Poddar                   | Advancing Data Storage and Neuromorphic Computing with Three-dimensionally Integrated Perovskite Nanowires and Quantum Wires               |                          |
| 17:00 - 17:15  | Oral                 | Dayanand Kumar                      | Flexible Optical Memristors for Edge Neuromorphic Vision and Biosignal Processing  |                          |
| 17:15 - 17:30  | Oral                 | Neethu Kuriakose                    | Integrated Memristor Control and Crossbar Array Design using TSMC 28 nm Technology   |                          |
| Room 2   |                      |                                     |  |                          |
| 11:45 - 13:05 Session 1: Materials for Memristive/Emerging Devices; Chair: Stephan Menzel                                      |                      |                                     |  |                          |
| 11:45 - 12:10  | Invited              | Jung-Hae Choi                       | Ab initio study on charge transition-driven resistive switching in Pt/TiO <sub>2</sub> /Ti devices   |                          |
| 12:10 - 12:35  | Oral                 | Emilio Perez-Bosch Quesada          | Forming and Resistive Switching of HfO <sub>2</sub> -based RRAMs at cryogenic temperature  |                          |
| 12:35 - 12:50  | Oral                 | Dennis Braun                        | Correlating MOCVD MoS <sub>2</sub> Material Properties with Improved Memristor Resistance State and Switching Voltage Variabilities        |                          |
| 12:50 - 13:05  | Oral                 | Lambert Alff                        | Materials design and defect engineering correlated with compact modelled device behavior towards neuromorphic memristors                   |                          |
| 13:05 - 14:30  | Lunch Break          |                                     |  |                          |
| 14:30 - 15:50 Session 1: Materials for Memristive/Emerging Devices; Chair: Tifenn HIRTZLIN                                     |                      |                                     |  |                          |
| 14:30 - 14:55  | Invited              | Tae-Sik Yoon                        | Analog resistance changes in multilayer metal-oxide memristors for neuromorphic computing  |                          |
| 14:55 - 15:20  | Invited              | Stephan Menzel                      | On the Relation between Switching Kinetics and Analog Programming Capabilities of Memristive Devices based on the Valence Change Mechanism |                          |
| 15:20 - 15:35  | Oral                 | Geunyoung Kim                       | Double Charge Trap Layer Memristor for Modulative Threshold Switching  |                          |
| 15:35 - 15:50  | Oral                 | Sunwoo Cheong                       | Hyperplane Tree-based Data Mining with Multi-functional Memristive Crossbar Array  |                          |
| 15:50 - 16:20  | Coffee Break - Lobby |                                     |  |                          |
| 16:20 - 17:30 Session 3: Three terminal neuromorphic devices; Chair: Seyoung Kim   |                      |                                     |  |                          |
| 16:20 - 16:45  | Invited              | Gunuk Wang                          | A three-terminal vertical organic ferroelectric barristor for fast and energy-efficient neuromorphic computing                             |                          |
| 16:45 - 17:00  | Invited              | Tifenn HIRTZLIN                     | Overcoming catastrophic forgetting through Bayesian Metaplasticity in Memristor based In-Memory Computing                                  |                          |
| 17:00 - 17:15  | Oral                 | Anugerah Firdausi                   | A Current-Mode SAR ADC for Memristor Readout in 28nm CMOS  |                          |
| 17:15 - 17:30  | TBD                  | TBD                                 | TBD  |                          |
| Room 3   |                      |                                     |  |                          |
| 11:45 - 13:05 Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc.); Chair: Min Hyuk Park |                      |                                     |  |                          |
| 11:45 - 12:10  | Invited              | Toshiharu Sasaki                    | Colloidal robotics using phase-change memory in individuals and the environment  |                          |
| 12:10 - 12:35  | Invited              | Ho Won Jang                         | Linearly programmable two-dimensional halide perovskite memristor arrays for neuromorphic computing  |                          |
| 12:35 - 12:50  | Oral                 | Mohammad Tauquir Alam Shamim Shaikh | Facile Solution-Processed Flexible and Biodegradable Organic Memristor for Wearable and Transient Electronics                              |                          |
| 12:50 - 13:05  | Oral                 | Takashi Tsuchiya                    | Iono-Magnonic Reservoir Computing with Enhanced High Dimensionality  |                          |
| 13:05 - 14:30  | Lunch Break          |                                     |  |                          |
| 14:30 - 15:50 Session 4: Memristor-based Edge Computing Systems and Design; Chair: Ho Won Jang                                 |                      |                                     |  |                          |
| 14:30 - 14:55  | Invited              | Yoeri van de Burgt                  | Local and autonomous learning with organic neuromorphic electronics  |                          |
| 14:55 - 15:20  | Oral                 | Yingjie Yu                          | Memristive Ternary Content Addressable Memory for In-Memory Search   |                          |
| 15:20 - 15:35  | Oral                 | samarth jain                        | Compute-in-Memory Hardware Featuring Low Latency   |                          |
| 15:35 - 15:50  | Oral                 | Lukas Voelkel                       | Influence of Vacuum on the Resistive Switching of h-BN Based Memristors  |                          |
| 15:50 - 16:20  | Coffee Break - Lobby |                                     |  |                          |
| 16:20 - 17:30 Session 4: Memristor-based Edge Computing Systems and Design; Chair: Yoeri van de Burgt                          |                      |                                     |  |                          |
| 16:20 - 16:45  | Invited              | Jeonghoon Kim                       | Neuromorphic Learning-in-Memory with Selector-less RRAM Crossbar Array   |                          |
| 16:45 - 17:00  | Oral                 | Sahitya Yarragolla                  | Nonlinear dynamics in memristive devices for secure neuromorphic computing   |                          |
| 17:00 - 17:15  | Oral                 | Namju Kim                           | Medical Image Synthesis utilizing Memristor based True Random Number Generator for noise input of Generative Network                       |                          |
| 17:15 - 17:30  | Oral                 | Andreia Silva                       | Approaching bio-voltages with copper liquid-based artificial synapses  |                          |
| Common   | 17:30 - 19:00        | Poster Session #3                   |  |                          |

Parallel Sessions

| Day 4. Wed, November 13, 2024   |  |                         |   |                          |
|---|--|-------------------------|---|--------------------------|
| Korean Time   | Registration   |                         |   |                          |
|   | 08:15 - 09:00  | Registration: Lobby     |   |                          |
| Plenary session - Room 1  |  |                         |   |                          |
| 09:00 - 09:45   | Plenary  | Jong-Ho Lee             | AI semiconductor policy and flash memory-based neural networks  | Chair: Cheol Seong Hwang |
| Room 1  |  |                         |   |                          |
| 09:45 - 11:20 Session 2: Two terminal neuromorphic devices; Chair: Jung Ho Yoon   |  |                         |   |                          |
| 09:45 - 10:10   | Invited  | Juerg Leuthold          | Photonic-Electronic Memristive Devices for Fast Neuronal Networks   |                          |
| 10:10 - 10:35   | Invited  | Keon Jae Lee            | Simultaneous emulation of synaptic and intrinsic plasticity using a memristive synapse  |                          |
| 10:35 - 10:50   | Oral   | Jingsheng Chen          | Multimode-fused Sensing System Based on Second-order Memristor  |                          |
| 10:50 - 11:05   | Oral   | Sung Keun Shim          | Thresholding Computing with Heterogeneous Integration of Memristive Kernel with MOS Capacitor for Temporal Data Analysis                                    |                          |
| 11:05 - 11:35   | Coffee Break - Lobby                                       |                         |   |                          |
| 11:35 - 13:15 Session 2: Two terminal neuromorphic devices; Chair: Juerg Leuthold   |  |                         |   |                          |
| 11:35 - 12:00   | Invited  | Jung Ho Yoon            | Oxide Nanostructure-based Memristor Research for Bio-inspired Computing Applications  |                          |
| 12:00 - 12:15   | Oral   | Ioannis Messaris        | Utilizing Global Fading Memory Effects in Non-Volatile Memristors to Tune Resistive States  |                          |
| 12:15 - 12:30   | Oral   | Yao Ni                  | Neuromorphic units for simulating complex temporal regulation of multiple neurotransmitters   |                          |
| 12:30 - 12:45   | Oral   | Fernando Leonel Aguirre | Verilog-AMS compact model for memristor-based circuit simulation  |                          |
| 12:45 - 13:00   | Oral   | Stefan Wiefels          | Reliability Aspects of 28 nm BEOL-Integrated Resistive Switching Random Access Memory   |                          |
| 13:00 - 13:15   | Oral   | Kitae Park              | Enhanced Analog Synapse Characteristics of Atomic-layer Deposited CeO <sub>2</sub> -based 150x150 nm Memristor Crossbar Array for Artificial Neural Network |                          |
| 13:15 - 14:45   | Lunch Break  |                         |   |                          |
| Room 2  |  |                         |   |                          |
| 09:45 - 11:20 Session 1: Materials for Memristive/Emerging Devices; Chair: Sreetosh Goswami                                     |  |                         |   |                          |
| 09:45 - 10:10   | Invited  | Min Hyuk Park           | Self-rectifying ferroelectric tunnel based on HfO <sub>2</sub> /ZrO <sub>2</sub> superlattices  |                          |
| 10:10 - 10:35   | Invited  | Tamalika Banerjee       | Memristive devices based on complex oxides as synapses and neurons  |                          |
| 10:35 - 10:50   | Oral   | Eszter Piros            | Yttrium oxide based memristors: an alternative material for stable analog switching and quantized conductance   |                          |
| 10:50 - 11:05   | Oral   | Sanjoy Nandi            | V3O5 a potential material for neuromorphic computing  |                          |
| 11:05 - 11:35   | Coffee Break - Lobby                                       |                         |   |                          |
| 11:35 - 13:15 Session 1: Materials for Memristive/Emerging Devices; Chair: Alexandros Emoras                                    |  |                         |   |                          |
| 11:35 - 12:00   | Invited  | Joon-Kyu Han            | Next-Generation Computing Using Silicon Two-Terminal Resistive Switching Devices  |                          |
| 12:00 - 12:15   | Oral   | Tao Zeng                | Approaching the Ideal Linearity in Epitaxial Crystalline-Type Memristor by Controlling Filament Growth  |                          |
| 12:15 - 12:30   | Oral   | Henrique Teixeira       | Tuning of 2D Ti <sub>3</sub> C <sub>2</sub> Tx MXene flakes for flexible neuromorphic devices   |                          |
| 12:30 - 12:45   | Oral   | Gleb Demin              | Neuromorphic functionality of thin-film GMI structures in a nonlinear mode of the ac current excitation   |                          |
| 12:45 - 13:00   | Oral   | Xuechao Xing            | In-sensor Design Based on Programmable Self-doping in Mixed 2D-3D Halide Perovskite   |                          |
| 13:00 - 13:15   | Oral   | Onur Toprak             | CMOS compatible analog memristive devices based on gallium oxide for on-chip neural activity processing   |                          |
| 13:15 - 14:45   | Lunch Break  |                         |   |                          |
| Room 3  |  |                         |   |                          |
| 09:45 - 11:20 Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc.); Chair: Joon-Kyu Han   |  |                         |   |                          |
| 09:45 - 10:10   | Invited  | Hyungjin Kim            | In-Memory Computing Applications with Memristor Crossbar Array  |                          |
| 10:10 - 10:35   | Invited  | Alexandros Emoras       | Bio-Inspired Learning Rules on Opto-Electronic Memristive Hardware  |                          |
| 10:35 - 10:50   | Oral   | Deepika Yadav           | Effect of annealing on Memimpedance behavior of Hafnium oxide Memristors  |                          |
| 10:50 - 11:05   | Oral   | Till Zellweger          | Amorphous Germanium as Multi-Functional Switching Layer for Electro-Optical Memristors  |                          |
| 11:05 - 11:35   | Coffee Break - Lobby                                       |                         |   |                          |
| 11:35 - 13:15 Session 5: Memristor-based non-conventional computing (In-sensor, Photonic, Quantum, etc.); Chair: Kyeong-sik Min |  |                         |   |                          |
| 11:35 - 12:00   | Oral   | Dániel Molnár           | Autonomous Neural Information Processing by a Dynamical Memristor Circuit   |                          |
| 12:00 - 12:15   | Oral   | Caterina Sbandati       | Decoding multiunit activity in behaving animals using volatile RRAM   |                          |
| 12:15 - 12:30   | Oral   | Harivignesh S           | A 14-Bit Molecular Dot Product Engine with Wire-Resistance-Resilience   |                          |
| 12:30 - 12:45   | Oral   | Oliver Solfronk         | Time dependent evolution of the transient voltage drop on a ReRAM operated in a 1T1R configuration under constant load                                      |                          |
| 12:45 - 13:00   | Oral   | Zhuodong Kang           | A Hybrid-Memory-Based Digital Compute-in-Memory Architecture for Edge LLM Applications  |                          |
| 13:00 - 13:15   | Oral   | Abhijith Anand          | Optically Enhanced memory using Copper (II) Phthalocyanine-based Artificial Synapses  |                          |
| 13:15 - 14:45   | Lunch Break  |                         |   |                          |
| Common  | 14:45 - 17:45 Korean National Neuromorphic and PIM Program |                         |   |                          |
|   | 17:45 - 18:00 MEMRISYS 2024 Closure                        |                         |   |                          |

**Poster Session #1 (Day 1, Sun)**

|                        |  |
|------------------------|--|
| Donghoon Shin          | Heterogeneous Density-based Clustering with Dual-functional Memristive Array   |
| Yoonho Cho             | Synaptic Behavior Implementation in a Highly Uniform Self-Rectifying Interfacial Memristor   |
| Seokki Son             | Multi-level switching in 1T1R memristive cells: A simulation approach by compact model   |
| Mihyang Park           | Self-rectifying Two-terminal Vertical Floating Memristor   |
| Yeongkwon Kim          | A Physic-based Numerical Model for Potentiation/Depression Characteristics of Electrochemical Metallization Memristor              |
| Sola Moon              | Reservoir Computing for Pattern Recognition using Gd-doped CeO <sub>2</sub> /CeO <sub>2</sub> Bi-layer Memristor                   |
| Maki Nishimura         | Computational performance of Magnonic Reservoir Computing with Increased Number of Detectors                                       |
| Hyungsuk Oh            | Silicon/Graphene Optical Sensors and Neuromorphic system for Visual Cell Emulation   |
| Peter Hayoung Chung    | Self-selective Crossbar Synapse Array with n-ZnO/p-NiOx/n-ZnO Structure for Neuromorphic Computing                                 |
| Foelke Janssen         | Rare-earth Nickelate resistive switching devices   |
| Linkun Wang            | Improved tolerance to the non-idealities of artificial synapses by gradient accumulation and periodical write for in-situ learning |
| Tae Won Park           | Fabrication of 4k Density Vertical Resistive Switching Memory for Neuromorphic Applications  |
| Jamie Steel            | Physical Reservoir Computing with Percolating Networks of Nanoparticles  |
| Xinming Shi            | Memristor-based Integrate-and-Fire with Homeostatic Plasticity for Simulation and Application                                      |
| Minh Chien Nguyen      | Reconfigurable Non-volatile Floating Gate Memory based on van der Waals Heterostructure for Multi-functional Devices               |
| Marina Sparvoli        | Circuit emulating neuronal response based on Ga <sub>2</sub> O <sub>3</sub> photomemristors  |
| Mohamad Moner Al Chawa | Ovonic Threshold Switch-Cellular Neural Network (OTS-CNN)  |
| YEUNWOO KWON           | Effect of molecular alignment on off current and switching properties in PEDOT:PSS-based RRAM                                      |
| Yujin Kim              | Analysis of 3-Dimensional Gate-Injection Field Effect Transistor with VNAND Structure for Area-Efficient Neuromorphic Hardware     |
| Rohit Attri            | Emergence of In Materia Intelligence in Energy-efficient Neuromorphic Devices realized using Self-forming Hierarchical Structures  |

**Poster Session #2 (Day 2, Mon)**

|                       |  |
|-----------------------|--|
| Yanzhen He            | Memimpedance-based Neural Adaptation Circuit with Hybrid CMOS/Volatile Memristor LIF Neuron  |
| Vaishnavi M Rajesh    | Neuromorphic memory devices using Molybdenum oxide and Copper Molybdates using RF Magnetron sputtering.                                |
| Taehoon Park          | Low Power and Reliable Dynamic Memtransistor with Step-Wise Potential Barrier for Energy-Efficient Computing                           |
| khaled humood         | SPIKA: An Energy-Efficient Time-Domain Hybrid CMOS-RRAM Compute-in-Memory Macro for AI Applications                                    |
| Dokyeong Yun          | Characteristics of Fe-MST using a stacked heterogeneous structure of ferroelectric HZO and phase transition material MoTe <sub>2</sub> |
| Alin Panca            | Automated RRAM characterization and post-processing for investigating device variability   |
| xinxin wang           | Memristive Transformer   |
| Rishona Daniels       | V-VTEAM: A Compact Behavioral Model for Volatile Memristors  |
| Yeon Jun Kim          | Effects of Surface Defect States on Memristive Switching in InP/ZnSe/ZnS Quantum Dot-based Memristors                                  |
| Viet Cuong Vu         | Circuit-Based Modelling of Current Transients within the Memristive Devices Subthreshold Regime  |
| Richard Schroedter    | An ErMnO <sub>3</sub> memristive spiking neuristor   |
| Maria Grácio          | Doping PVDF polymer with 2D flakes to achieve resistive switching  |
| Su-Jin Sung           | Low-Power and Thermally Stable Phase Change Memory by Material Engineering of Phase-Changeable Nano-Filament                           |
| Seokman Hong          | Selector-Memory Bi-Functionality Utilizing Polycrystalline-Based Ge <sub>2</sub> Sb <sub>2</sub> T <sub>5</sub> Thin Films             |
| Keunho Soh            | Stochastic Ion-motion Mediated Volatile Threshold Switching Memristor Enables Probabilistic Computing                                  |
| Minseong Park         | Backpropagation-free deep reinforcement learning for privacy-preserving recommendation system via memristor crossbar cores             |
| Naoya Yamashita       | Development and Resistive Switching Properties of Amorphous GaOx Four-Terminal Crossbar Memristor                                      |
| Mark Christian Guinto | Local activity principle as a theory on the emergence of grid cells  |
| Jiyeon Ryu            | Energy efficient, high performance resistive memory device with Ag/VOx/Pt structure by facilitated Ag filament formation               |

**Poster Session #3 (Day 3, Tue)**

|                     |   |
|---------------------|---|
| Leon Brackmann      | Improved Stateful Logic Designs based on Memristive 1T-1R Arrays  |
| Xuanyu Shan         | Plasmonic Optoelectronic Memristor Enabling Fully Light-Modulated Synaptic Plasticity for Neuromorphic Vision   |
| Xiaohua Liu         | Effect of Transistor Transfer Characteristics on the Programming Process in 1T1R Configuration  |
| László Pósa         | Size-Dependent Study on Nanosized VO <sub>2</sub> Phase Change Memory Devices   |
| Tejaswini Subba Rao | A scalable solution recipe for a Ag-based neuromorphic device   |
| Dashan Shang        | A biomimetic nociceptor based on a vertical multi-gate, multi-channel neuromorphic transistor   |
| DAYAL G             | Reactive Pulsed Laser Deposited Bismuth Iron Oxide thin film devices for Pattern Recognition.   |
| Yihan Pan           | Energy-Efficient Capacitive-RRAM Dually Addressable Read Memory Core  |
| Timo Oster          | Long-Term Stability Testing of Memristors: Pulsed Read Endurance Measurements On Yttria-based OxRAM   |
| Néstor Ghenzi       | Reconfigurable Devices for Enhanced Reservoir Computing   |
| Hongxiao Duan       | 1T-1PD pixel with broadband and reconfigurable characteristics  |
| Hina Kitano         | Reservoir computing using graphene-based solid state electric double layer transistors  |
| Guoyang Huang       | Memimpedance-based Neural Adaptation Circuit with Hybrid CMOS/Volatile Memristor LIF Neuron   |
| Wang Xiaoyuan       | Design of the tri-valued memristor and its application  |
| Hongwoon Yun        | Neuromorphic Computing based on Two-terminal Au nanoparticle Floating-gate Memristor  |
| Jieun Kim           | Cluster type selector-less 1R memristor array for spiking neural network  |
| Yuan Fa             | Volatile and Nonvolatile Resistive Switching in Wafer-Scale MoS <sub>2</sub> -based Memristors  |
| Taeyoung Jeong      | A combined approach of numerical simulation and ab initio calculations on Ag/HfO <sub>2</sub> /RuO <sub>2</sub> diffusive memristor for probabilistic computation application |
| Boyoung Jeong       | Analog weight update by tunable interfacial energy barrier by Li ion redistribution in Pt/p-LiCoOx/p-NiO/Pt memristor for neuromorphic computing                              |