



Symposium EP02 : Memristor devices from theory to system level integration for next generation of computation and communication

Scope of the Symposium

One of the significant challenges in today's Artificial Intelligence (AI) computation is the issue of energy consumption. While AI has made remarkable advancements, the computational demands of training and running large-scale models, particularly deep neural networks, require substantial computing power, leading to high energy consumption. In this regard, in-memory and neuromorphic computation functionality of resistive switching devices may be the game-changer for future computing systems in mitigating the pressing power challenges of our digital age. Memristors, a class of non-volatile resistive devices, exhibit unique properties that have the potential to revolutionize computation and communication systems. Stepping into a new frontier of 6G networks, memristors with their reconfigurable nature and memory capabilities, announce a paradigm shift in wireless communication, paving the way for unprecedented adaptability, efficiency, and speed. This symposium brings together experts in the field of memristors and resistive switching devices to explore the latest advancements in theory, materials, and system-level integration. It serves as a platform for interdisciplinary collaboration, providing a forum for researchers, engineers, and industry professionals to exchange ideas and foster innovation. The symposium will cover fundamental principles, recent breakthroughs in material science, and strategies for transitioning from theoretical concepts to practical applications. In fact, it is not just about technology; it is a call to action, a preview of a future where computational power and environmental responsibility cohesively align with one another.

Abstracts will be solicited in (but not limited to) the following areas

- *Novel materials with resistive switching properties (oxides, organic, inorganic and 2D materials)*
- *Memristor devices, materials, and circuits enabling in-memory computing, neuromorphic computation and other unconventional computing paradigms*
- *Responsible and sustainable memristors: Green materials, solution-processing and printing techniques*
- *Electrical and structural properties of heterojunctions and material interfaces*
- *Memristor architectures for hardware artificial intelligence acceleration*
- *Memristor applications in data sensing and signal processing*
- *Photonic memristors*
- *Applications of memristors in spintronics*
- *Memristors' role in quantum computing applications*
- *Bioinspired memristor devices, materials and circuits*
- *Theoretical models and mathematical frameworks of memristor dynamics*
- *Development of neuromorphic processors and sensors with memristor technology*
- *Challenges and market perspectives on memristor technology*

List of invited speakers

Stephan Menzel (Peter Grünberg Institute, Forschungszentrum Jülich and RWTH Aachen) **Valeria Bragaglia** (IBM Research Europe)
Hannes Raebiger (Yokohama National University) **Vitor Tavares** (Faculdade de Engenharia da Universidade do Porto) **Victor Lopez**
Richard (Universidade Federal de São Carlos) .

Symposium Organizers

Asal Kiazadeh (CENIMAT/i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, Caparica, Portugal) **Jonas Deuermeier** (CENIMAT/i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, Caparica, Portugal) **Emanuel Carlos** (CENIMAT/i3N, Department of Materials Science, School of Science and Technology, NOVA University Lisbon and CEMOP/UNINOVA, Caparica, Portugal) **Carlos Bufon** (São Paulo State University - UNESP, Instituto de Geociências e Ciências Exatas, Rio Claro, SP, Brazil) .

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XXII B-MRS Meeting