Research Accelerator Programme

"Memristors: Materials, Characterization and Applications"

Where: NCSR "Demokritos", Athens, Greece

When: 28 – 30 April, 2025

Application deadline: 3rd January 2025, 10:00 AM CET

Summary

A large variety of resistive random-access memory (RRAM) technologies are prominent. Nevertheless, a few fulfill the requirements for CMOS integration and meet the commercialization standards. Many dielectrics (e.g., metal oxides, nitrides) have been proposed to realize RRAM. A memristor, a two-terminal nanodevice corresponding to a typical RRAM cell, has garnered substantial attention in recent years due to its distinctive properties and versatile applications. These nanoscale components, characterized by their simplicity of manufacture, scalability in small dimensions, nonvolatile memory capabilities, and adaptability to low-power platforms, offer a wealth of opportunities for technological innovation. Memristors hold great promise in diverse fields, ranging from advanced memory devices and neuromorphic computing to energy-efficient circuits and more.

Costs for travel, accommodation and access to infrastructure are covered by INFRACHIP project for up to 6 applicants. Preference is given to PhD students.

Programme

During the first day, 28th of April, the participants will have a tour in cleanroom and characterization labs. After lunch, a theoretical introduction to microelectronics fabrication processes will be delivered

- Microelectronics Fabrication Processes
    - Photolithography – Electron Beam Lithography
    - Dry etching – Pattern transfer
    - Low-pressure Chemical Vapor Deposition (LPCVD)
    - Physical Vapor Deposition (PVD)

All the above processing tools are described in https://infrachip.eu/think/ .

On the 29th of April, the participants will get the theoretical knowledge about the resistance switching mechanisms in dielectric materials as well as they will be taught the main electrical

characterization techniques of memristor devices. On the afternoon of the second day, the participants will get a lab-based training including the following topic:

- Hands-on training memristor device characterization
    - I-V characterization using semiconductor parameter analyzers
    - Impedance spectroscopy

The last day, 30th April, the participants will have the opportunity to learn about the potential applications of memristors including

- Memristor Applications
    - Resistive RAM
    - Compute-in-memory
    - In sensor computing
    - Neuromorphic computing

Calendar

When	What	Where
Day #1 (28/4/2025), Morning (9:30 – 13:00)	Welcome and lab tour	Seminar room and labs
Day #1 (28/4/2025), (14:30 – 17:30)	Fabrication of Memristors and Memristor Arrays on Si substrates	Seminar room
Day #2 (29/4/2025), Morning (9:30 – 13:00)	Memristive materials and device characterization	Seminar room
Day #2 (29/4/2025), Afternoon (14:30 – 17:30)	Memristor device characterization	Electrical characterization Lab
Day #3 (30/4/2025), Morning (9:30 – 13:00)	Applications of Memristors	Seminar room

To apply, please fill the form on the dedicated RAP website page: https://infrachip.eu/research-accelerator-programme

In case of troubles, please contact us – contact@infrachip.fr