Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Electrochemical Materials

Engineering a novel resistive switching device-type based on a functional bilayer oxide unit

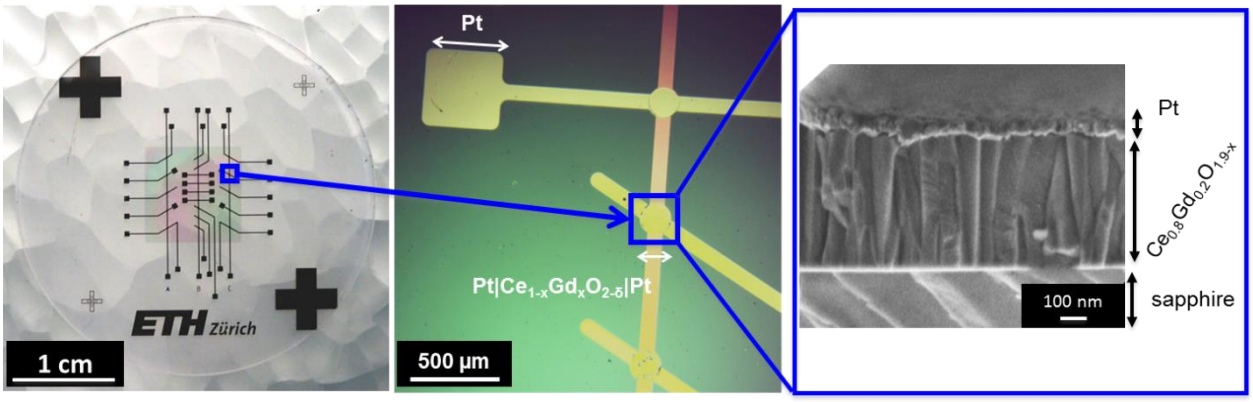
Resistive switches or memristors are extensively studied as promising building blocks of future electronics. Highly nonlinear and nonvolatile memristive characteristics of two-terminal capacitor-like metal-insulator-metal (MIM) devices were found in wide range of materials from organic monolayers and polymers till glasses, salts and ceramics. Despite the intensive research conducted in this field and the high diversity of discovered switching mechanisms, there is a lot of room for revolutionary ideas, designs and devices that, expectantly, will change the conceptions of electronics.

We are welcoming a motivated Master student (from materials, electric engineering, chemistry or physics) to join our research group and to test a novel idea of combining two metal oxides with different functionality in order to achieve superior synergetic electronic properties. The idea to-be-discussed with the candidate has never implemented before in a device, and may open new pathways to tune resistive switching beyond classic memristor, or other memory-type devices.

The experimental work will consist of designing the device structure bottom-up and envisioned materials, manufacturing the test structures by pulsed laser deposition (PLD) and e-beam evaporation, structural (SEM, XRD, optical microscope), electronic properties characterizations and a defect chemical description.

Creative and analytical thinking will be required for optimizing the processes, materials and the device architecture based on the first outcomes, for achieving the best applicational results or investigating the memristance mechanisms of this system.

This is a collaborative project between Weizmann Institute of Science, Israel and Electrochemical Materials ETH, Zurich.



Contact: Dr. Roman Korobko

References:

M. Kubicek, R. Schmitt, F. Messerschmitt, J.L.M. Rupp; *Uncovering Two Competing Switching Mechanisms for Epitaxial and Ultra-Thin Strontium Titanate-Based Resistive Switching Bits*; **ACS Nano**, (2015)

F. Messerschmitt, M. Kubicek, S. Schweiger, J.L.M. Rupp; *Memristor Kinetics and Diffusion Characteristics for Mixed Anionic-Electronic SrTiO3-δ: The Memristor-based Cottrell Analysis Connecting Material to Device Performance*; **Adv. Funct. Mat.**, (2014)