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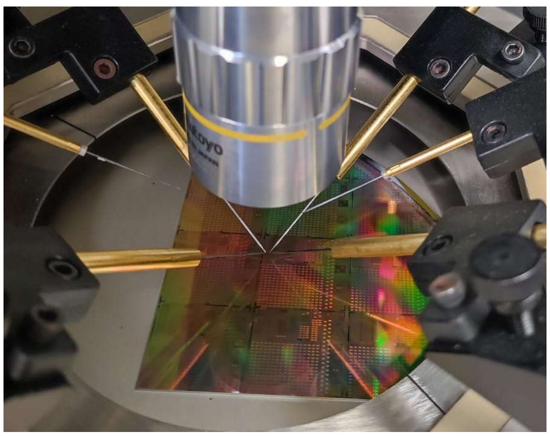
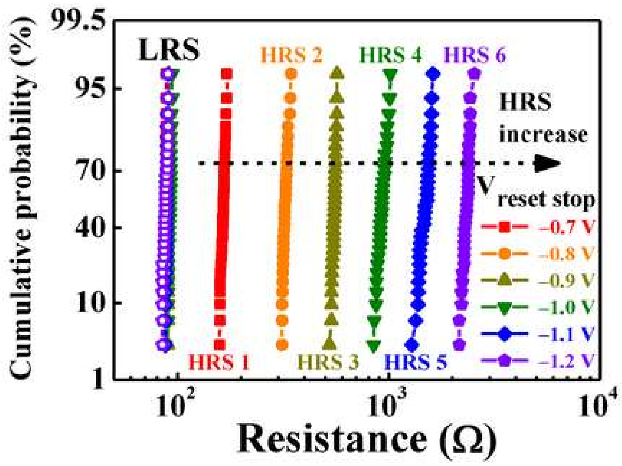
ASIC[2] ARCHITECTURES SYSTEMS INTELLIGENT COMPUTING INTEGRATED CIRCUITS

Experimental Investigation of Multi-Level Capabilities of Memristive Devices

The exponential growth of data calls for increasing power efficiency in computation as well as scaling down the needed computation area. New emerging non-von Neumann technologies offer solutions to these challenges and are often based on memristive devices such as resistive RAM (ReRAM) and Y-flash as building blocks. Resistive RAM (ReRAM) and Y-flash are great candidates for neuromorphic applications. The feasibility of the devices has to be evaluated by experimental characterization of the technologies. Many neuromorphic applications require multi-level devices with as many available levels as possible. Therefore, the experimental investigation aims for information about the number of levels and the accuracy of these levels.





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Project goals:
This project aims for the experimental investigation of multi-level options of ReRAM by Weebit and Y-Flash devices fabricated in Tower 180 nm standard CMOS process. The devices will be measured and characterized to gain information about the multi-level properties.

What the students will do:

- Hands-on electrical measurements with lab equipment
- Investigate device characteristics of memristors
- Learn about theoretical background and application of memristors
- Use statistical analysis tools, get familiar with different evaluation methods

Recommended:
Python

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Reference:
[1] Min, S.-Y.; Cho, W.-J. High-Performance Resistive Switching in Solution-Derived IGZO:N Memristors by Microwave-Assisted Nitridation. *Nanomaterials* **2021**, *11*, 1081.