

Memristive devices: from bio-inspired computing to artificial neural networks

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One of the biggest challenge for future information and communication technologies would be to replicate the brain computing capacity to learn, adapt and evolve in a complex environment. The emergence of memristive devices is currently driving an increasing interest in neuromorphic computing to complement and to provide enhanced functionalities to existing CMOS/Von Neumann processors with the aim to realize low-power bio-mimetic hardware systems. Indeed, this technology appears as a realistic solution for the implementation of synaptic functions, one of the most critical component to be realized in such circuits. Two main streams are now driving research efforts: (i) from one hand, the quest for ultra high-density, low power and analog programmability memory devices would offer promising solution for artificial neural networks implementation. (ii) In the other hand, the bio-mimetic approach aims at replicating and implementing in emerging memory technologies synaptic features observed in biology that would revolutionize our way of building computing systems. In this talk, I will present how different memristive technologies can be used with respect to this two approaches and how innovative circuits can be built based on this elementary devices.

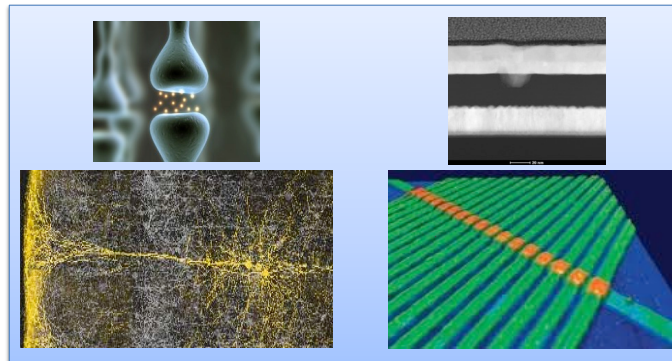


Figure 1 : *Illustration of the artificial neural network concept. From biological synapse to neuron (left), and from memristive devices to high density memory circuits (right).*