

Emerging Memory Technologies for Neuromorphic Computing

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Synapses, the most numerous elements of neural networks, are memory devices. Similarly to traditional memory applications, device density is one of the most essential metrics for large-scale artificial neural networks. This application, however, imposes a number of additional requirements, such as the continuous change of the memory state, so that novel engineering approaches are required. In my talk, I will discuss my group's recent efforts at addressing these needs. I will start by reviewing hybrid CMOS/nanodevice circuits [1], in particular of CMOL variety, which were conceived to address major challenges of artificial neural network hardware implementations. I will then discuss the recent progress towards demonstration of such circuits, focusing on the experimental and theoretical results for networks based on the crossbar-integrated memristive metal oxide devices [2-5] and on the redesigned commercial NOR flash memory [6, 7].

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