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# Wafer-scale integration of two-dimensional materials in high-density memristive crossbar arrays for artificial neural networks

Memristors have attracted enormous interest due to their excellent capability to store digital information, and they are being considered to be a key element to build future artificial neural networks for bio-inspired neuromorphic computing systems [1-5]. Recent works have shown that memristors made of layered two-dimensional (2D) materials can exhibit performances that traditional memristors (made of transition metal oxides) do not show, such as excellent transparency and flexibility, high-temperature stability, and unique controllability of the conductance potentiation, depression and relaxation [6-10]. However, most studies on 2D materials based memristors focused on single devices, and system level performances like yield and device-to-device variability have never been analyzed in depth, despite the great interest that they have raised [11-14]. In this talk, I will present the first wafer-scale statistical analysis of high-density memristive crossbar arrays made of 2D layered materials, their nanoscale electronic characterization with conductive atomic force microscopy [15-16], and their application to neuromorphic computing.

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