

2D materials for the semiconductors industry

Mario Lanza

1 Materials Science and Engineering Program, Physical Science and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal 23955-6900, Saudi Arabia
Mario.lanza@kaust.edu.sa

Two-dimensional layered materials (2D-LMs) materials have outstanding physical, chemical and thermal properties that make them attractive for the fabrication of solid-state micro/nano-electronic devices and circuits. However, synthesizing high-quality 2D-LMs at the wafer scale is difficult, and integrating them in semiconductor production lines brings associated multiple challenges. Nevertheless, in the past few years substantial progress has been achieved and leading companies like TSMC, Samsung and Imec have started to work more intensively on the fabrication of devices using 2D-LMs. In this invited talk, I will present our work towards hybrid 2D/CMOS microchips, with special emphasis on those dedicated to realize memristive operations. I will show state-of-the-art performance as electronic memory, as well as other novel properties that traditional microchips don't exhibit, and that enable different innovative applications¹⁻¹⁰.

References

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Figures

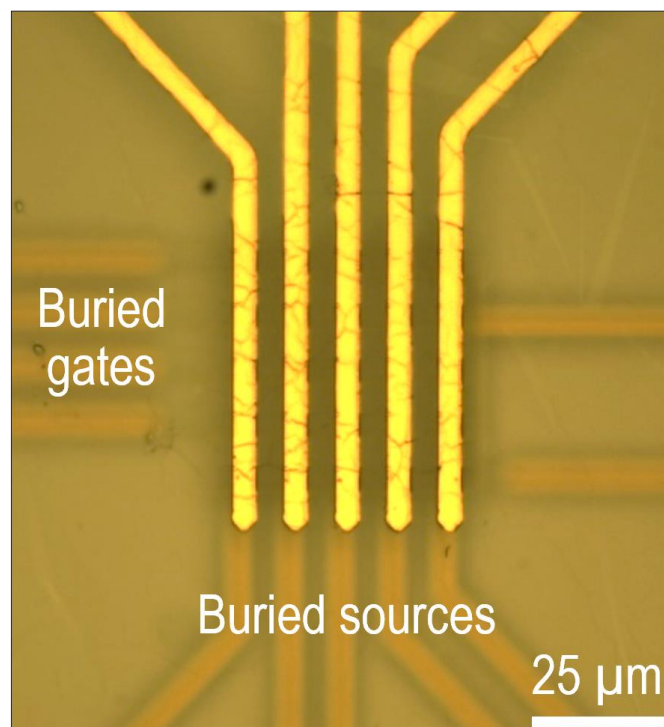


Figure 1: Optical microscope image of a hybrid 2D/CMOS microchip containing a 5×5 crossbar array of one-transistor-one-memristor cells, with h-BN memristor and 180-nm-node CMOS transistor.