Defect-free metal evaporation on 2D materials

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Two-dimensional (2D) materials have outstanding physical, chemical and thermal properties that make them attractive for the fabrication of solid-state micro/nano-electronic devices and circuits, and leading semiconductor companies like Intel, Samsung and TSMC have started to work in this direction. However, synthesizing high-quality 2D materials at the wafer scale is difficult, and integrating them in silicon microchips brings associated multiple challenges. In this talk, I will discuss about the generation of defects in 2D materials produced during metal evaporation (on top of them), whcih is a mandatory step for the fabrication of electronic devices and circuits. In particular, I will present how to reliably quantify the number of defects in the 2D materials by combining transmission electron microscopy and conductive atomic force microscopy, as well as an effective strategy to reduce the amount of defects. I will also present what happens when the metal is evaporated at different rates, and the effect of evaporating different types of metals on the 2D material. Finally, I will also present the very beneficial effect that a reduced defects density has at the device level.

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