

Electron microscopy and spectroscopy of individual defects in low-dimensional materials

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Properties of low-dimensional materials are largely influenced by its structural imperfections, such as defects, impurities, edges or boundaries. Hence, analytical technique at single atom level is becoming crucial to fully understand the physical/chemical performance of nano-devices. In my presentation, single atom spectroscopy by means of electron energy-loss spectroscopy (EELS) will be shown to identify the structure and chemistry of atomic defects in low-dimensional materials at their interrupted periodicities. Large variations of the atomic coordinates for novel 1D and 2D materials will be introduced. Especially 2D nanospace in bilayer graphene is proven to be an efficient platform to stabilize different 2D phases from bulk [1]. Some of the recent examples for in situ doping experiments of low-dimensional nanomaterials will be also presented [2].

[1] YC Lin, *Advanced Materials* 2105898 (2021).

[2] Q Lin, *ACS Nano* 19, 4845 (2025).