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Atomic-scale imaging and spectroscopy of defects in low-dimensional materials

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Atomic defects or edge structures are of great importance for any kind of low-dimensional materials, since the interrupted periodicities strongly affect their physical and/or chemical properties. Studies of point defects in mono-layered materials have become very popular among scientists. Vacancies and topological defects in graphene are routinely examined at atomic level. Defects and edge structures in hexagonal boron nitride (h-BN) and WS2 nano-ribbons are also a hot topic among physicists. Here we describe TEM and spatially resolved EELS studies of various single-layered materials with the interrupted periodicities. Atomic defects and edge structures can be unambiguously identified with the elemental assignment. The monovacancy analysis in h-BN single-layer and the alloying and doping behaviors of MoS2/WS2 single-layers will be presented.

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