Atomic-scale imaging of low-dimensional materials

K. Suenaga[1]

[1]AIST, Japan

We have been developing facilities of electron microscopy which enables the atomic resolution analysis of low-dimensional materials. Point defects and edge structures of graphene have been intensively studied with atomic precision in the last decade [1-5]. Because the studies of atomic defects and boundaries are of general interest in the fundamental researches and becoming more and more crucial for technological applications of any nanoscale materials, the atomic scale studies can be also expanded to the other low-dimensional materials. Here we demonstrate some examples for atomic-scale imaging and spectroscopy of various low-dimensional materials with interrupted periodicities. Active 4|8 defects are most recently found to be responsible for plastic deformation of hexagonal boron-nitride (h-BN) layers [6]. Vacancies and edges with radical bonds are also successfully assigned in h-BN [7, 8]. Doping and boundary behaviors of single-layered dichalcogenides (MX2) are intensively studied [9] because they indeed govern the phase transition behaviors between 2H and 1T phases [10]. Possible nano-device assembly made of metallic and semiconducting MoS2 single layers will be also proposed.