Development of low-voltage TEM/STEM for single-atom imaging and spectroscopy

Kazu Suenaga
AIST Tsukuba

Abstract

In this presentation, our recent developments of low-voltage TEM/STEM with the JEOL ltd. will be overviewed. Several examples for single atom spectroscopy by means of core-level EELS will be demonstrated to discriminate individual atoms in low-dimensional materials at their interrupted periodicities. It is emphasized here that information of the bonding/electronic states has become accessible for single atoms through the EELS fine-structure analysis [1] as well as the spin state [2]. Large variations of local electronic properties of 1D and 2D materials with different atomic coordinates will be shown [3]. Such an analysis was applied to understand catalytic behavior of Co doped MoS2 for hydrodeoxygenation reaction [4]. Furthermore, a high-energy resolution EELS with the double-Wien filter-type monochromator offers us possibilities to obtain local optical/vibrational properties[5]. Some of the recent examples for such experiments on low-dimensional nanomaterials will be also presented [6].

[7]. This research was supported by JST-CREST and JSPS KAKENHI (JP16H06333).