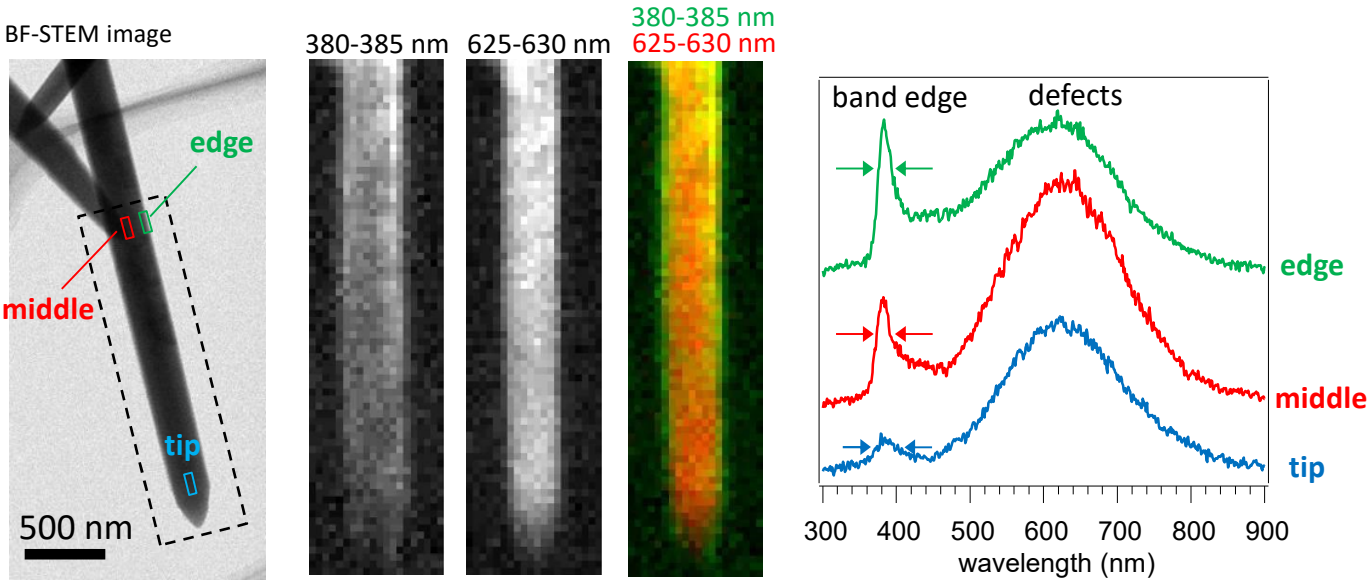
Optical property of single ZnO nanowire characterized by STEM-Cathodoluminescence

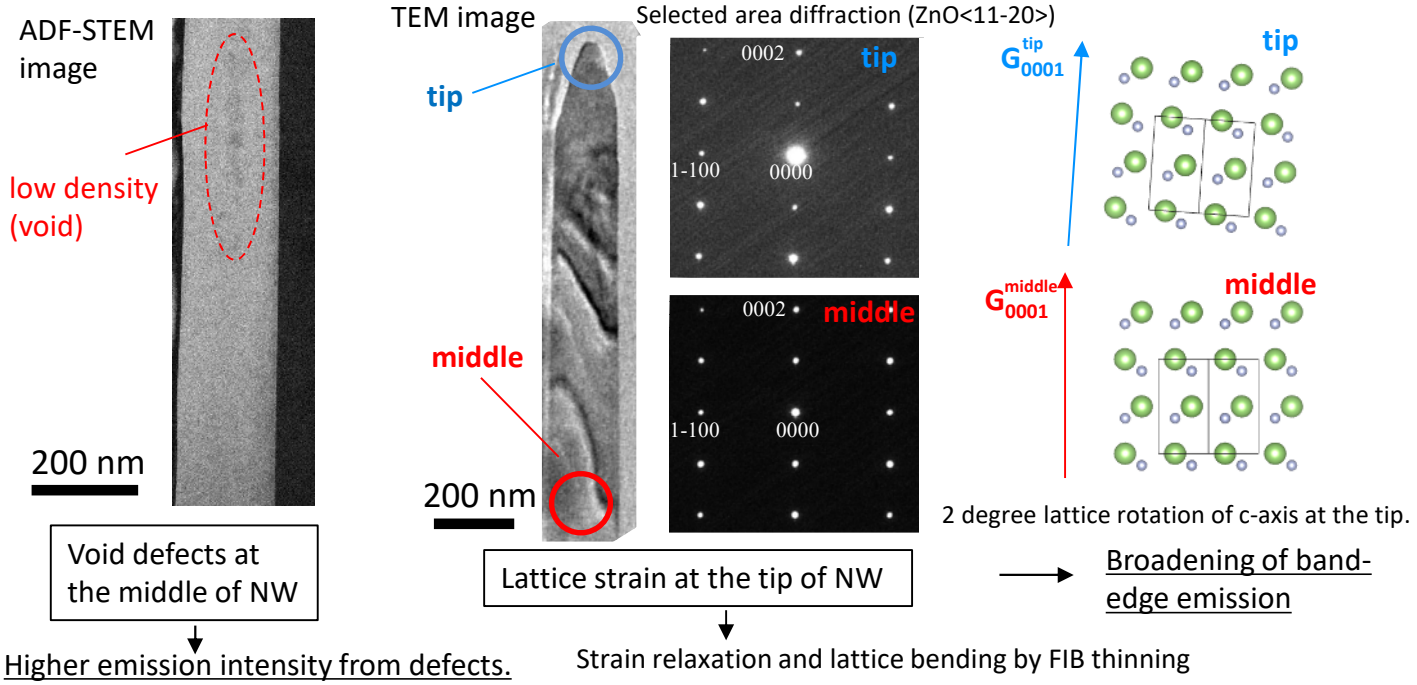
The optical and electric property of wide-band gap semiconductors, GaN, SiC and ZnO can be controlled by their nanostructures. The relationship between structure and optical property of single ZnO nanowire (NW) was characterized using the original technique, STEM-Cathodoluminescence (CL) system.

1. CL intensity maps and spectra from single ZnO NW



At the inner part of the NW (middle), the emission intensity ascribed to defects is higher.
At the tip of the NW, the intensity of the band-edge emission is lower and its width becomes broader.

2. The interpretation of emission spectra considered from longitudinal cross sectional TEM



Void defects at the middle of NW

Higher emission intensity from defects.

Lattice strain at the tip of NW

Strain relaxation and lattice bending by FIB thinning

2 degree lattice rotation of c-axis at the tip.

Broadening of band-edge emission

The relationship between nano-spatial distribution of optical property and nanostructure can be unraveled using the original technique, STEM-Cathodoluminescence.

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