Aberration-corrected HR-TEM and Analytical STEM with 200 kV cold-FEG

T. Oikawa

JEOL(Europe) SAS, Allée de Giverny, 78290, Croissy-sur-Seine, France

It is very important to investigate structures and concentrations in atomic scale for understanding performances of materials. Recently, spherical aberration correction technology had become in practical use, therefore, a resolution of the TEM is now arriving picomater order. JEOL recently developed new type of the cold-FEG(CFEG) and it is applied to both TEM and scanning transmission electron microscopy (STEM) combined with spherical aberration correctors. The performance of higher brightness and smaller source size of the electron emission of 200 kV CFEG is effectively utilized [1]. Figure 1 shows appearance and configurations of newly developed 200 kV CFEG Cs-corrected TEM *JEM-ARM200F*. An accelerating voltage are variable from 80 to 200 kV. All of the analytical detectors, such as EDS, STEM, EELS detectors, are covered with panel of anti-acoustic, anti-magnetic and thermal materials. Figure 2 shows STEM high-resolution images of HAADF (a) and BF (b) acquired simultaneously. The insets are FFT spatial spectra of corresponding images. Owing to a small source size of CFEG and Cs-corrector combination, 78 pm resolution was obtained. Figure 3 shows High-resolution EELS under 0.28 eV resolution analyses of Si and SiO_2. The band gaps in low loss region are obtained. Owing to a CFEG performance, it is provided higher energy resolution and higher emission current simultaneously.

[1] Y. Kohno et al., Electron Microscope Microsc. Analysis 24(7), (2010) S9 – S13.

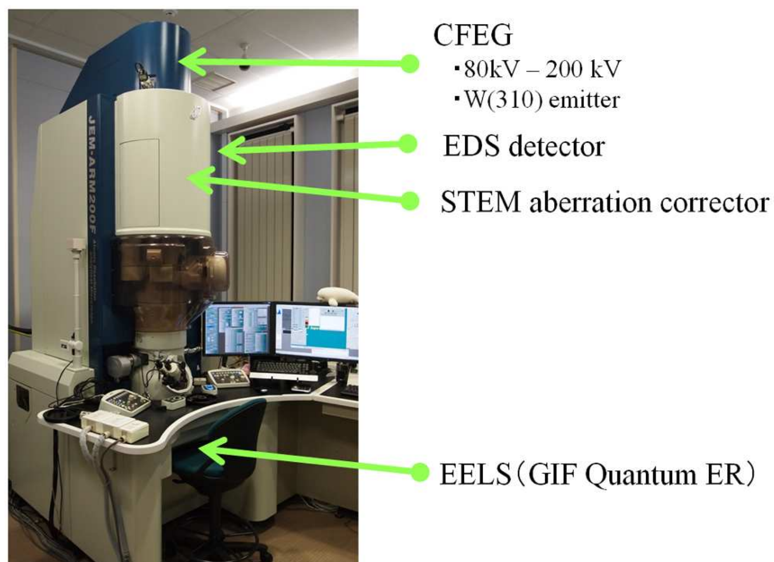

Fig. 1 Appearance of *JEM-ARM200F* 200 kV CFEG Cs-corrected TEM

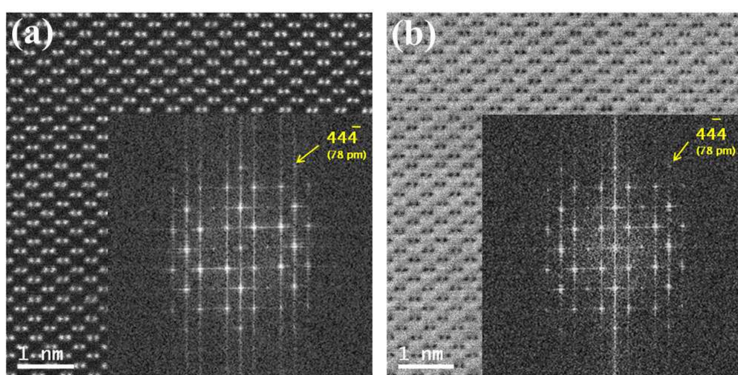

Fig. 2 STEM high-resolution images of HAADF (a) and BF (b) acquired simultaneously.

Specimen: Si(110) single crystal.

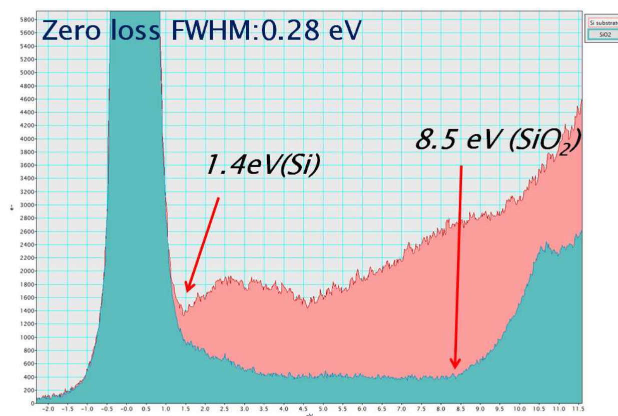

Fig. 3 High-resolution EELS (0.28 eV) analysis of Si and SiO2 band gaps.