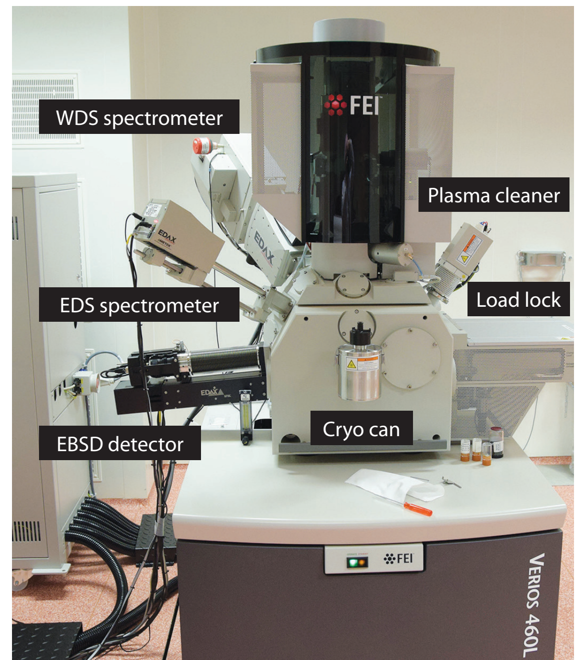
Scanning Electron Microscopy

VERIOS 460L



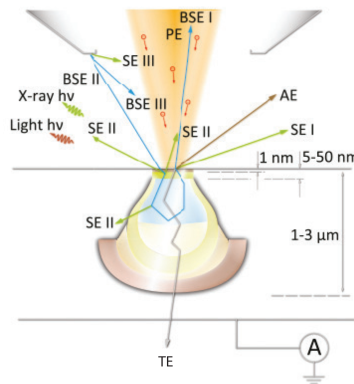
DESCRIPTION

The Thermo Fisher Verios 460L field-emission scanning electron microscope (FESEM) offers sub-nanometer resolution over a wide energy range (0.7 nm @ 1 keV, 0.6 nm @ 2-30 keV) with excellent materials contrast. Its extraordinary low-voltage performance provides extremely precise, surface-specific information even on insulating samples with no conductive coating. The microscope is equipped with a wide array of imaging and analytical detectors for structural and compositional analysis.

PRINCIPLE

In the SEM finely focused electron beam is produced and scanned over the sample under vacuum to obtain the image. Incident electron beam interacts with the sample and generates number of signals each carrying a specific type of information. The intensities of these signals can be measured by variety of detectors. The most commonly imaged signals are secondary electrons (SEs) and backscattered electrons (BSEs).

PE	primary electrons
AE	auger electrons
SE	secondary electrons
BSE	backscattered electrons
SE I	generated by PE in sample
SE II	generated by BSE in sample
SE III	generated by BSE on column/chamber
SE IV	generated by PE in column
BSE I	PE scattered in sample (elastically)
BSE II	PE scattered in sample (inelastically)
BSE III	BSE I scattered on column/chamber
TE	transmitted electrons

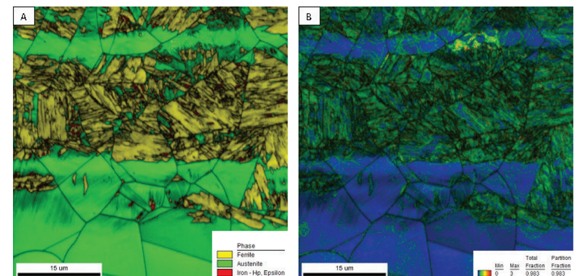


SPECIFICATION

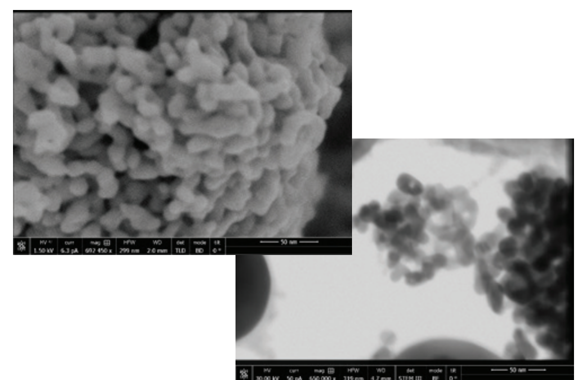
Electron optics		Imaging detectors (detected signal)	Analytical detectors (detected signal)
Column type	Elstar UC	TLD-SE (SE I, SE II, SE IV)	EDS EDAX SDD Octane Super (X ray)
Source type	Schottky FEG with monochromator	TLD-BSE (BSE I, BSE II)	WDS EDAX TEXS HP XM 4 (X ray)
Imaging modes	field free	ICD (BSE I)	EBSD EDAX DigiView IV (BSE, TE)
	XHR immersion	MD (BSE I, BSE II)	**Accessories**
	EDS optimized	ETD (SE I,SEII, SE III, BSE II, BSE III)	Beam current measurement (integrated + external)
	Beam deceleration	FSD (BSE)	IR camera for viewing sample/column
Probe current	0.8 pA to 100 nA	CBS (BSE II, BSE III)	Chamber mounted Nav-Cam+
Landing Energy	20 eV to 30 keV	STEM (TE)	Plasma cleaner
			Cryo cleaner

Sample stage movements		Maximum sample sizes	
X, Y	100 mm	**Maximum size**	100 mm diameter
Z	20 mm	**Maximum sample thickness (via loadlock)**	15 mm including sample holder
Tilt	– 10 ° to + 60 ° eucentric	**Maximum sample thickness (via chamber door)**	27.8 mm including sample holder
Rotation	720 ° stroke	**Fully motorized loadlock**	

APPLICATIONS EXAMPLES



EBSD analysis of a 301LN steel sample: A) Phase map indicating regions of Austenite, Ferrite and ε-martensite; B) Map of Kernel Average Misorientation parameter, indicating local lattice distortion as a measure of strain.



Titanium dioxide particles (uncoated) observed in secondary electron signal in beam deceleration mode (left) and in STEM mode (right).

MORE INFO

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