

JSM-7610F

Field Emission Scanning Electron Microscope





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JSM-7610F Field Emission Scanning Electron Microscope

JSM-7610F is an ultra high resolution Schottky Field Emission Scanning Electron Microscope which has semi-in-lens objective lens.

High power optics can provide high throughput and high performance analysis.

It's also suitable for high spatial resolution analysis.

Furthermore, Gentle Beam mode can reduce the incident electron penetration to the specimen, enabling you to observe its topmost surface by using a few hundred landing energy.

■ High resolution imaging and high performance analysis by semi-in-lens objective lens

The JSM-7610F combines two proven technologies – an electron column with semi-in-lens objective lens which can provide high resolution imaging by low accelerating voltage and an in-lens Schottky FEG which can provide stable large probe current – to deliver ultrahigh resolution with wide range of probe currents for all applications (A few pA to more than 200 nA).

The in-lens Schottky FEG is a combination of a Schottky FEG and the first condenser lens and is designed to collect the electrons from the emitter efficiently.

Then the emitter life is extremely long and its warranty period is 3 years.

■ The topmost surface imaging at low accelerating voltage by Gentle Beam mode (GB)

The Gentle Beam (GB) mode applies a negative voltage to a specimen and decelerates incident electrons just before they irradiate the specimen, thus the resolution is improved at an extremely low accelerating voltage.

Therefore, 7610F is possible to observe a topmost surface by a few hundred eV which were difficult to observe conventionally and nonconductive samples such as ceramics and semiconductor etc.

■ High throughput and high performance analysis by High Power Optics

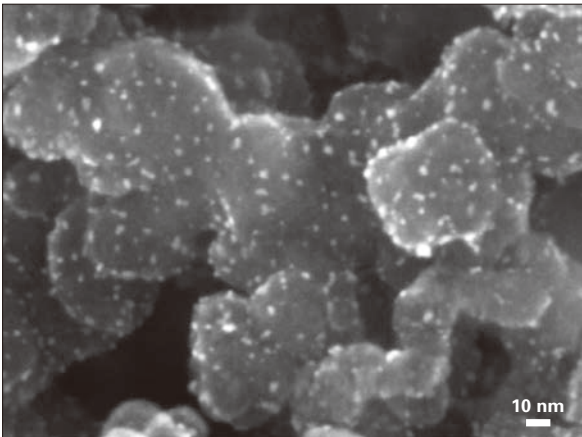
The High Power Optics produces fine electron probe for both observation and analysis.

The aperture angle control lens maintains a small probe diameter even at a larger probe current.

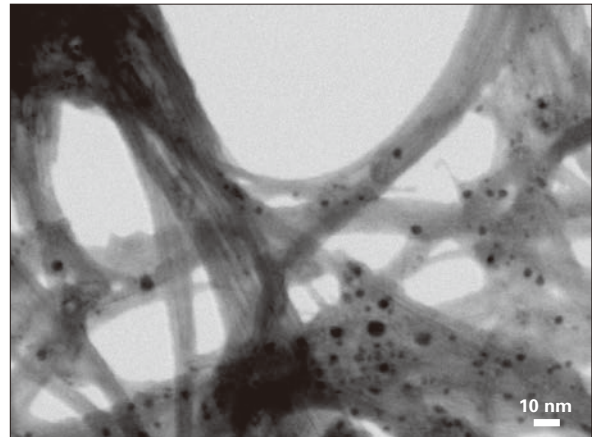
Using both techniques, the 7610F is suitable for a wide variety of analysis with EDS, WDS, CL etc

The JEOL's SEM World

High resolution imaging by semi-in-lens objective lens

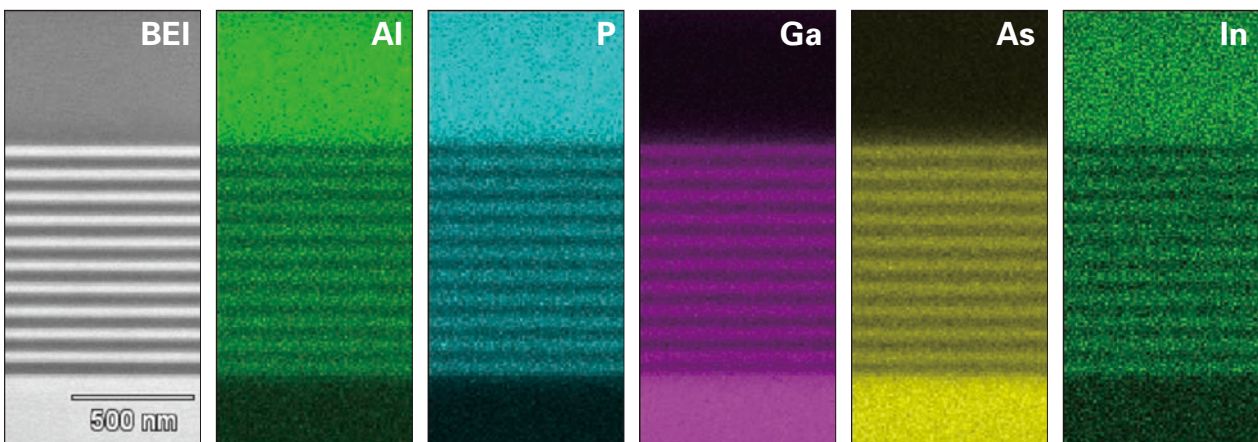


Sample: Pt Catalyst Accelerating Voltage 15 kV



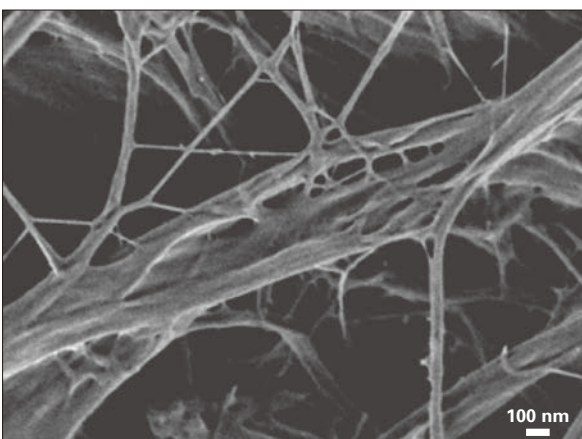
Sample: Carbon Nanotubes Accelerating Voltage 30 kV

High spatial resolution analysis by semi-in-lens objective lens

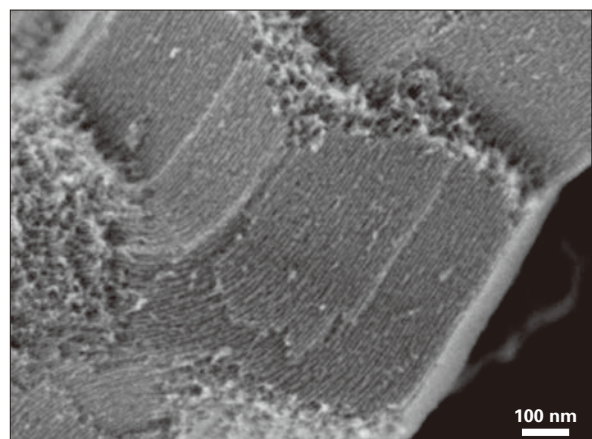


LED cross section (EDS analysis of multilayers below 100 nm)

The topmost surface imaging at ultra low landing energy by Gentle Beam mode (GB)



Sample: filter Landing energy 500 eV



Sample: Mesoporous Silica Landing energy 800 eV

JSM-7610F

■ Specifications

Secondary-electron image resolution	1.0 nm (15 kV), 1.5 nm (1 kV, GB mode) During analysis 3.0 nm (15 kV, WD 8mm, probe current 5 nA)		
Magnification	×25 to ×19,000 (LM mode) ×130 to ×1,000,000 (SEM mode)		
Accelerating voltage	0.1 to 30 kV		
Probe current	A few pA to 200 nA		
Electron gun	In-lens Schottky field-emission gun		
Lens system	Condenser lens Semi-in-lens objective lens Aperture angle control lens (ACL)		
detector	Upper detector(SED), Lower detector(LDD)		
Energy filter	r-filter (Built-in)		
Gentle Beam mode	Built-in		
Specimen chamber	Maximum specimen size 200 mm diameter		
Specimen stage	Full eucentric goniometer stage, Computer-controlled 5-axis (X, Y, R, T, Z) motor drive (with backlash correction)		
Specimen movements	Specimen stage		
	Standard	Optional	Optional
	Type I A2	Type II	Type III
	X: 70 mm	X: 110 mm	X: 140 mm
	Y: 50 mm	Y: 80 mm	Y: 80 mm
	Z: 1.0 to 40 mm	Z: 1.0 to 40 mm	Z: 1.0 to 40 mm
	Tilt: -5 to 70°	Tilt: -5 to 70°	Tilt: -5 to 70°
	Rotation: 360°	Rotation: 360°	Rotation: 360°
Specimen exchange	Load lock chamber, single-touch chucking		
Specimen holders	For 12.5 mm diameter × 10 mm thick, For 32 mm diameter × 20 mm thick		
SEM control system	PC IBM PC/AT compatible OS Windows®7 Professional*		
Image observation LCD	Screen size 23 inch, Maximum resolution, 1280 × 1024 pixels		
Scan and display modes	Full-frame scan, direct magnification, reduced-area scan, CF scan, HD scan, 2-segment display (different magnification, different image), 2-segment wide display 4-segment display (simultaneous 4 signal live display), addition image (4 images + addition image) Scale		
Auto functions	Focus, Stigmator, Brightness, Contrast		
Evacuation system	SIP, TMP, RP		
Energy saving mode	Power consumption is reduced by using Operating System Stop / Evacuation System Stop modes. During normal operation: 1.2 kVA During the sleepmode: 1 kVA During the evacuation system OFF: 0.76 kVA		
Co ₂ Emission		Co ₂ / hour	Co ₂ / year
	During normal operation	0.481 kg	4.214 kg
	During the sleepmode	0.411 kg	-
	During the evacuation system OFF	0.286 kg	-
Safety devices	Safety protection against rise of pressure, loss of water pressure, loss of power, loss of Nitrogen gas pressure, leak current.		

*1 If the actual conditions do not meet these requirements, we will check the room before installation and consult with the customer about the maximum observation magnification.
*2 If the door width is 900 mm, please consult us.
* Microsoft Windows is registered trademark of Microsoft Corporation in United States and other countries.

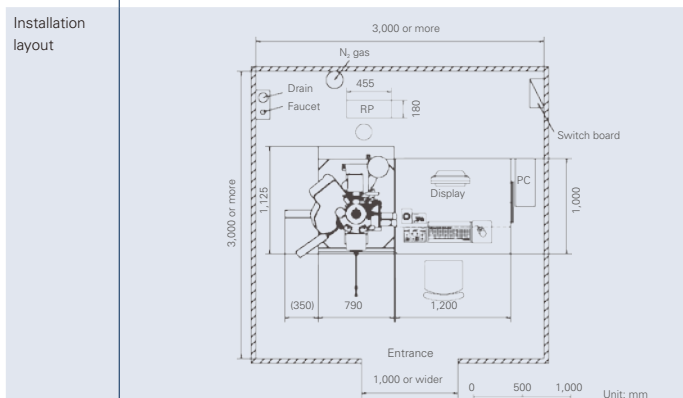
Specifications subject to change without notice.



High technology for quality assurance and the environment.

■ Installation Requirements

Power	Single phase 200 V, 50/60 Hz, 4 kVA maximum, During normal use: approximately 1.4 kVA In energy-saving mode: (Evacuation system on: approximately 1.1 kVA Evacuation system off: approximately 0.8 kVA) Voltage fluctuation tolerance: within ±10 % Grounding terminal 100 Ω or less ×1
Cooling water	Faucet JIS B 0203 Rc 1/4 ×1 Flow rate 0.3 to 0.5 L/min Pressure 0.05 to 0.25 MPa (gauge) Temperature 15 to 25 °C Drain JIS B 0203 Rc 1/4 ×1
Dry nitrogen gas	JIS B 0203 Rc 1/4 (to be provided by the customer) Pressure 0.45 to 0.55 MPa (gauge)
Room	Temperature 15 to 25 °C Humidity 60% or less Stray AC magnetic fields 0.3 μT (P-P) or less (50/60 Hz sine wave, WD 15 mm, 30 kV)*1 Floor vibrations 3 μm (P-P) or less*1 at a sine wave frequency of 5 Hz or higher Acoustic noise 70 dB or less*1, flat characteristics Room size 3,000 mm × 2,800 mm or more Height 2,300 mm or more Door size 1,000*2 mm (width) × 2,000 mm (height) or more



■ Principal options

- Retractable backscatter electron detector (RBEI)
- Low angle backscatter electron detector (LABE)
- Retractable inlens backscatter electron detector
- Scanning Transmission Electron Detector (STEM)
- Stage navigation system (SNS)
- Chamber camera
- Energy dispersive X-ray spectrometer (EDS)
- Wavelength dispersive X-ray spectrometer (WDS)
- Electron backscatter diffraction (EBSD)
- Cathodoluminescence Detector (CL)
- Anti-contamination Trap
- Transfer vessel system
- Ion cleaning device
- Specimen holder A variety of optional specimen holder are available

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