

HITACHI UHR FE-SEM
SU8200 Series

Hitachi High-Tech
HITACHI

Ultra-high Resolution Scanning Electron Microscope

SU8200
Series

HITACHI

SU8220
Scanning Electron Microscope

The image features a Hitachi SU8220 Scanning Electron Microscope (SEM) in the foreground, with its control panel and sample stage visible. The background is a dark, textured surface with a greenish-blue glow, overlaid with a complex, branching, biological-like pattern. A bright blue beam of light originates from the left side of the frame, passing through the text area. The text "Broadening technology for continued advancement" is written in a white, serif font, centered horizontally and partially obscured by the light beam.

Broadening technology for continued advancement

HITACHI

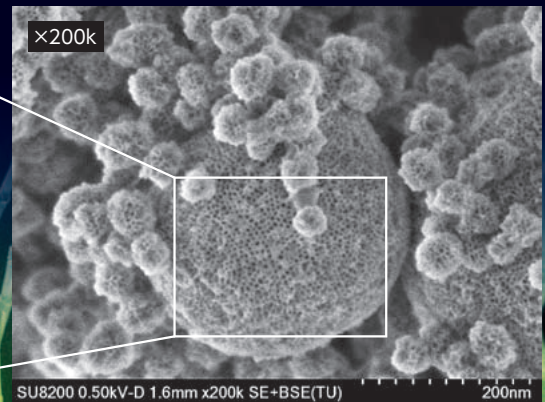
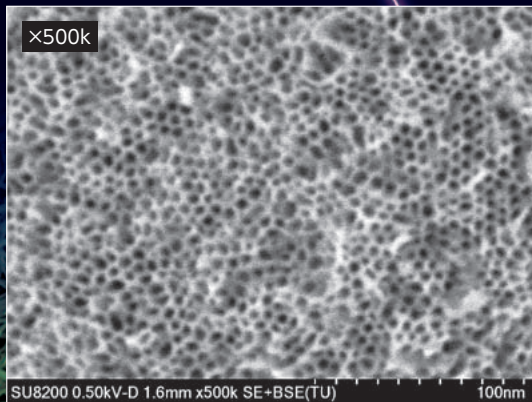
SU8220
Scanning Electron Microscope



Hitachi continues their legacy of innovative Field Emission Microscopes
with refined Cold Field Emission (CFE) source technology

High Resolution Imaging

The ultimate SEM source for high resolution imaging at low acceleration voltage with unmatched beam brightness and stability.



Sample : Mesoporous silica nanospheres Landing Voltage : 500 V Magnification : 500,000× / 200,000×
Sample courtesy of Tokyo Institute of Technology, Dr. Toshiyuki Yokoi

The SU8200 series FE-SEM — The ultimate FE-SEM for high resolution image observation and elemental microanalysis

Hitachi SEMs have contributed to the advancement of materials science, medical research, and biology for over 40 years with the release of the first commercially available CFE-SEM in 1972. Today, the innovative SU8200 series FE-SEM is the culmination of decades of experience, research, and innovation. The result is the ultimate FE-SEM with unmatched beam brightness and stability affording high resolution and high quality elemental analysis at low acceleration voltages.

Sample : Au/Cu₂O core-shell nanocubes EDX mapping condition : 5 kV, 0.7 nA, 15 min Magnification : 150,000×
Sample courtesy of Institute for Chemical Research, Kyoto University, Dr. Toshiharu Teranishi



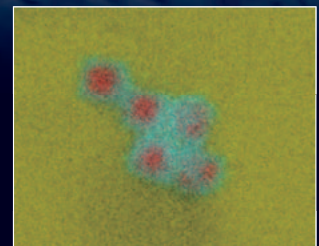
YAGBSE



Au_M



Cu_L



Au/Cu Layer map

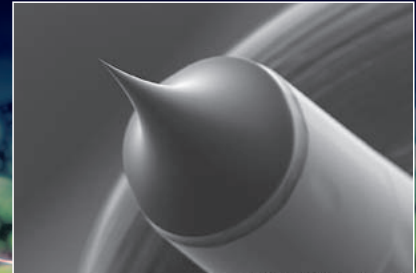
High Spatial Resolution X-ray Microanalysis

The SU8200 series FE-SEM realizes high spatial resolution EDS analysis with higher probe current even at low acceleration voltage conditions.

A novel cold field emission (CFE) gun for improved imaging and analytical performance

The CFE source is ideal for high resolution imaging with a small source size and energy spread. The newly designed Hitachi CFE gun complements the inherent high resolution and brightness of conventional CFE with increased probe current and beam stability. Long-term, continuous operation and elemental analysis are now routine with the new CFE source.

	Cold FE electron source	Schottky FE electron source
Source size (nm)	5	15 - 30
Energy spread (eV)	0.2 - 0.3	0.6 - 0.8
Brightness (A/cm ² sr)	10 ⁸	10 ⁷



E-SEM providing unsurpassed analysis at low acceleration voltage conditions

and industrial manufacturing

ch, and ongoing technology development.
gh resolution imaging





SU8220
Standard stage model

SU8230
Large chamber and stage model



The SU8200 opens a new gateway for SEM analysis

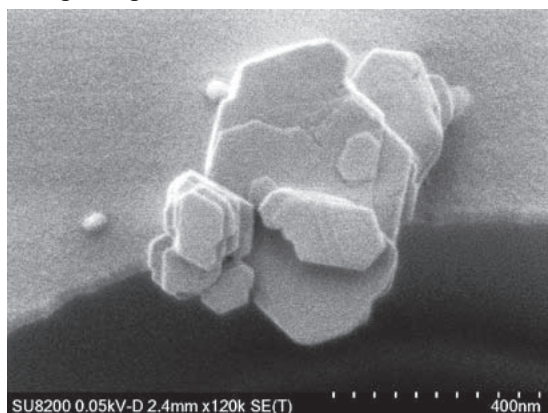
The ultimate SEM electron source now offers high signal to noise (S/N) and uncompromising resolution with high beam current and stability, which is critical for analytical solutions. The robust SU8200 series supports a wide variety of applications within material research & development and industrial quality control environments.



SU8240
Regulus® stage,
High precision stage model
*Regulus stage : REGULated Ultra Stable stage

Advanced electron optics with extended beam deceleration voltage range

The beam deceleration voltage can be optimized to yield a landing voltage of 10-2000 V enabling the observation of beam sensitive samples, such as organic materials or polymers, in the natural state without beam damage or sample deformation. Additionally, a new selective energy filtering system for the top detector offers fine contrast differentiation even at low accelerating voltages.

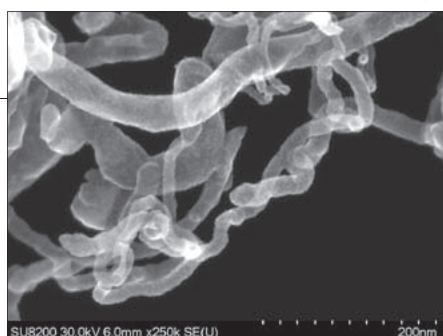


Sample : Kaolin Landing Voltage : 50 V Magnification : 120,000×
"Kaolin" is a coating pigment used for coated papers and is very sensitive to electron beam damage. On the SU8200 series SEM, Kaolin was well observed without sample damage/deformation at acceleration voltage of less than 100 V.

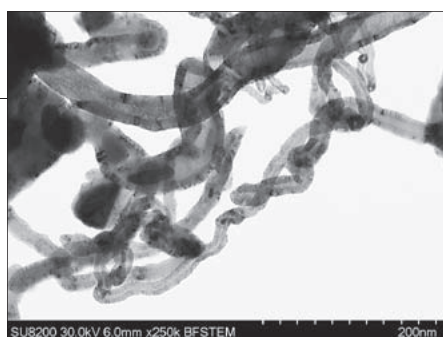
STEM Image Observation Function (Option)

A Scanning Transmission Electron Microscope (STEM) image, providing internal specimen information, can be obtained simultaneously with the secondary electron image. The optional Bright Field STEM Aperture Unit is often utilized to generate enhanced contrast differentiation on materials of similar density.

SE image
Surface information



BF-STEM image
Internal information

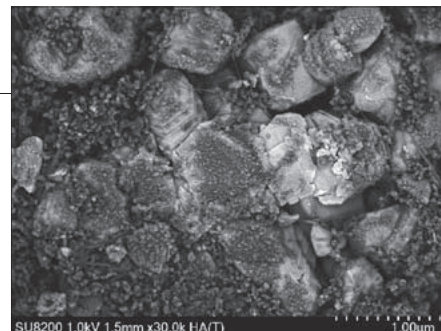


Sample : Carbon nanotubes Acceleration Voltage : 30 kV Magnification : 250,000×

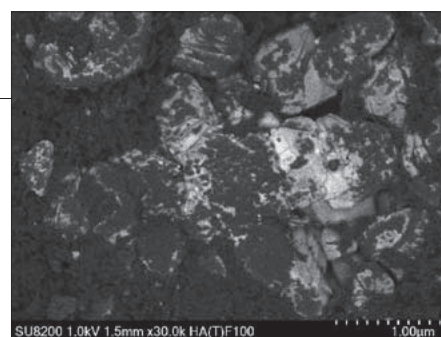
Top Detector Filtering System (Option)

Top detector filtering system provides enhanced electron detection specificity. Fine contrast differentiation is achieved by selectively filtering inelastic scattering electrons and directly detecting specific energy back scattered electrons.

Top filter
OFF



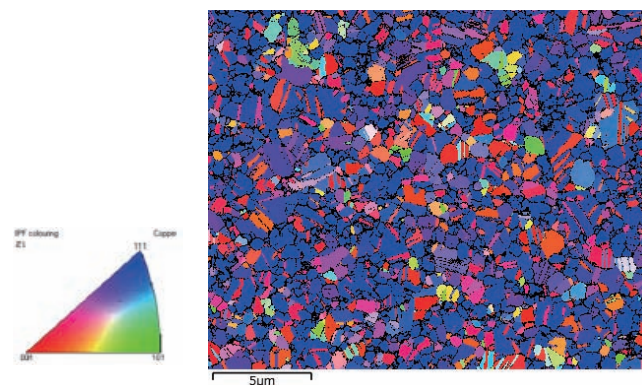
Top filter
ON



Sample : Lithium-ion Battery Positive Electrode (the Same FOV)
Acceleration Voltage : 1 kV Magnification : 30,000×

Electron Back Scattered Diffraction (EBSD) Analysis System (Option)

Optional EBSD systems for the SU8230 and SU8240 are available from various vendors.



Main specifications

		SU8220	SU8230	SU8240
Secondary Electron Image Resolution		0.8 nm (Vacc 15 kV, WD=4 mm, Magnification 270,000×)* ¹ 1.1 nm(Landing voltage 1 kV, WD=1.5 mm, Magnification 200,000×)* ¹		
Mag.	Low mag mode	20 - 2,000× (Magnification on Photo)* ²		
	High mag mode	100 - 1,000,000× (Magnification on Photo)* ²		
Electron Optics	Electron gun	Cold cathode field emission source, Anode heating system, Mild flashing system		
	Accelerating voltage	0.5 - 30 kV (Normal optics)		
	Landing voltage	0.01 - 2 kV (Decelerating optics)		
	Lens system	3-Stage electromagnetic lens		
	Objective lens aperture	Variable type (4 openings selectable and finely adjustable from outside the vacuum)		
	Stigmator coil	Octopole electromagnetic system		
	Scanning coil	2-stage electromagnetic deflection		
Specimen stage	Stage control	5-axis motor drive		5-axis motor drive Regulus® stage
	Movable range	X	0 - 50 mm	0 - 110 mm
		Y	0 - 50 mm	0 - 110 mm
		R	360°	
		T	-5 - 70°	
		Z	1.5 - 30 mm	1.5 - 40 mm
	Stage repeatability	—		less than ±0.5 μm
Electrical Image Shift		±12 μm (WD=8 mm)		
Detector	Secondary electron detector	Top / Upper / Lower, SE/BSE Signal mixing function (Upper), Top filter function (Top)* ³		
	Backscattered electron detector	YAG BSED* ³ , Semiconductor type BSED* ³		
	Transmission Electron detector	STEM detector (for BF-STEM)* ³ , BF-STEM aperture* ³ , DF-STEM holder* ³		
	Others	Energy Dispersive X-ray spectrometer (EDX)* ³ , Electron Back Scattered Diffraction (EBSD)* ³ (for SU8230, SU8240)		
Evacuation system	Auto evacuation	Pneumatic valve system		
	Ultimate vacuum	Electron gun chamber <2×10 ⁻⁸ Pa, Specimen chamber <1×10 ⁻⁴ Pa		
	Vacuum pumps	Ion pump ×3, Turbo molecular pump ×1, Scroll Dry pump (DRP) ×1* ³		
	Vacuum gauges	Full range gauge ×1, Pirani gauge ×2		
	Anti-contamination	Anti-contamination trap		
Display unit	PC/OS	PC/AT compatible, OS : Windows* ⁴		
	External device connection port	USB interface, Network interface (Ethernet)		
	Monitor	LCD (Display screen image: 1,920×1,200 pixels), Chamberscope* ³		
	Image display modes	Full screen display (1,280×960 pixels), Single screen display (800×600 pixels), Dual screen display (800×600 pixels, ×2) Quad screen display (640×480 pixels), Reduced display		
	Auto alignment function	Auto Brightness and Contrast (ABCC), Auto Focus (AFC)		
	Image data saving	640×480 pixels, 800×600 pixels, 1,280×960 pixels, 2,560×1,920 pixels, 5,120×3,840 pixels		
	Image format	BMP, TIFF, JPEG		
	Image data printing	Free layout print function provided		
	Data manager	SEM Data Manager		

		SU8220	SU8230	SU8240
Software ^{※3}		CD measurement function, CD measurement for external PC, Hi-Mouse, TCP/IP communication interface DBC interface		
Others		Microscale (standard sample for calibration) ^{※3} , Joystick ^{※3}		
Utility requirements	Temperature	15 - 25℃		
	Humidity	60%(RH) or less (non-condensing)		
	Power (Main unit)	AC100 V - 240 V ±10%, 4 kVA (Crimp contact for M6)		
	Grounding	Class D independent grounding (100 Ω or less)		
	Cooling water	Flow 1.0 - 1.5 L/min, Pressure 50 - 100 kPa, Temperature 10 - 20℃ (allowable fluctuations 0.5℃/10 min or less, difference from room temperature must be within 7℃) Supply faucet Rc3/8 tapered female thread ×1, Drain port 20 mm dia. or more ×1 (natural drain type located on floor)		
	Air compressor ^{※5}	600 - 800 kPa (RC1/4 tapered female thread) ^{※3} ^{※5}		
	Options	N2 Gas leak port ^{※3} , Autotransformer ^{※3}		
Dimensions & Weight ^{※6}	Main unit	850(W) × 990(D) × 1,710(H) mm, 665 kg	850(W) × 990(D) × 1,745(H) mm, 740 kg	850(W) × 990(D) × 1,745(H) mm, 745 kg
	Display unit	1,100(W) × 1,120(D) × 1,200(H) mm, 275 kg		
	Dry pump ^{※3}	260(W) × 400(D) × 340(H) mm, 25 kg		
	Weight	200(W) × 180(D) × 160(H) mm, 40 kg		
	Air compressor ^{※3}	420(W) × 210(D) × 520(H) mm, 18 kg		
	Water circulator ^{※3}	380(W) × 500(D) × 620(H) mm, 61 kg		

※1 Base on the gap (point to point) method by using Hitachi standard sample for resolution measurement

※2 At 127 mm × 95 mm (4" × 5" picture size)

※3 Option

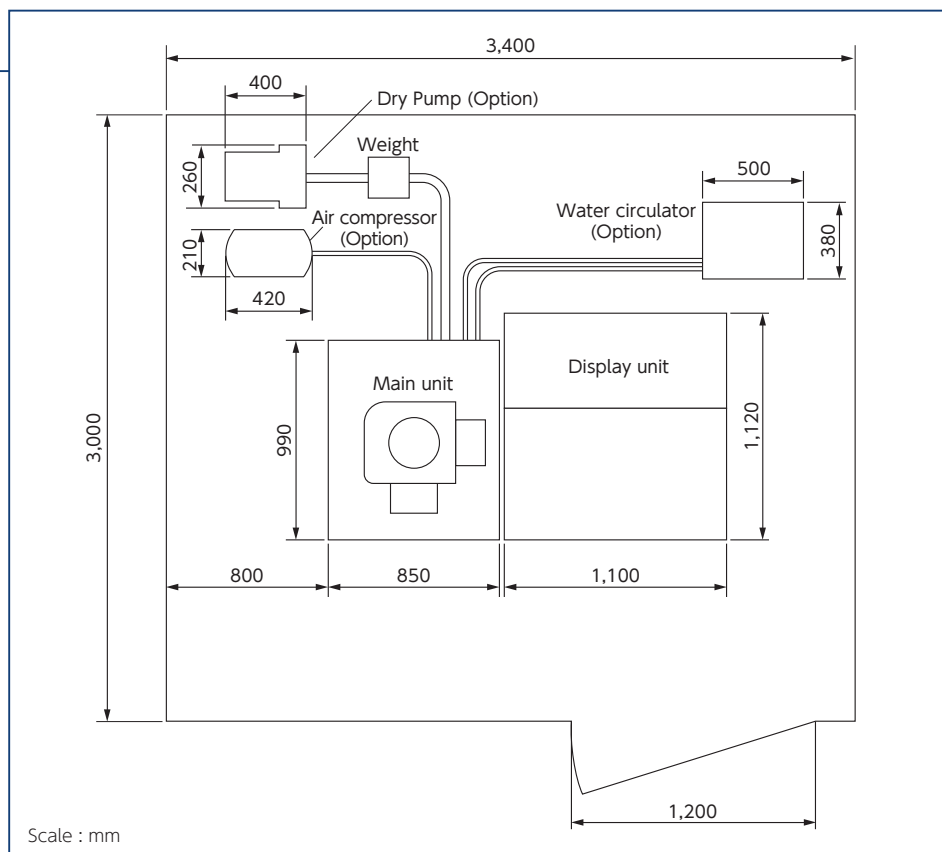
※4 Windows® is a resisted trademark of U.S. Microsoft Corp. in U.S.A. and other countries


※5 In case of connection from the installation site facilities

※6 Weight does not include options

*For disposal of this product, please contact your nearest sales representative

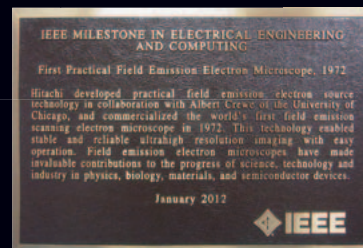
Suggested layout





Hitachi's successful achievement of practical Field Emission (FE) source technology development was recognized by the IEEE, the world's largest professional association of electrical and electronic engineers.

Hitachi initiated research and development of the FE source in 1969. The distinguished IEEE award in 2012 recognizes and validates our contributions to FE technology and the advancement of materials science, medical research, and industrial manufacturing.



NOTICE: For correct operation, follow the instruction manual when using the instrument.

Specifications in this catalog are subject to change with or without notice, as Hitachi High-Technologies Corporation continues to develop the latest technologies and products for our customers.

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