

Ultra-high Resolution
Scanning Electron Microscope

S-5500

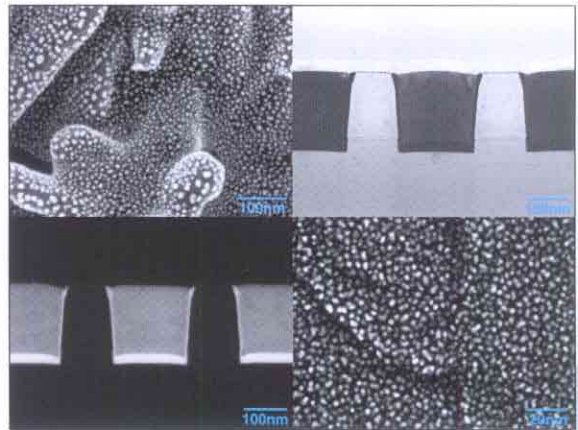


Like no other SEM in the world...

Ultra-High resolution microscopy places special demands on the equipment used to capture new information and reveal the secrets of the Nano-world. The New S-5500 meets these needs with proven technology, combining high resolution and easy, reliable operation.

A new objective lens helps to achieve the world's highest resolution*¹ of 0.4nm at 30kV. A new and improved display system and GUI design is loaded with features to make high resolution microscopy as effortless as possible. An innovative BF/DF Duo-STEM Detector*² allows simultaneous observation of both bright and dark field images with a unique "variable angle" collection method in DF-STEM mode.

The S-5500 boasts a host of other features and details, all designed to make high resolution microscopy and analysis that much easier. If you are searching for the ultimate high resolution Scanning Electron Microscope, the S-5500 is like no other microscope in the world.



SE Image

Evaporated
Au particles
Vacc: 1 kV

BF STEM Image

Cu Wiring
Vacc: 30 kV

DF STEM Image

Cu Wiring
Vacc: 30 kV

SE Image

Sputtered
Pt particles
Vacc: 30 kV

Technical Information

- **0.4 nm at 30 kV / 1.6 nm at 1 kV**
- **Hitachi's unique variable super $E \times B$ *³ signal mode allows operator to optimize secondary and backscatter signal content of the image**
- **New GUI with LCD viewing monitor, SNAP operation!**
- **New BF/DF Duo-STEM detector allows simultaneous display of BF and DF images. Variable detection angle in DF STEM mode (option)**
- **Electron optical design allows EDS Analysis and Imaging without changing specimen position**
- **EDS solid angle of 0.15 steradians or better at 20 degrees**
- **FIB compatible holders for seamless imaging of targeted preparation sites.**

*1. At Vacc = 30kV, as of October, 2004

*2. Option, Patent pending

*3. $E \times B$: E cross B field, Hitachi Patent

*4. Wide Area Microscopy - Option

S-5500 – Feature highlights

Easy Operation, **SNAP!**

Sometimes you want it all. The combination of in-lens technology and an intelligent user interface allows the S-5500 to meet the demands of even the most discerning operator. The new user interface ensures that every image you record is a part of the future. Taking great SEM images should be simple.

- Unobtrusive control panel
- Stage positions linked to captured images
- Advanced Critical Dimension Measurement (option)
- Simple mode selection changes conditions from high-resolution imaging to analytical currents
- Linked imaging to PCI database for Web based Wide Area Microscopy*4

In-Lens Technology

Stay ahead of the pack. The S-5500 uses in-lens technology to give you the best of both worlds. The highest resolution available today AND high sensitivity EDX analysis capabilities. Your technology investment is safe both now and in the future.

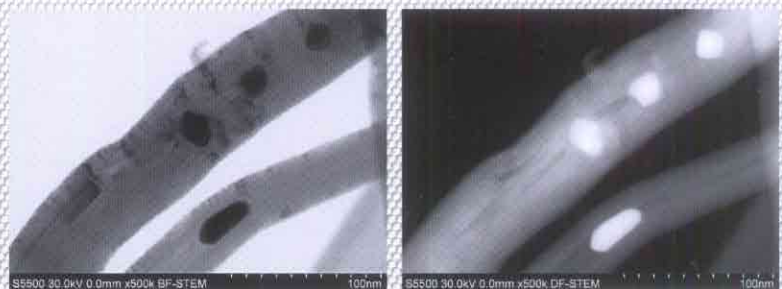
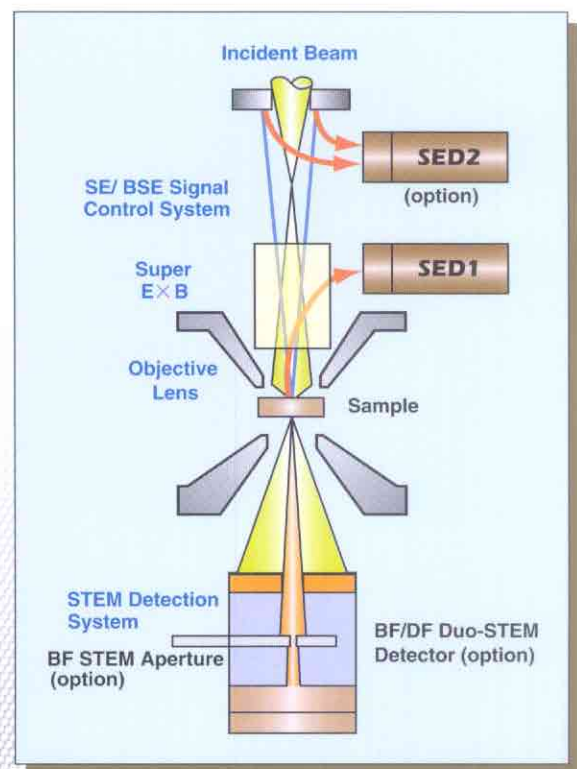
- The in-lens design places the sample within the bore of the objective lens to enhance imaging performance.
- The Super ExB filter increases signal collection efficiency.
- The side-entry specimen stage has outstanding stability and provides smooth motion at high magnification
- State-of-the-art specimen holder designs are available for cross sections, TEM specimens, revolving specimens, and cryo-specimens.
- The Expanded Depth of Focus routine is available to enhance image depth. (option)

STEM Function (Option)

Sometimes a single image can change the way we look at life. High-contrast, low voltage TE imaging is a new field of high resolution electron microscopy. This discovery has prompted improvements in Hitachi's detector design leading to the introduction of a new BF/DF Duo-STEM Detector. The thin section sample is most notable for its finite spatial resolution, both for high-resolution imaging, and EDS analysis. Dark field imaging, providing atomic number (Z) contrast, is the preferred imaging technique for locating areas for EDS analysis. The S-5500 BF/DF Duo-STEM detector simultaneously displays both the bright and dark field images and provides the capability to image with variable detection angles. This innovative detection method may open the door to new discoveries. A single image. A symbol of the future.



Sample : Catalyst



Sample : CNT

Main Specifications

Secondary electron image resolution

0.4 nm (30 kV, Sample height = 1.0 mm)
1.6 nm (1 kV, Sample height = 2.0 mm)

Accelerating Voltage 0.5 ~ 30kV

Magnification

LM Mode 60 ~ 10,000X
HM Mode 800 ~ 2,000,000X

Electron optics

Electron gun Cold cathode field emission electron source
Lens system 3-stage electromagnetic lens reduction system
Objective lens aperture Variable type (4 openings)
Selectable and finely adjustable from outside the vacuum, 100-50-50-30 μm)
Stigmator coil Octopole electromagnetic system
Scanning coil (HM mode) 2-stage electromagnetic deflection
(LM mode) 1-stage electromagnetic deflection
Beam blanking Electrostatic type
(synchronized with scanning coil)
Electromagnetic type
(for image freezing)

Specimen stage

Stage Side-entry goniometer stage
Stage traverse X : ±3.5 mm, Y : ±2.0 mm
Z : ±0.3 mm, T : ±40°
Sample size
Bulk 5.0 mm × 9.5 mm × 3.5 mmH (max.)
Cross-section 2.0 mm × 6.0 mm × 5.0 mmH (max.)

Electrical image shift ±5 μm (Sample height = 0 mm)

Detectors

Secondary electron detector
Upper backscattered electron detector (option)
YAG backscattered electron detector (option)
BF/DF Duo-STEM detector (option)
STEM detector (option)
Faraday cup (option)
Energy dispersive X-ray detector (option)

Display system

PC Windows® Desktop PC
OS Microsoft® Windows® XP Professional
Monitor 19 type LCD
Image display mode
Full screen display 1,280 × 960 pixels
Reduced area display 640 × 480 pixels
Reduced area display 320 × 240 pixels
Dual image display 640 × 480 pixels × 2

Microsoft® and Windows® are trademark of Microsoft Corp., U.S.A.

Evacuation system

Auto evacuation Fully automatic pneumatic valve control system
Ultimate vacuum Electron gun chamber : 1×10^{-7}Pa
Specimen chamber : 7×10^{-5}Pa
Vacuum pumps Ion pump 70 l/s × 1
Ion pump 30 l/s × 1
Turbomolecular pump 260 l/s × 1
Scroll type dry pump* × 1

Dimensions & Weight

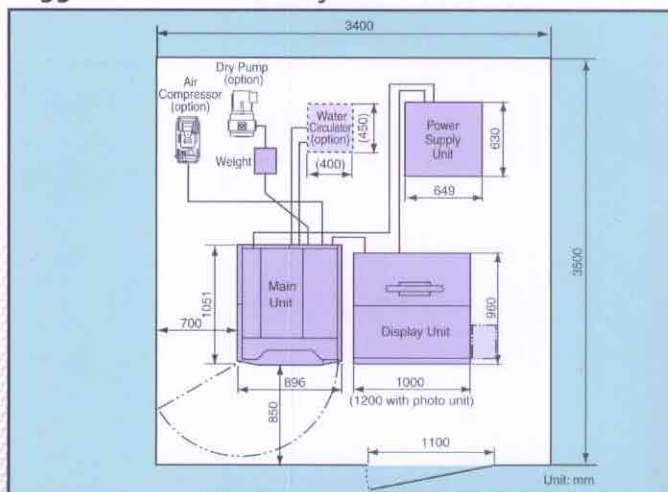
	Width	Depth	Height	Weight
Main unit	896	1,051	1,760 mm	630 kg
Display unit	1,000	960	1,200 mm	230 kg
Power supply unit	649	630	1,245 mm	190 kg
Dry pump*	(311)	(437)	(337 mm)	(25 kg)
Air compressor*	(230)	(400)	(550 mm)	(18 kg)
Weight	200	180	160 mm	40 kg

Utility requirements

Room temperature 15 ~ 25°C
Humidity 60% RH or less
Power Single phase AC 100~240V±10%, 4 kVA
Grounding 100 ohms or less
Cooling water
Flow 0.6 ~ 1.0 l/min.
Pressure 50 ~ 100 kPa
Temperature 10 ~ 20°C (allowable fluctuations 0.5°C/10 min. or less, difference from room temperature must be within 7°C)
Supply faucet Rc3/8 tapered female thread × 1
Drain port (20 mm dia. or more) × 1
(Natural drain type located on floor)

*Option

Suggested installation layout



NOTICE: For proper 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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