Main Specifications of Tabletop Microscope TM4000PlusIII/TM4000III Body

■ Specifications

Item	Description	
Model name	TM4000PlusIII	TM4000III
Model No.	TM4000Plus	TM4000
Magnifications	10× to 100,000× (photographic magnification)*1 25× to 250,000× (monitor magnification)*2	
Accelerating voltage	5 kV, 10 kV, 15 kV, 20 kV*3	
Observation mode (irradiation current) setting	5 levels	
Sample current display function	Available	None
Image signal	Backscattered electrons Secondary electrons	Backscattered electrons
	Mixed (backscattered electrons + secondary electrons)	
Vacuum mode	BSE: Conductor	Standard
	Standard	Charge-up reduction
	Charge-up reduction	
Image mode (BSE)	Normal/Shadow 1/Shadow 2/TOPO	
Stage	Motor driven	Manual
Camera navigation function	Available	None
Sample traverse range	X: 40 mm, Y: 35 mm	
Maximum sample size	80 mm (diameter) × 50 mm (thickness)	
Electron gun	Pre-centered cartridge tungsten filament	
Filament indicator	Available	
Signal detection system	BSE: High-sensitivity 4-quadrant BSE detector	BSE: High-sensitivity 4-quadrant BSE detector
	Secondary electron: High-sensitivity low-vacuum SE detector (UVD)	
Auto image adjustment function	Auto start, Auto focus, Auto brightness	
Saved image sizes	2,560x1,920 pixels, 1,280x960 pixels, 640x480 pixels	
Image format	BMP, TIFF, JPEG	
Data display	Micron marker, micron value, magnification, date and time, image number and comment, working distance (WD), accelerating voltage, vacuum mode, image mode, image signal	
Evacuation system (vacuum pump)	Turbo molecular pump: 67 L/s × 1 Diaphragm pump: 20 L/min × 1	
Operation helper functions	Raster rotation, magnification presets (3 steps), Image shift (±50 µm @ WD 6.0 mm)	
Safety functions	Built-in ELCB with overcurrent protection	

■ PC/monitor specifications

Item	Description	
Model name	TM4000PlusIII	TM4000III
OS	Microsoft® Windows11® (64-bit)	
Storage device	DVD-ROM drive	
Display	23.8-inch	

■ Size/weight

Item	Description	
Model name	TM4000PlusIII	TM4000III
Main unit	330 (W) × 614 (D) × 547 (H) mm, 55 kg	330 (W) × 617 (D) × 547 (H) mm, 53 kg
Diaphragm pump	144 (W) × 270 (D) × 216 (H) mm, 5.5 kg	

■ Optional accessories

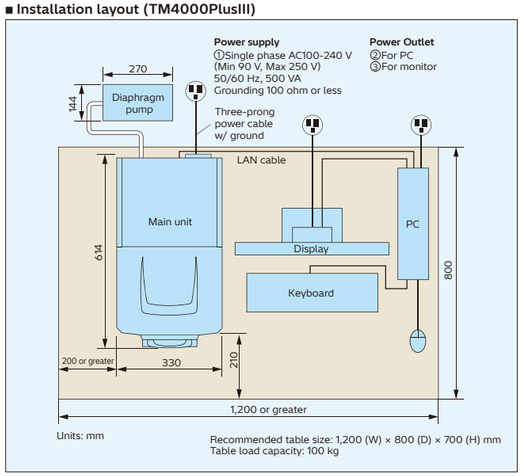
Energy dispersive X-ray spectrometer (EDS)	Cooling stage
Hitachi map 3D: three-dimensional image display/measurement function	Tilt & rotation stage
EM Flow Creator LITE*4	Multi Zigzag function (continuous field of view)*4
Image Pro: image measurement software	UVD-STEM holder*4

■ Installation requirements

Item	Description
Room temperature	15–30°C (Δt = ±2.5°C/hr or less)
Humidity	70% RH or less (no condensation)
Power supply (main unit)	Single phase AC100-240 V (Min 90 V, Max 250 V)

* This device has specified installation requirements, so please consult our sales representatives.

■ Installation layout (TM4000PlusIII)



*1 Photographic magnification is defined for display size of 127 mm × 95 mm (4 × 5" picture size).
*2 Monitor magnification is assumed so that actual magnification is the same as the displayed image on a 23.8-inch display.
*3 Focal position is limited when using 20 kV.
*4 Optional for TM4000PlusIII models.

- Leave at least 200 mm of space on the left-hand side of the unit and place it as close to the center of the table as possible.
- Do not use a table with casters.
- Place the diaphragm pump under the table.
- Equipment requires regular maintenance.
- Customer is to provide the input power supply, ground terminal, and recommended table.
- TM4000 series models are not approved as medical devices.
- For use in the educational sector, TM4000 series models are to be operated by trained personnel only.
- This equipment and PC specifications and design are subject to change without notice for improvement.
- Do not attempt to install or relocate the equipment by yourself after installation.
- When relocating the system after installation, please contact your point of purchase.
- The screen shows a simulated image.
- Microsoft® and Windows® are registered trademarks of Microsoft Corporation in the United States and other countries.
- WD: Working distance

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-Tech Corporation continues to develop the latest technologies and products for our customers.

Copyright (C) Hitachi High-Tech Corporation 2026 All rights reserved.

Hitachi High-Tech Corporation

Tokyo, Japan
www.hitachi-hightech.com/global/science/

MIX
Paper | Supporting responsible forestry
FSC® C019620

VEGETABLE OIL INK

HTD-E311 2026.3

Tabletop Microscope

TM4000Plus III / TM4000 III

HITACHI

Tabletop Microscope

TM4000 Series

Easy to use,
No-hassle observation,
Quick results.

The TM4000III Series requires no sample preparation and allows samples to be observed in just three steps. High operational efficiency is achieved without the need to remember any complex operations.

Advanced model that balances functionality, performance and usability

TM4000PlusIII

○BSE/SE ○Motor driven stage
○Camera navigation

Standard Model

TM4000III

○BSE ○Manual stage

No sample preparation required

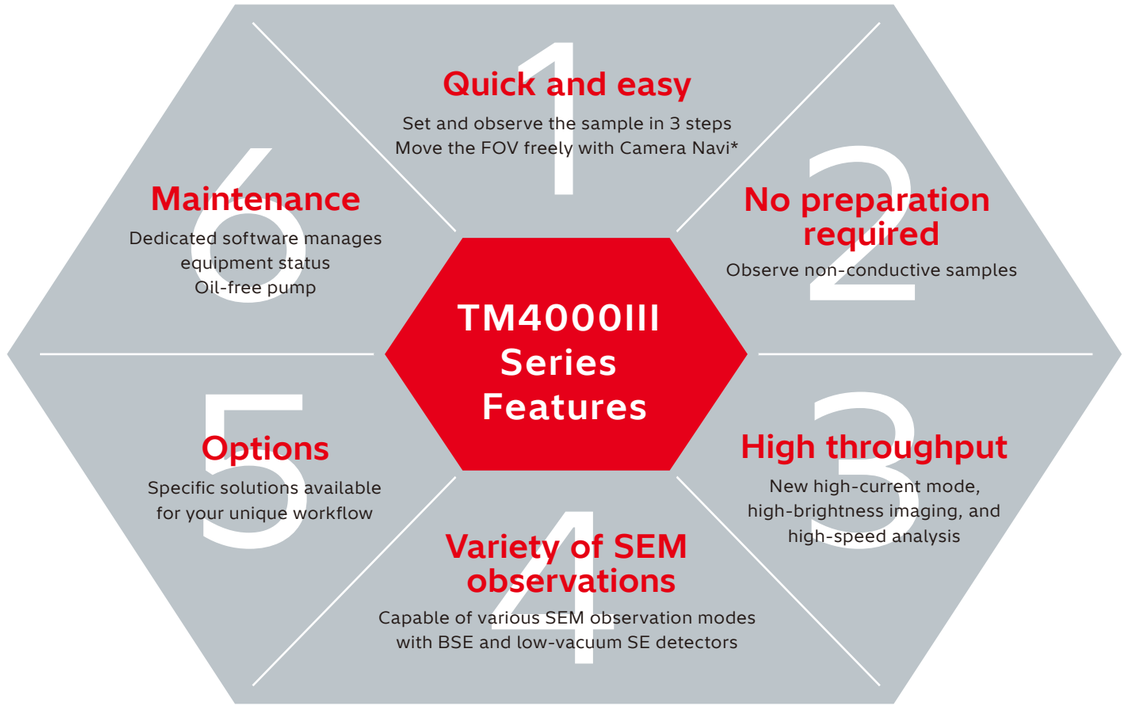
With its low-vacuum observation capabilities, the TM4000III Series can observe non-conductive samples without any sample preparation. Even for samples prone to charging or containing moisture, imaging takes just 3 steps, with no cumbersome metal coating required.

Smooth navigation to the field of view (FOV)

Finding your FOV is easy with Camera Navi*. The SEM stage is linked to the optical-camera image, allowing for quick navigation across the sample. *The Camera Navi feature is available on TM4000PlusIII models.

Flexible observation and analysis

The TM4000III Series features auto focus, auto brightness, and auto contrast.
Designed for ease of use, its many automatic functions allow for smooth workflows even for users with no SEM experience.



1 Quick and easy

From sample setting to imaging, save vivid images in just 3 steps with high-precision auto functions

Workflow for the TM4000PlusIII

STEP 1

Sample Exchange

Check the sample height with the height-check gauge and set it in on the stage.

Press the EVAC/AIR button to start vacuum pumpdown.

STEP 2

Navigate to the field of view Camera Navi.

With Camera Navi*, an image of the sample is taken with the optical camera during vacuum pumpdown. Then the stage is moved based on the camera image allowing for observation to be started from the point of interest.

Vacuum pumpdown is complete in less than 2 minutes, and observation can be started with the Start button.

STEP 3

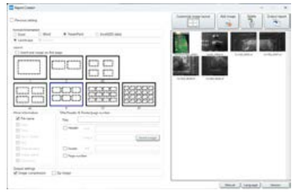
Start observation

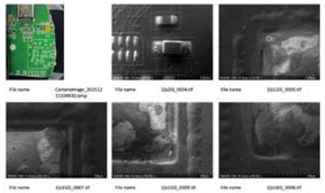
Capture images effortlessly with auto focus and auto brightness adjustments.

Move the FOV with just a click of the mouse. The camera image and SEM image are always linked.

Reports

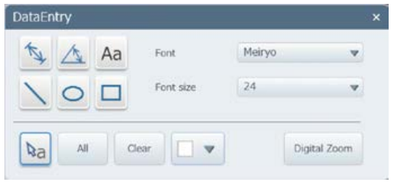
Simply select an image and template to create reports in Microsoft® Word, Excel, or PowerPoint format.

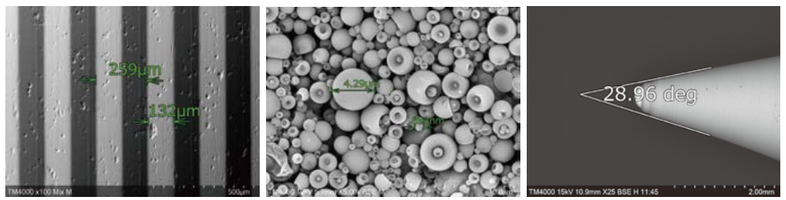




Analysis

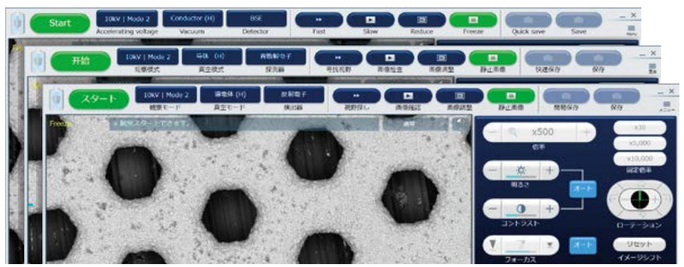
Annotate images with distance and angle measurements, and add text to highlight key features.





Multilingual usability

Select between English, Chinese, and Japanese for the language of operation.

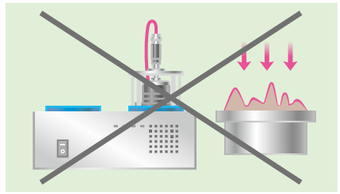


2 No preparation required

The TM4000III Series does not require any sample preparation and allows samples to observed in their natural state

No conductive coating required

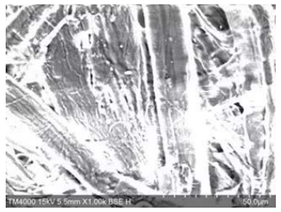
In conventional SEM, when observing a non-conductive sample, electrons accumulate on the sample surface causing it to charge up, preventing proper observation. To prevent this, a metal or other conductive coating is required. Coating the sample with metal requires extra time and additional tools, and can even negatively affect EDS analysis and other functions. TM4000III Series models come with three vacuum modes, allowing for non-conductive samples to be observed without metal coating.



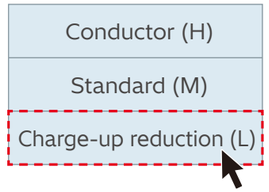
3 vacuum modes* for optimal observation

* For TM4000PlusIII model

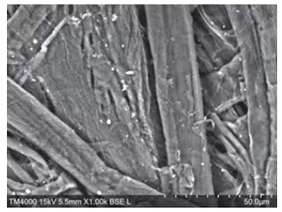
The TM4000PlusIII is equipped with three different vacuum modes, each for unique sample types. With a single click, change the vacuum mode based on your samples needs.



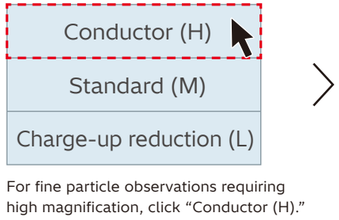
Charging phenomenon occurred during observation!



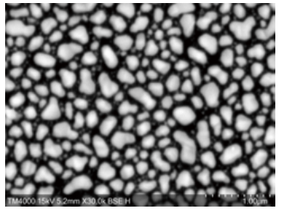
Click on "Charge-up Reduction (L)" vacuum mode.



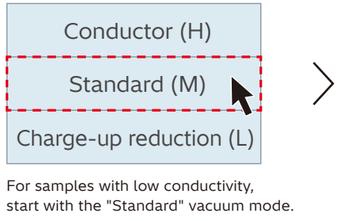
After 20 seconds, the optimal SEM image can be observed.



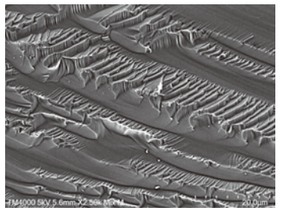
For fine particle observations requiring high magnification, click “Conductor (H).”



Samples can be observed at a submicron scale.



For samples with low conductivity, start with the "Standard" vacuum mode.

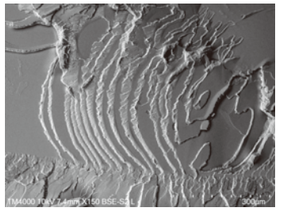


Resin-fracture surfaces and other non-conductive materials can be observed clearly.

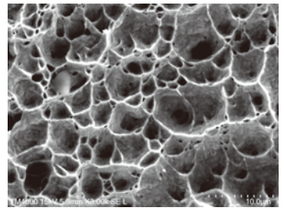
Simple observation of fractures and oil-containing substances

A variety of samples can be observed without metal coating.

Fracture surface observation



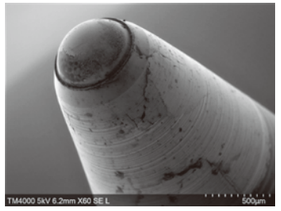
Accelerating voltage: 10 kV
Image signal: BSE
Magnification: 150x
Sample: Fracture surface of resin



TM4000PlusIII

Accelerating voltage: 15 kV
Image signal: SE
Magnification: 3,000x
Sample: Fracture surface of metal

Oil-containing sample observation



TM4000PlusIII

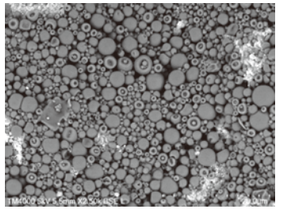
Accelerating voltage: 5 kV
Image signal: SE
Magnification: 60x
Sample: Tip of ballpoint pen

Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 500x
Sample: Chocolate
Cooling stage used

Non-conductive powders and moisture-containing samples can also be observed without preparation

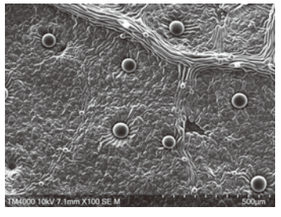
The various vacuum-mode settings allow for a diverse range of sample types to be easily observed.

Non-conductive sample observation



Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 2,500x
Sample: Special ink

Moisture-containing sample observation



TM4000PlusIII

Accelerating voltage: 10 kV
Image signal: SE
Magnification: 100x
Sample: Plant leaf

TM4000PlusIII

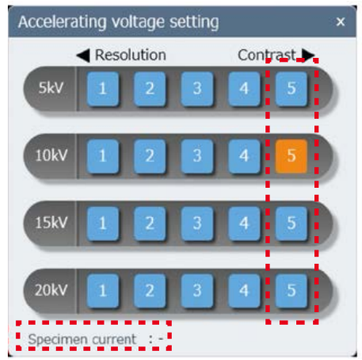
Accelerating voltage: 10 kV
Image signal: Mixed image
Magnification: 1,500×
Ionic liquid used
Sample: Azalea pollen

3 High throughput

High-throughput analysis made possible by the TM4000III Series

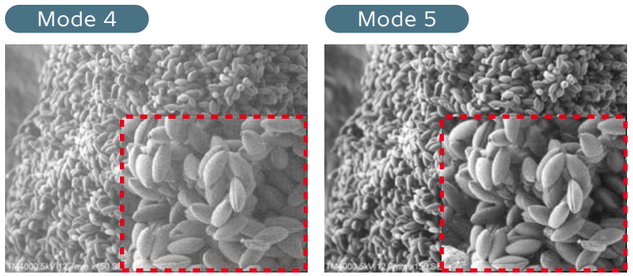
New High-Current mode for increased observation speed

High-current mode provides increase signal level which improves the signal-to-noise ratio, reduces image roughness, and contributes to higher analytical throughput.



Sample current display (TM4000PlusIII only)

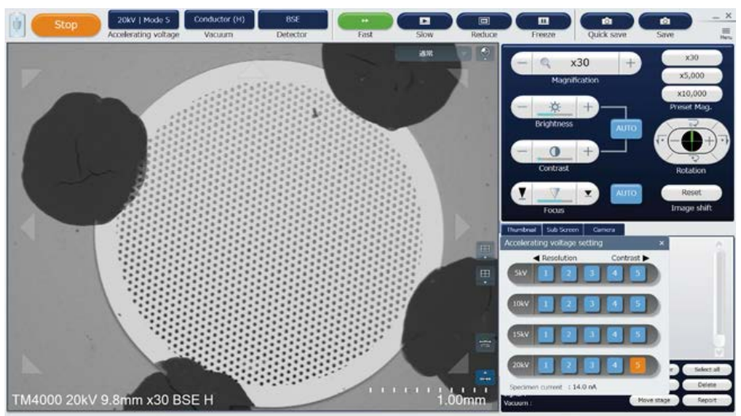
High-current Mode 5

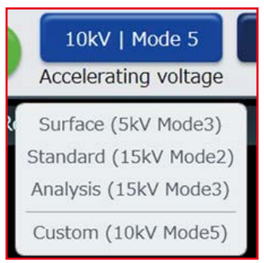


Sample: Pollen sacs (anther)
Accelerating voltage: 5 kV
Vacuum mode: Charge-up reduction

One-click recall of frequently used observation modes

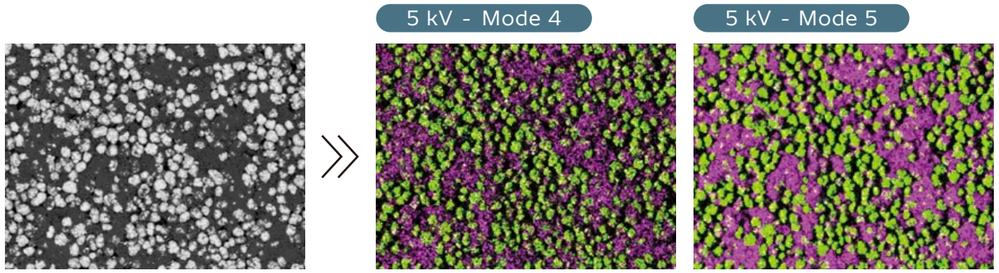
Frequently used voltage and current settings can be set as custom conditions, allowing users to quickly return to their desired settings.
This is ideal for users looking to achieve consistent data under the same conditions or those who regurarly adjust SEM settings.



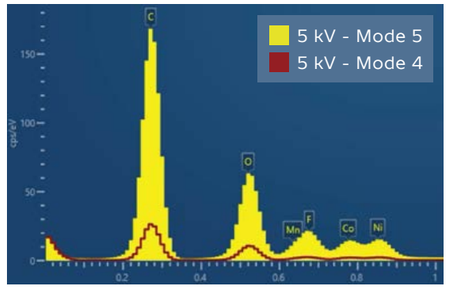


Significantly increase EDS analysis speed with high-current mode

Binder distribution in lithium-ion-battery cathodes is difficult to visualize under high accelerating-voltage conditions.
However, by setting the accelerating voltage to 5 kV in high-current Mode 5, the TM4000III Series can map these materials in 5 minutes.

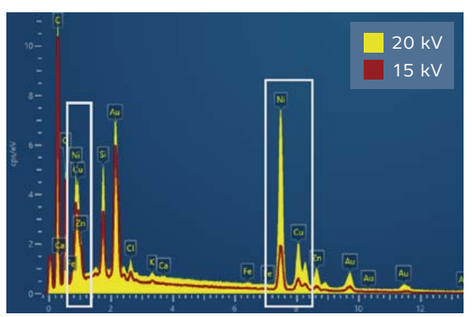


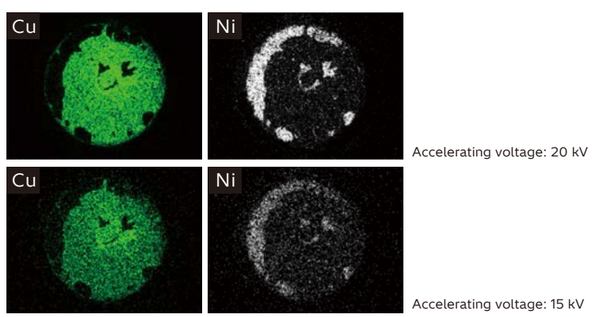
Measurement time: Comparison at 300 seconds



Perform EDS analysis at 20 kV

When performing EDS analysis, the accelerating voltage for SEM is an important setting. Since peaks in the spectrum from different elements can overlap at low energies, it is common to use high acceleration voltages for analysis. The TM4000III Series allows for the accelerating voltage to be set up to 20 kV, at which high-energy elements can be accurately analyzed. For example, for analysis of copper (8.04 keV), the accelerating voltage must be set to at least double the energy for copper.





Accelerating voltage: 20 kV

Accelerating voltage: 15 kV

4 Variety of SEM observations

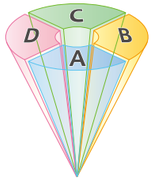
A wide range of imaging capabilites, enabled by 2 types of detectors

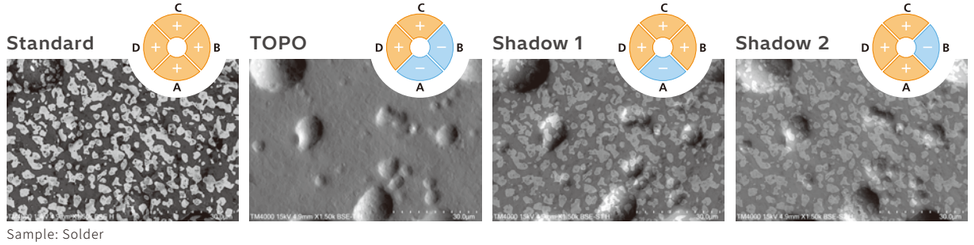
A variety of observation techniques using the BSE detector

Topographical/shadow observation

Three-dimensional images with topography and shadows using a 4-quadrant BSE detector.

Observe samples from different angles by utilizing the 4-quadrant annular design of the BSE detector. With a single click, change the detection mode to emphasize compositional contrast, enhance topographic detail, or show three-dimensional "shadow" images.





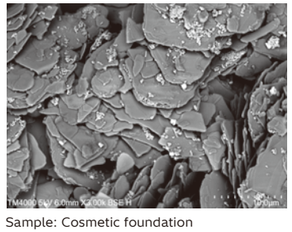
Sample: Solder

5 kV BSE

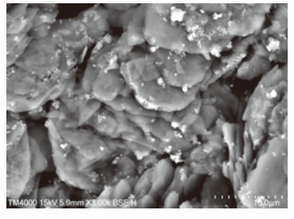
Compositional contrast including surface details at lower accelerating voltages

In general, images tend to darken at low accelerating voltages due to the decrease in the signal intensity.
The TM4000III Series uses a high-sensitivity detector to produce bright images even at an accelerating voltage of 5 kV.

Comparison of BSE images at low and high accelerating voltages



Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 3,000x

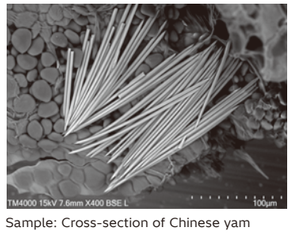


Accelerating voltage: 15 kV
Image signal: BSE
Magnification: 3,000x

Sample: Cosmetic foundation

Example Images Example of use cases for the BSE detector

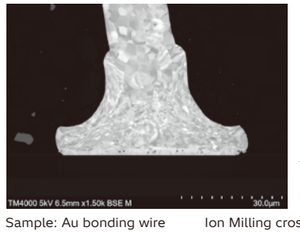
Food (hydrated sample)



Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 3,000x

Sample: Cross-section of Chinese yam

Electronic component (grain contrast)



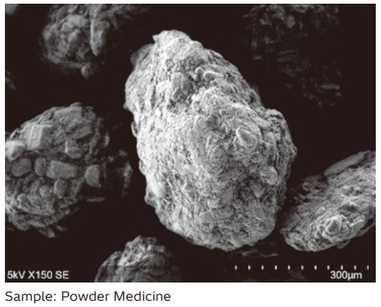
Accelerating voltage: 15 kV
Image signal: BSE
Magnification: 3,000x

Sample: Au bonding wire Ion Milling cross section

Low-vacuum SE observation, using the only ultra-variable-pressure detector (UVD) for a tabletop SEM* *As of October 2025

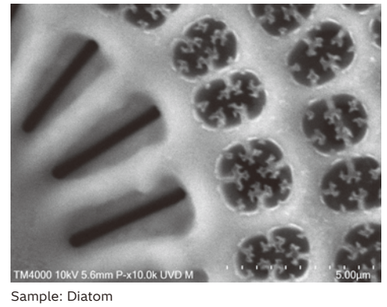
TM4000PlusIII

In addition to conventional observation of conductive samples, the TM4000III Series enables observation of non-conductive samples and moisture-/oil-containing samples without sample preparation.
Changing image modes can be done quickly and simply with the click of a button.



Accelerating voltage: 5 kV
Image signal: SE
Magnification: 150x

Sample: Powder Medicine



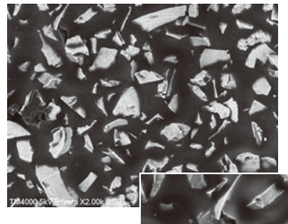
Accelerating voltage: 10 kV
Image signal: SE
Magnification: 10,000x

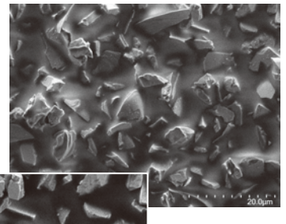
Sample: Diatom

Composite imaging by synthesizing BSE and SE signals TM4000PlusIII

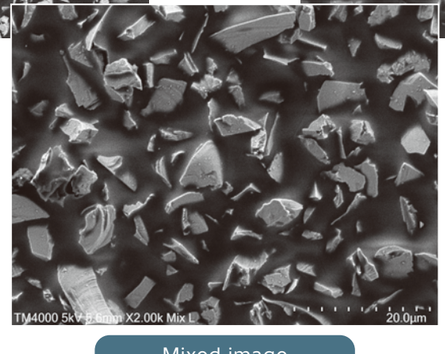
In addition to BSE and SE images, the TM4000PlusIII can also capture composite images that layer the BSE and SE images into a single image. By layering and displaying the surface shape and compositional information of the sample, this enables observations utilizing the best use of both features.
Switching between BSE, SE, and composite images can be performed quickly.

Compositional information* (BSE)





Surface shape (SE)



Mixed image (BSE + SE)

Accelerating voltage: 5 kV
Magnification: 2,000×
Sample: Sandpaper

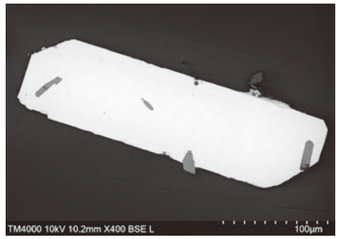
*Compositional information
Displays the brightness difference between the components.
The bright areas consist of elements with a higher average atomic number than the dark areas.

CL analysis made possible by the UVD SE detector

■ Zircon (zoning) UVD-CL*1 observation example

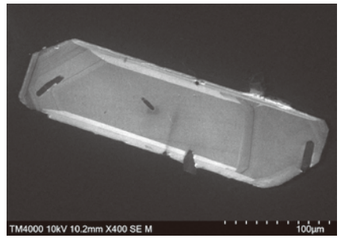
The images below are BSE and UVD-CL images of a polished zircon section. Zircon contains internal structures formed during the crystal growth process, known as zoning. While this zoning is difficult to observe in the BSE image, the UVD-CL image clearly visualizes striped zoning structures through variations in luminescence intensity. The zircon also contains apatite (Ca, P) inclusions. Because the EDS peaks of zirconium (Zr), a major component of zircon, and phosphorus (P) overlap, these elements are difficult to distinguish using standard EDS*2 mapping feature. However, by applying peak-separation EDS mapping, the distributions of Zr and P can be accurately separated and visualized.

BSE image



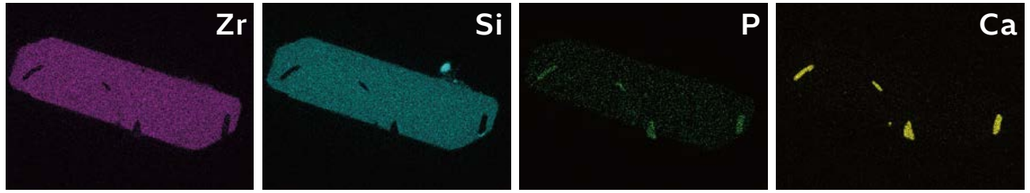
Accelerating voltage: 10 kV
Magnification: 400x

UVD-CL image



Accelerating voltage: 10 kV
Magnification: 400x

EDS mapping

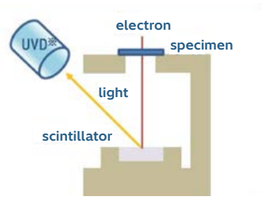


Sample: Zircon

*1 UVD-CL: Image containing CL details obtained with UVD *2 Option

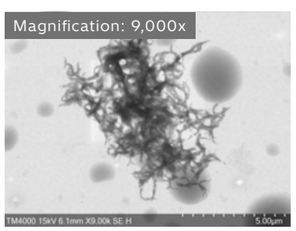
Optional UVD-STEM holder

Using the low-vacuum SE detector with the UVD-STEM holder enables bright-field STEM observation.

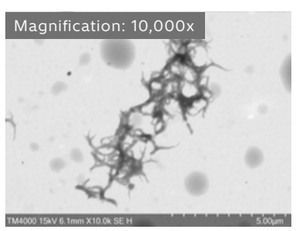


* SEM with UVD detector equipped

Magnification: 9,000x



Magnification: 10,000x

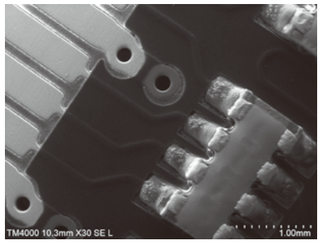


Sample: Grease thickener
Accelerating voltage: 15 kV

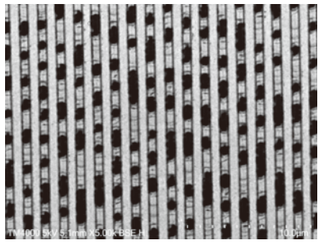
Application Gallery

Visit gallery site

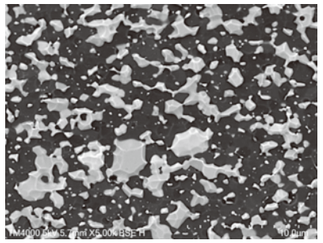
Electronic components



Accelerating voltage: 15 kV
Image signal: SE
Magnification: 30x
Sample: Electronic substrate

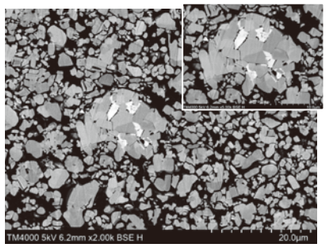


Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 5,000x
Sample: CD

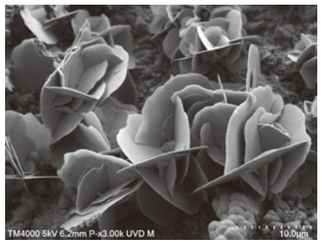


Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 5,000x
Sample: AlTiC substrate

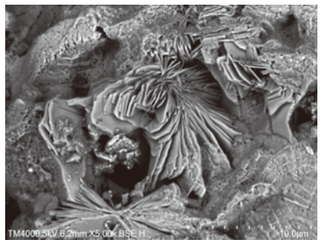
Environmental & energy materials



Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 2,000x, 5,000x
Sample: Lithium-ion battery (cathode) Ion milling used

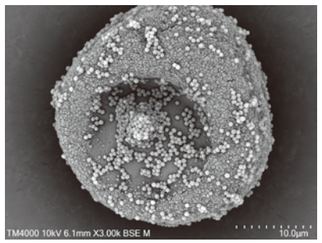


Accelerating voltage: 5 kV
Image signal: SE
Magnification: 3,000x
Sample: Copper crystal (copper sulfide)

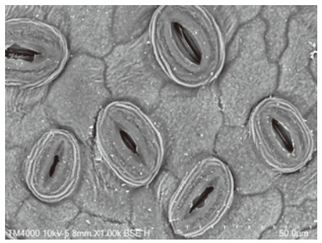


Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 5,000x
Sample: Cement

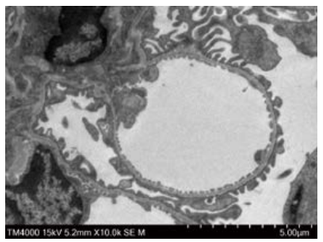
Biology/foods/pharmaceuticals



Accelerating voltage: 10 kV
Image signal: BSE
Magnification: 3,000x
Sample: Japanese cedar pollen

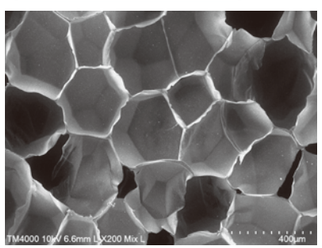


Accelerating voltage: 10 kV
Image signal: BSE
Magnification: 1,000x
Sample: leaf stomata

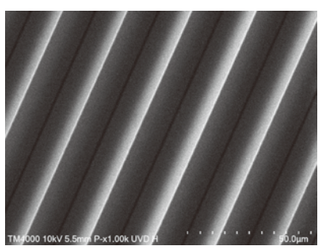


Accelerating voltage: 10 kV
Image signal: SE
Magnification: 10,000x
Sample: Mouse kidney

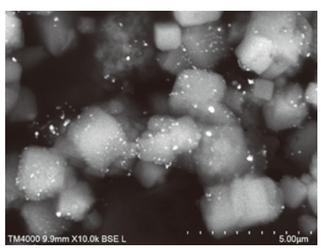
Processed products



Accelerating voltage: 10 kV
Image signal: Mixed
Magnification: 200x
Sample: Foam resin



Accelerating voltage: 10 kV
Image signal: SE
Magnification: 1,000x
Sample: Functional film



Accelerating voltage: 10 kV
Image signal: BSE
Magnification: 10,000x
Sample: Catalyst/zeolite

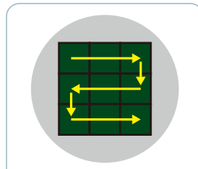
5 Options Software

Automatic-Observation Software

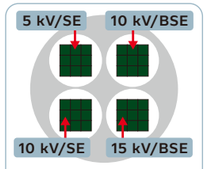
EM Flow Creator LITE

EM Flow Creator LITE allows for SEM work to be automated by creating and executing recipes with GUI operations. The program uses blocks and containers with drag-and-drop functionality, allowing users to create automatic observation recipes without any scripting knowledge.

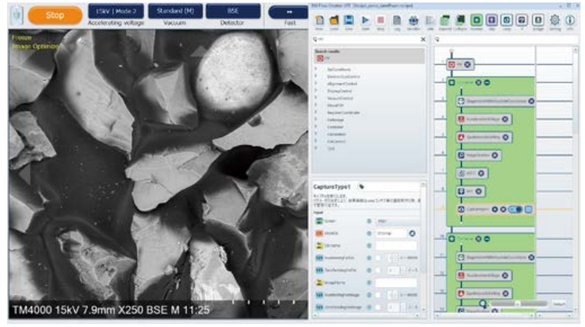
■ Automated workflow examples



Automatic continous image acquisition



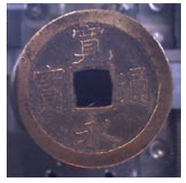
Automatic multi-condition exposure



Multi Zigzag

Multi ZigZag allows users to generate low-magnification images by tiling across the sample at higher magnification and stiching the images together. Used in combination with the motor drive stage, this allows for automatic observation of large areas.

Camera navigation image

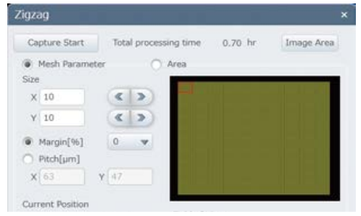


Stitching

Accelerating voltage: 15 kV
Image signal: SE
Magnification: 30× / 10 × 12 FOV grid (partial trimming)
Sample: Old coin

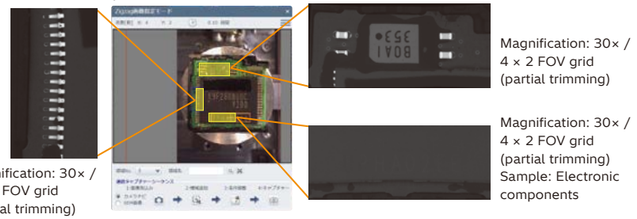
ZigZag tiling mode

Starting from the current observation position, specify the tiling array size, then begin continous automatic observation of the FOV.



Zigzag image specification mode

Specify multiple locations based on the camera navigation image to begin automatic capture.



Magnification: 30× / 3 × 7 FOV grid (partial trimming)

Magnification: 30× / 4 × 2 FOV grid (partial trimming)

Magnification: 30× / 4 × 2 FOV grid (partial trimming)
Sample: Electronic components

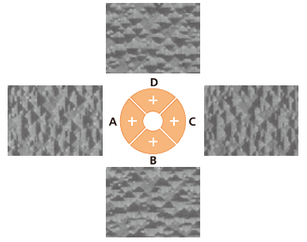
Image analysis software

Hitachi Map 3D

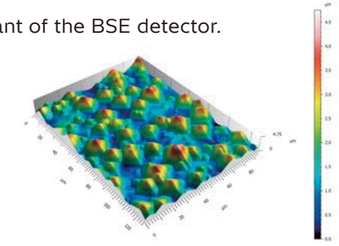
Hitachi Map 3D constructs a 3D model by combining four SEM images from different orientations, as captured with the 4-quadrant BSE detector. It can measure height differences between two points, volumes, surface roughness, line roughness, and more. The four SEM images are detected at once, eliminating the need for sample tilting or aligning the FOV across multiple screens.

■ SEM image (4-quadrant BSE image)

4 separate images, each from a specific quadrant of the BSE detector.

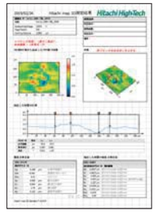


■ 3D model

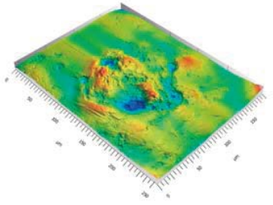


Accelerating voltage: 5 kV
Magnification: 2,000×
Sample: Solar cell

■ Report output



■ Height and angle measurements for extracted section



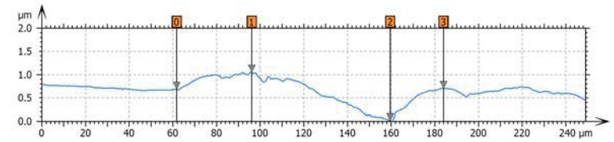
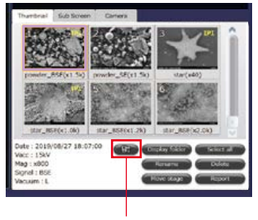


Image-Pro® Support for Image Pro image measurement software

Manufacturer: Media Cybernetics

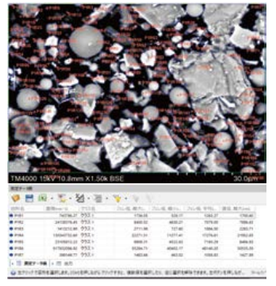
TM4000 Series models come equipped with functionality to quickly and easily transfer SEM images to the Image-Pro image processing application. Make workflows within Image-Pro to further automate your analysis.

Transfer from SEM operation screen (thumbnail)

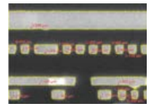


Transfer button

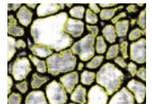
Particle size distribution analysis



Binary automatic measurement



Particle measurement



Fiber measurement

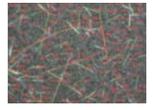


Image stitching

EDS system

Aztec Series XploreCompact 30/65

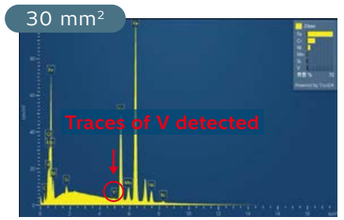
Manufacturer: Oxford Instruments NanoAnalysis

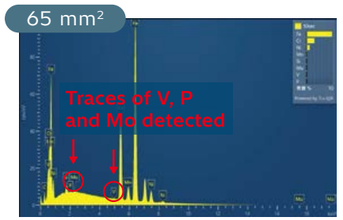
Intuitive and easy to use,
for accurate EDS analysis.

Sample configuration in combination
with TM4000III Series

Two sensor sizes

The lineup includes two sensor sizes: 30 mm² and 65 mm².

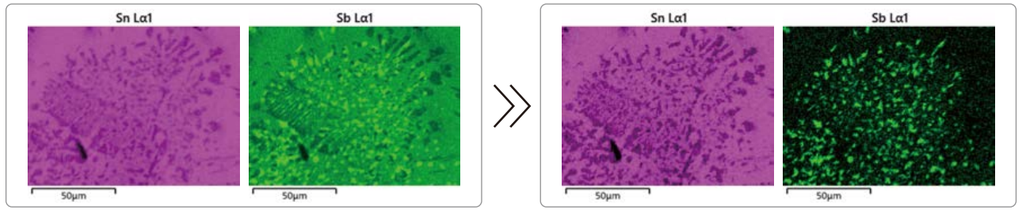




[Measurement example]
Automatic detection of trace components of SUS304 (analysis time: 20 s)

Traces of elements V, P and Mo ranging from 0.1% to 0.2% can be detected automatically in 20 seconds with the 65 mm² sensor, and in 50 seconds with the 30 mm² sensor.

TruMAP

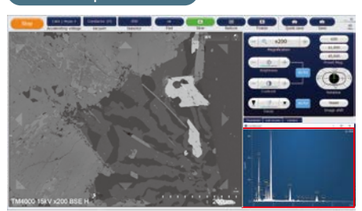


Performs peak separation and background processing in real time for overlapping element maps to display the correct results.

Live analytics

Collect and display spectra and mappings during SEM observation. This significantly reduces the search time for foreign matter analysis.

Live spectrum



Display the live EDS spectrum within the SEM software for convenient analysis. The spectrum responds quickly to changes in FOV and magnification.

Live mapping

View live SEM images, mappings, and spectra as you navigate across the sample. Move the stage while capturing data to narrow in on specific elements. The software will transition to an integrated map when the stage stops moving.

Quantax 75 30/60

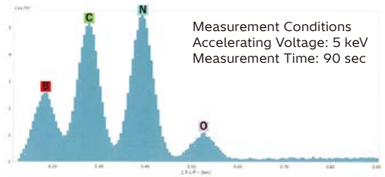
Qantax 75 combines high-performance detectors with state-of-the-art analysis software.
The detector element areas are availablie in both 30 mm² and 60 mm² options.

Manufacturer: Bruker Nano GmbH

Sample configuration
in combination
with TM4000III Series

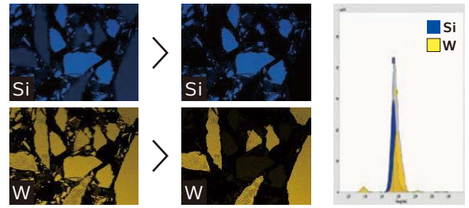
High-performance detectors

The high-energy resolution detector enables precise analysis of boron nitride in the light element region.



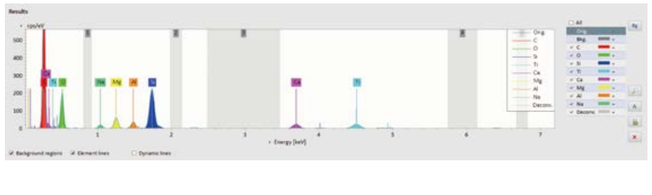
Real-time peak separation map (Online deconvolution map)

Peaks for overlapping elements are separated in real time during mapping and reflected in the mapping results.



Peak fitting

Automatic background subtraction and peak fitting (automatic/user-defined) are available for reliable identification of elements. In addition, as this enables estimation of electron beam penetration depth, spread, and density in the sample, the measurement volume can be estimated for a more precise analysis.



Element

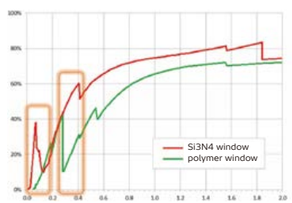
Brings the EDS performance for large SEMs to the TM4000III Series.

Manufacturer: AMETEK Gatan EDAX BU

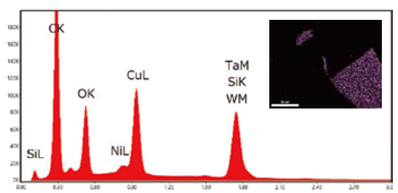
Sample configuration in combination
with TM4000III Series

Si_3N_4 window

The transmittance of low-energy X-rays is optimized with the Si_3N_4 window. In particular, light elements can be analyzed with high sensitivity.



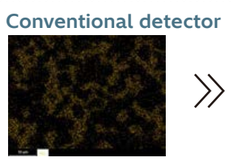
High X-ray transmittance



Low-energy X-rays detectable

High X-ray count rate

Compared to conventional polymer window detectors, the Si_3N_4 window detector has an improved X-ray count rate for improved mapping speed and detection limit.



Accelerating voltage: 20 kV
Sample: Stainless steel

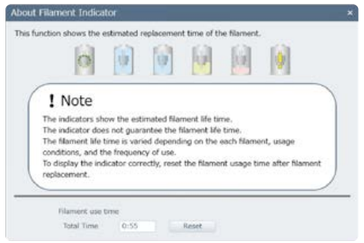
6 Maintenance

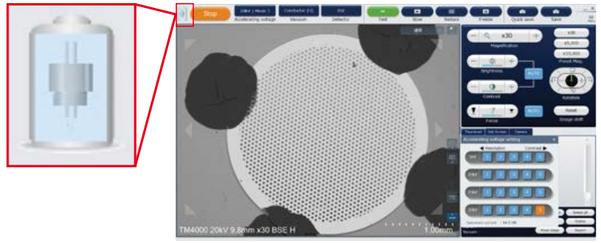
Dedicated software manages degradation

Maintenance for Ensuring Stable Operation of Electron Microscopes

Filament indicator — Visual indicator for the remaining lifetime of the filament

Filament replacement is a necessary routine task. By visually inspecting the filament for wear, the equipment manager can ensure timely maintenance is performed and reduce unncessary downtime.





Easy maintenance

Oil-free pump and cartridge filaments (no center alignment required)

Equipped with diaphragm pump that does not require oil changes

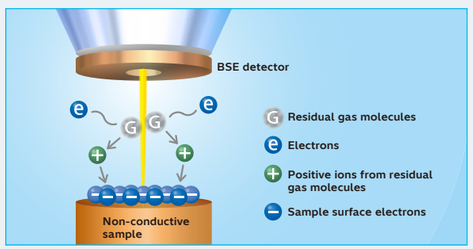
Equipped with pre-centered cartridge filament. No need for manual alignment of filament tip position allows for quick, drop-in replacements during filament exchange process.

Maintenance kit for users (optional)

For electron microscopes, contamination and foreign matter in the electron path creates trouble.
In the unlikely event it's needed, this maintenance kit allows the customer to clean the electron path themselves.

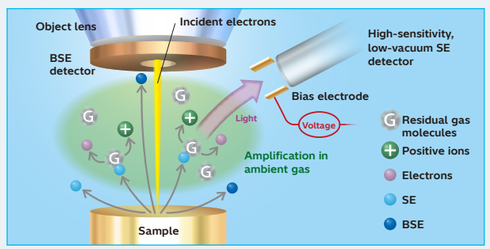
The TM4000III Series features unique low-vacuum technology.

Low-vacuum observation method



Pumping the sample chamber down to a low-vacuum state and increasing the number of gas molecules makes it easier for the electron beam to collide with gas molecules in the sample chamber. During such collisions, gas molecules (G) are ionized, generating positive ions (⊕) and electrons (e). These ions (⊕) combine with the electrons (⊖) accumulated on the sample surface and are neutralized, reducing the charge.

High-sensitivity low-vacuum SE detector



This product uses a high-sensitivity, low-vacuum SE detector known as the UVD. It detects light generated by collisions between the electron beam and residual gas molecules, creating images with detailed SE information. Controlling this detector to detect the light generated by electron beam irradiation allows CL information (UVD-CL*) to be obtained.

Main energy dispersive X-ray analyzer

Product name	AZtecOne/AZtecLiveOne/AZtecLiveLite	Quantax80	Element
Type of detector	Silicon drift detector	Silicon drift detector	Silicon nitride SDD detector
Detection area	30 mm² or 65 mm²(AZtecOne only supports 30 mm²)	30 mm² or 60 mm²	30 mm²
Energy resolution	129 eV (Mn-Ka)/ 151 eV (Cu-Ka)	129 eV (Mn-Ka) /148 eV (Cu-Ka)	129 eV (Mn-Ka)
Detectable element	B_5~U_{92}	B_5~Cf_{98}	Be_4~Am_{95}
Manufacturer	Oxford Instruments NanoAnalysis	Bruker Nano GmbH	AMETEK Gatan EDAX BU

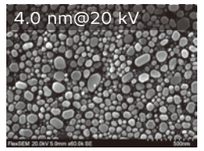
Recommendations for higher-end model

Scanning Electron Microscope

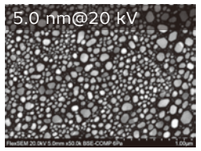
FlexSEM 1000 II

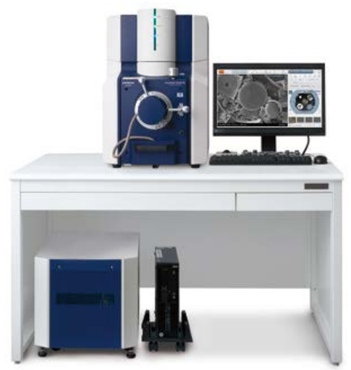
As the higher-end model of the TM4000 Series, the FlexSEM 1000 II offers a best-in-class 4-nm resolution with the ease of use of a tabletop microscope.

SE image resolution: 4.0 nm @ 20 kV



BSE image resolution: 5.0 nm @ 20 kV





■ **Specifications**

Item	Description
Model name	FlexSEM 1000 II
Model No.	SU1000
SE resolution	4.0 nm (accelerating voltage = 20 kV, WD = 5 mm, high-vacuum mode)/15.0 nm (accelerating voltage = 1 kV, WD = 5 mm, high-vacuum mode)*
BSE resolution	5.0 nm (accelerating voltage = 20 kV, WD = 5 mm, low-vacuum mode)*
Magnification	6x to 300,000x (photographic magnification)/ 16x to 800,000x (monitor magnification)
Accelerating voltage	0.3 kV to 20 kV
Variable Pressure Range	6 to 100 Pa