TM4000Plus II / TM4000 II Specifications

■Specifications

Item	Descriptipn	
Model name	TM4000Plus II	TM4000 II
Model No.	TM4000Plus	TM4000
Magnifications	10x - 100,000x (Photographic magnification*1) 25x - 250,000x (Monitor display magnification*2)	
Accelerating voltage	5 kV, 10 kV, 15 kV, 20 kV*3	
Image signal	Backscattered electron Secondary electron Mix (Backscattered electron+ Secondary electron)	Backscattered electron
Vacuum mode	BSE: Conductor/Standard/ Charge-up reduction SE: Standard/ Charge-up reduction Mix: Standard/ Charge-up reduction	BSE: Standard/ Charge-up reduction
Image mode (BSE)	Normal / Shadow 1 / Shadow 2 / TOPO	
Sample stage traverse	X : 40 mm, Y : 35 mm	
Maximum sample size	80 mm (diameter), 50 mm (thickness)	
Electron gun	Pre-centered cartridge tungsten filament	
Signal detection system	High-Sensitivity 4-segment BSE detector High-Sensitivity Low-Vacuum SE detector (UVD)	High-Sensitivity 4-segment BSE detector
Auto image-adjustment function	Auto start, Auto focus, Auto brightness	
image data saving	2,560 × 1,920 pixels, 1,280 × 960 pixels, 640 × 480 pixels	
Image format	BMP, TIFF, JPEG	
Data display	Micron marker, micron value, magnification, date and time, image number and comment, WD (Working Distance), accelerating voltage, vacuum mode, image signal, image mode	
Evacuation system (vacuum pump)	Turbo molecular pump: 67 L/s x 1 unit Diaphragm pump: 20 L/min x 1 unit	
Operation help functions	Raster rotation, Magnification presets (3 steps), Image shift (±50 µm @ WD6.0 mm)	
Safety functions	Over-current protection function, built-in ELCB	

■Required PC specifications

Item	Descriptipn	
Model name	TM4000Plus II	TM4000 II
OS	Windows® 10 (64bit)	
Memory device	HDD, DVD-ROM Drive	

■Size/weight

Item	Description	
Model name	TM4000Plus II	TM4000 II
Main unit (motorized stage)	330 (width) × 614 (depth) × 547 (height), 54 kg	
Main unit (manual stage)	330 (width) × 617 (depth) × 547 (height), 54 kg	
Diaphragm pump	144 (width) × 270 (depth) × 216 (height), 5.5 kg	

■Optional accessories

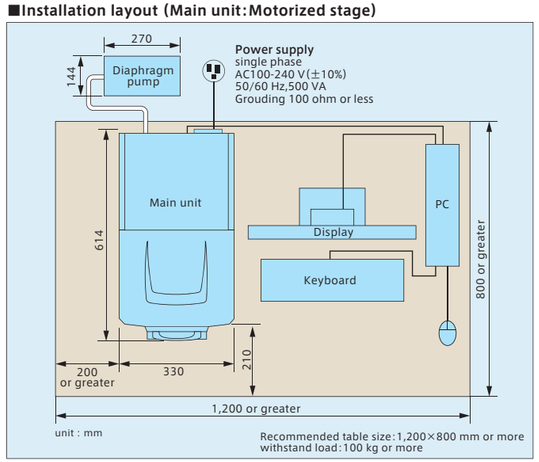
Camera navigation system	Tilt & rotation stage
Energy Dispersive X-ray Spectrometer (EDS)	Multi Zigzag function
Three-dimensional image display/ measurement function Hitachi map 3D	Cooling stage
	STEM holder

■Installation conditions

Item	Description
Room temperature	15-30 ℃ (△t=within ±2.5℃/h or less)
Humidity	- 70% RH (no condensation)
Power supply (main unit)	Singlep phase AC100-240 V (fluctuations in voltage: ±10%)

*Another power souce for PC is required.

■Installation layout (Main unit: Motorized stage)



*1 Defined at photo size of 127 mm×95 mm (4"×5" picture size)
*2 Defined at display size of 317 mm×238 mm
*3 There is a limit to the focus when using 20 kV
*Please make room for more than 200 mm to the left side of a main unit and put it the closest to the center position of the table.
*A table with caster is not suitable to put a main unit of TM4000 Series.
*Please put a diaphragm pump under the table.
*Periodical maintenance is required for this apparatus.
*Powercables, earth terminal and table should be prepared by users.
*TM4000 Series is not approved as a medical device.
*Dedicated mentors, teachers who received the operation training of the instrument are required at compulsory schools.
*It is advisable not to install or relocate the instrument by yourselves.
*When relocating the system, please contact in advance the sales department that handles your account or a maintenance service company designated by Hitachi.
*Screen shows simulated image.
*Windows® is a resistered trademark of U.S.Microsoft Corp. in U.S.A. and other countries.
*Intel® is a resistered trademark of Intel Corp. or its affilated companies in the United States and/or other countries.

Science for a better tomorrow

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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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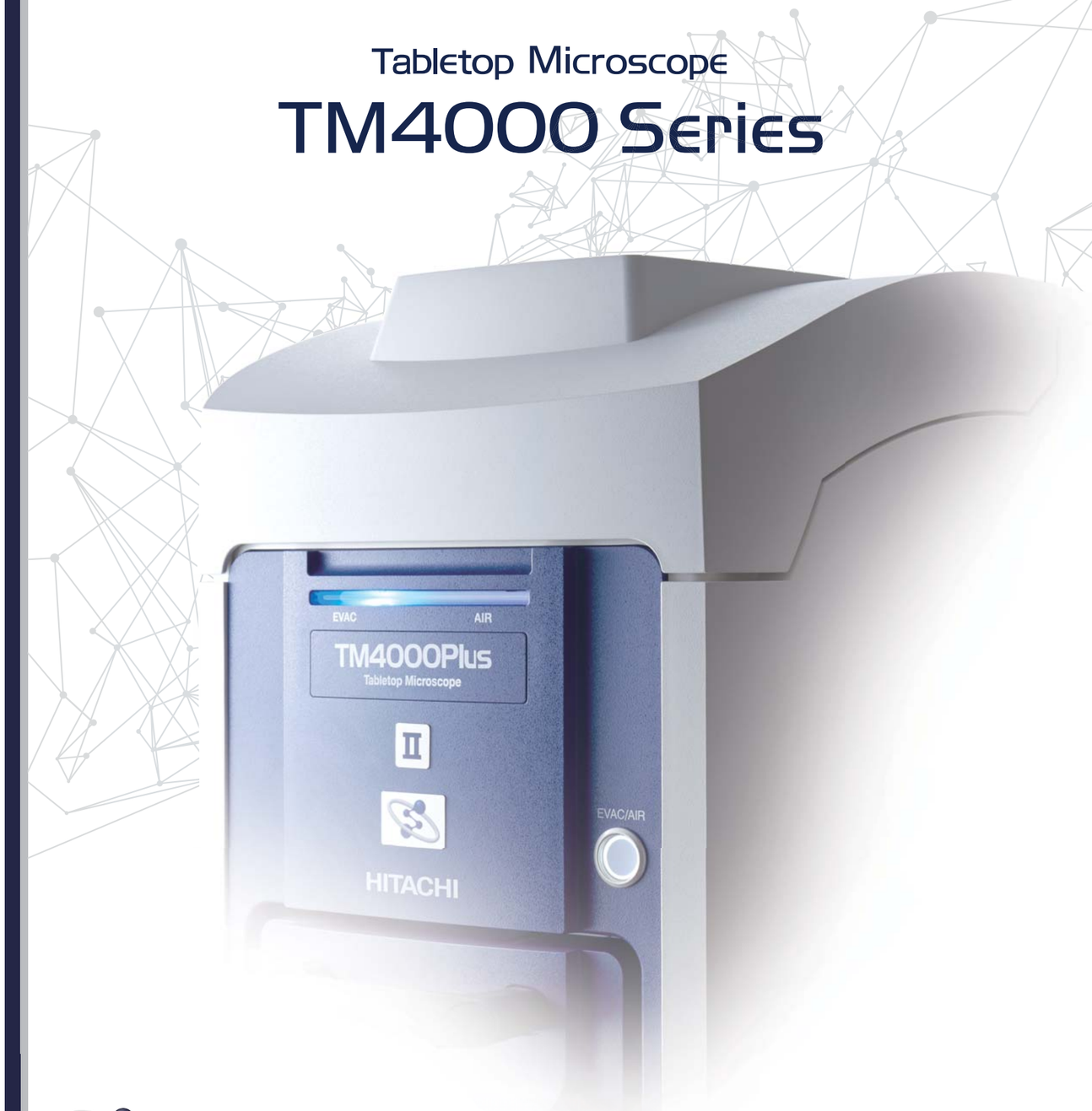
For technical consultation before purchase, please contact:contact@nst.hitachi-hitec.com

HTD-E374 2020.1

Tabletop Microscope
TM4000 II / TM4000Plus II

HITACHI
Inspire the Next

Tabletop Microscope
TM4000 Series

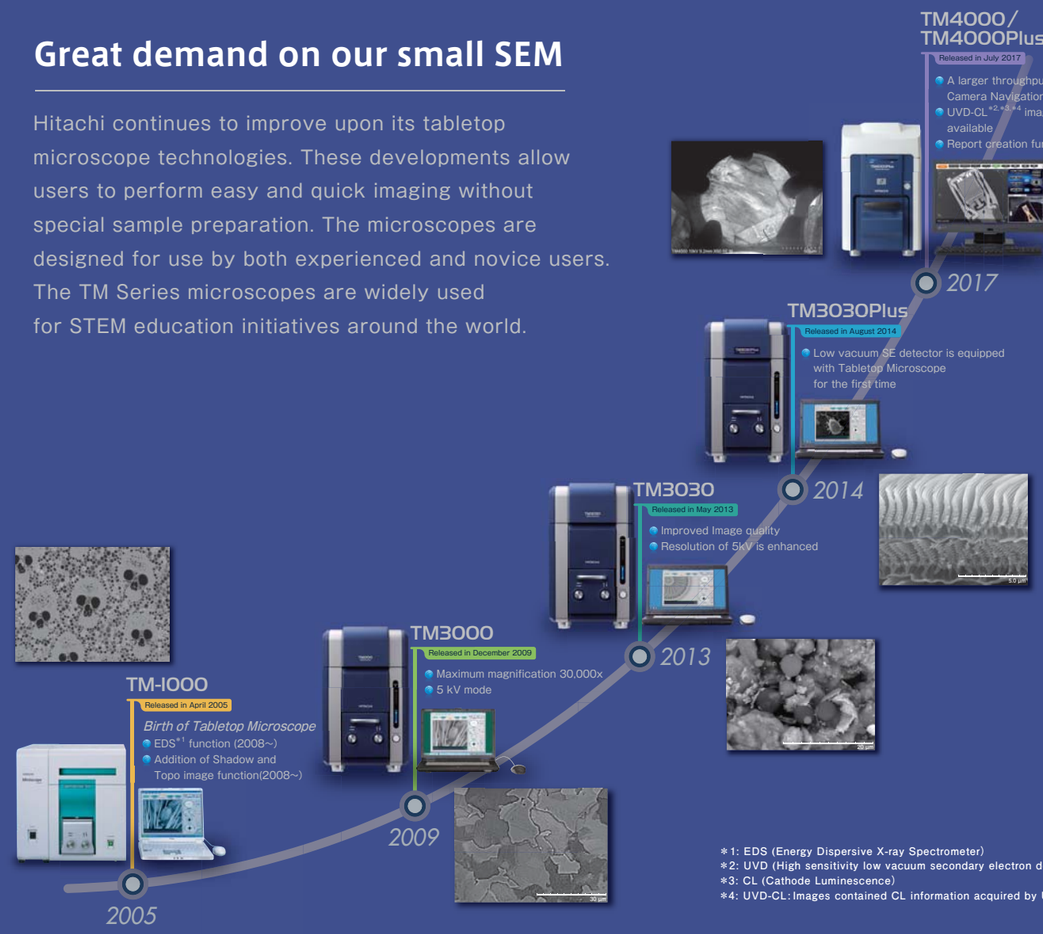


Science for
a better tomorrow

Tabletop Microscope TM4000 Series

Great demand on our small SEM

Hitachi continues to improve upon its tabletop microscope technologies. These developments allow users to perform easy and quick imaging without special sample preparation. The microscopes are designed for use by both experienced and novice users. The TM Series microscopes are widely used for STEM education initiatives around the world.



*1: EDS (Energy Dispersive X-ray Spectrometer)
*2: UVD (High sensitivity low vacuum secondary electron detector)
*3: CL (Cathode Luminescence)
*4: UVD-CL: Images contained CL information acquired by UVD

The image on the screen includes options. ＊Option

Easy & intuitive operation

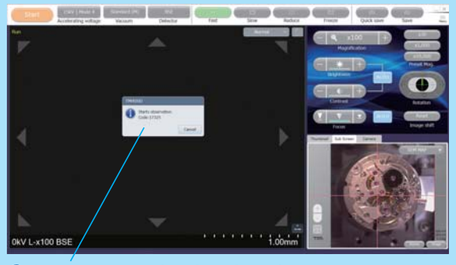
A quality image can be obtained with simple steps.

1 Sample setting

Sample: Movement of watch

2 Sample observation

1 Start Click the start button.



2 Auto start procedure is activated.

3 Image of magnification x100 will be displayed.

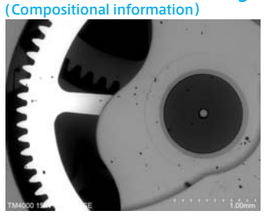
Within several minutes to obtain an image.

Automation, Observation, and Elemental Analysis

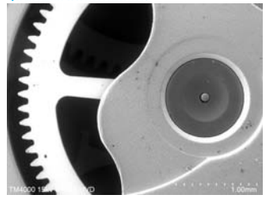
One-click operation

Easy to switch images with one-click.

Backscattered electron image
(Compositional information)



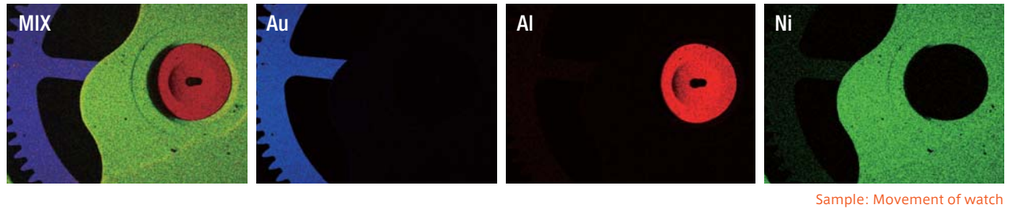
Secondary electron image
(Surface information) *1



Mixed image
(Back scattered electron and Secondary electron images) *1

Compositional analysis

Rapid acquisition of elemental maps*2



Sample: Movement of watch

*1 Secondary electron images and MIX images can only be observed in TM4000Plus II
*2 Option

Intuitive operation on Camera Navi*

Easy operation

Use of optical images helps navigate to target observation area easily. Obtained SEM images can be layered on a SEM MAP image.

Sample: Movement of watch
*Option: Camera Navigation System

Report Creator

Build reports quickly

Simply select images and a template to create a customized reports. Created reports can be saved/edited in Microsoft Office® formats.

Sample: Movement of watch
The image on the screen includes options.

No sample preparation

Non-conductive sample observation under low vacuum status.

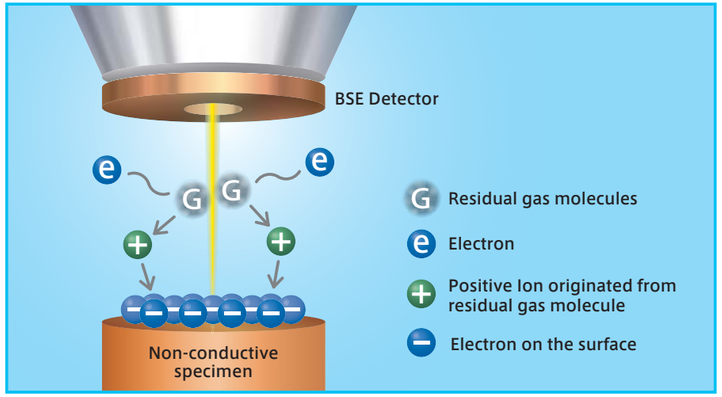
No sample preparation required

Simple observation on water/oil contained samples

When a non-conductive sample is observed under a high-vacuum state, electrons accumulate on the sample surface causing a charging phenomenon, which prevents imaging. In order to reduce phenomenon, samples are usually coated with a thin layer of conductive material prior to observation. This process is not only time consuming, but also interferes with imaging of surface details as well as EDS analysis. The TM4000 II is equipped " Charge-up reduction mode" for saving your time and removing the interferes.

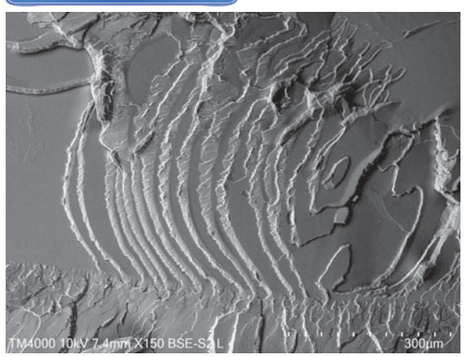
Low-vacuum microscopy

By utilizing a lower vacuum level inside the specimen chamber, more gas molecules are present.
These gas molecules (G) collide with the electron beam to generate positive ions (+) and electrons (e).
Each positive ion (+) can be neutralized by one of the excess electrons (−) on the specimen surface.
This way, the excess electrons on the surface of the sample are removed and the charging is eliminated or reduced.



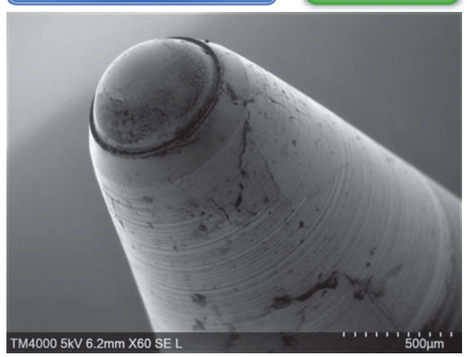
Observation without coating

Non-conductive sample



Accelerating voltage: 10 kV
Image signal: BSE (Shadow)
Magnification: 150x
Sample: Fracture surface of Resin

Water/Oil contained sample TM4000PlusII



Accelerating voltage: 5 kV
Image signal: SE
Magnification: 60x
Sample: Tip of a ball-point pen

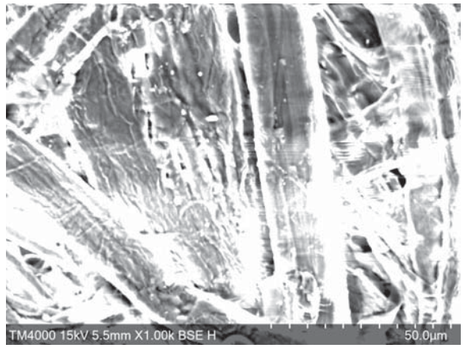
Charge reduction

Charge-up reduction mode

Charge on a sample can be reduced by one-click.

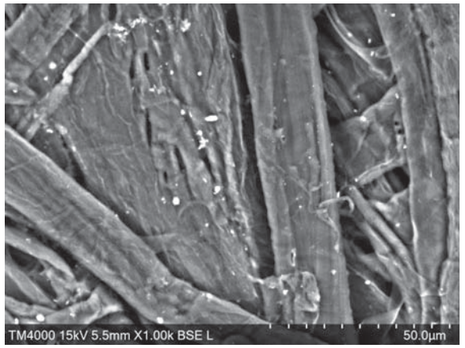
Charge-up reduction Mode

Without charge-up reduction mode



Accelerating voltage: 15 kV
Image signal: BSE
Magnification: 1,000x

With charge-up reduction mode



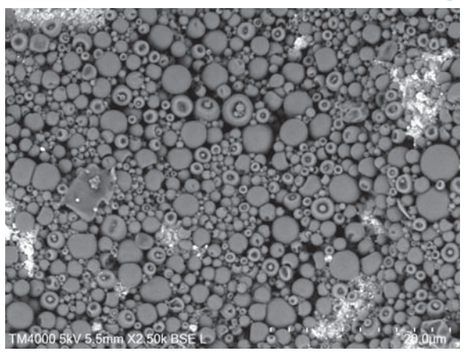
Accelerating voltage: 15 kV
Image signal: BSE
Magnification: 1,000x
Sample: Recycled paper

Surface & Composition observation

Image a variety of materials under low vacuum condition

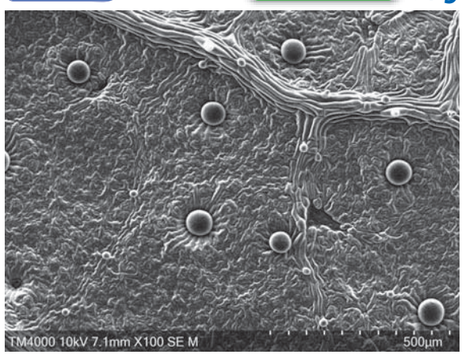
The images show observations of non-conductive samples such as ink toner particles and a hydrated leaf surface.

BSE image ▸P7



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

SE image TM4000PlusII ▸P9



Accelerating voltage: 10 kV
Image signal: SE
Magnification: 100x
Sample: Leaf of plant

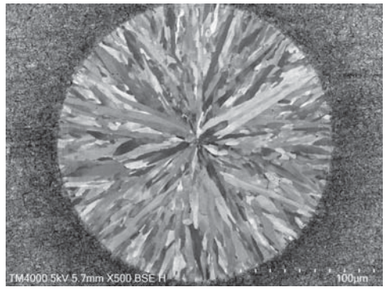
High-sensitivity BSE detector

Various imaging applications using 4- segment BSE detector.

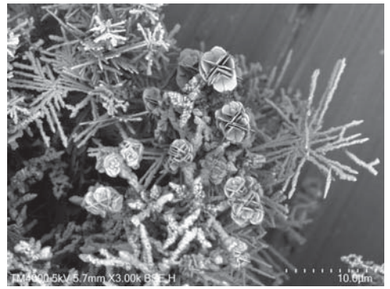
Composition/ Fine structure

Compositional contrast and fine structure observation

The TM4000 Series is equipped with a high-sensitivity four-segments BSE detector which is used to observe the different brightness levels representing composition in the sample or traditional topographic imaging.



Accelerating voltage: 5 kV Sample: Metal wiring
Image signal: BSE Magnification: 500x



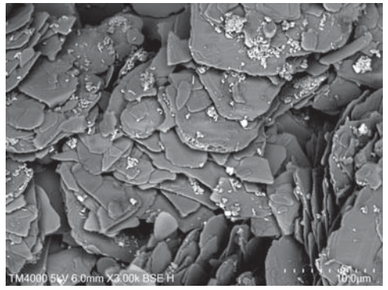
Accelerating voltage: 5 kV Sample: Copper crystal
Image signal: BSE Maghification: 3,000x

5 kV BSE*

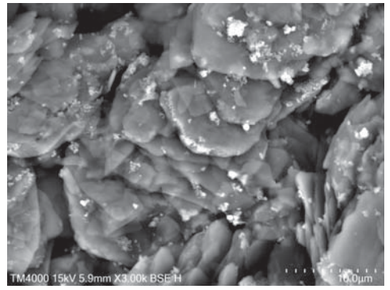
Compositional contrast including surface details using lower accelerating Voltage

Under lower accelerating voltage conditions, the electron signals are generally reduced due to loss of emission and brightness. The TM4000 II Series optimizes the emission across the voltage range to maintain a higher brightness level, even at the lower 5 kV accelerating voltage.

Comparison of BSE images between low and high accelerating voltages



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



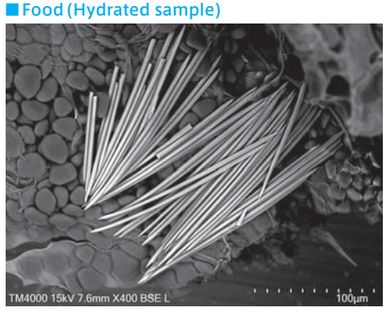
Accelerating voltage: 15 kV Sample: Cosmetic foundation
Image signal: BSE Magnification: 3,000x

*BSE
(Backscattered Electron)

Application example

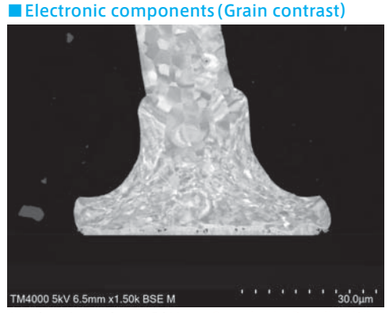
Observation examples using BSE detector

■ Food (Hydrated sample)



Accelerating voltage: 15 kV Sample: Chinese yam
Image signal: BSE
Magnification: 400x

■ Electronic components (Grain contrast)

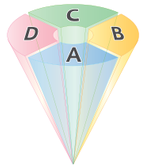


Accelerating voltage: 5 kV Sample: Au Bonding Wire
Image signal: BSE Sample treated by
Magnification: 1,500x Hitachi ion milling system

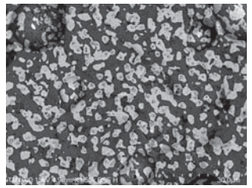
Multi image observation

Multiple images observation

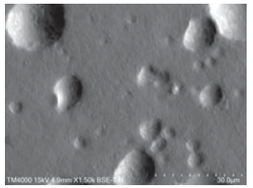
The TM4000 II Series features a backscattered-electron detector with four fully controllable independent segments. By utilizing the segments in different combinations, it is possible to emphasize compositional or topographical detail from the sample, as well as producing 'shadowed' images which highlight the surface from multiple directions.



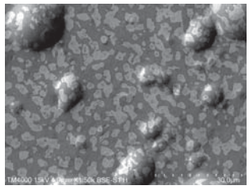
Compo



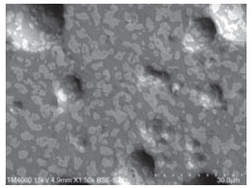
Topo



Shadow 1



Shadow 2



Sample: Solder

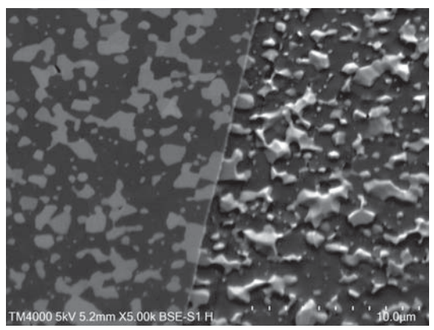
3D functionality

Three-Dimensional image display/ measurement function*

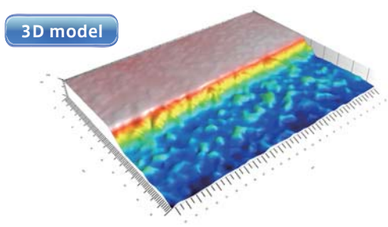
Hitachi map 3D

Three-dimensional images are obtainable without sample tilting or concerns about image shift since this 3D function utilizes the 4-segment BSE detector which can detect images from 4 distinct directions. Surface roughness can be measured easily based on the height measurement between 2 points (line profile), and the entire surface area (3D model).

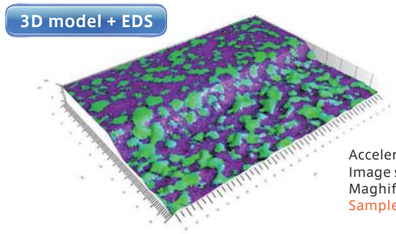
BSE image



3D model



3D model + EDS



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

*Option

Low vacuum SE detector providing sur face detail and topography.

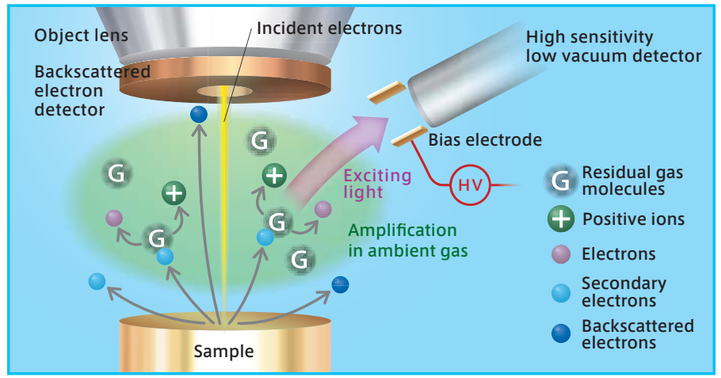
SE imaging under Low vacuum mode

Innovative secondary-electron detector to obtain surface detail with non-conductive samples at lower vacuum conditions

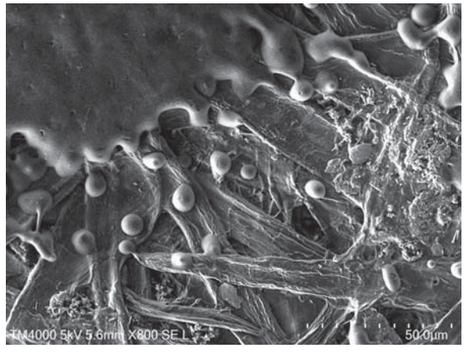
The TM4000Plus II can observe not only conductive samples, but also non-conductive or hydrated samples without sample preparation. Switching between BSE and SE can be performed easily.

High-sensitivity Low vacuum SE Detector (UVD)

Hitachi's UVD generates secondary-electron images by detecting visible light excited by the electron gas interactions.

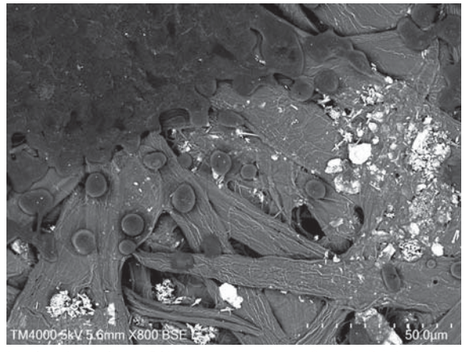


SE image (surface information)



Accelerating voltage: 5 kV
Image signal: SE
Magnification: 800x

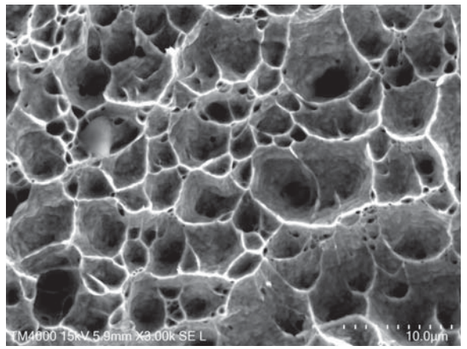
BSE image compotional information



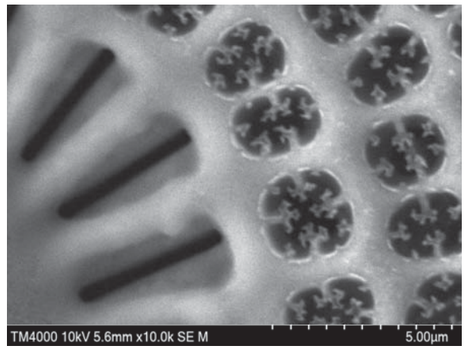
Accelerating voltage: 5 kV
Image signal: BSE
Magnification: 800x
Sample: Printed paper

Application data

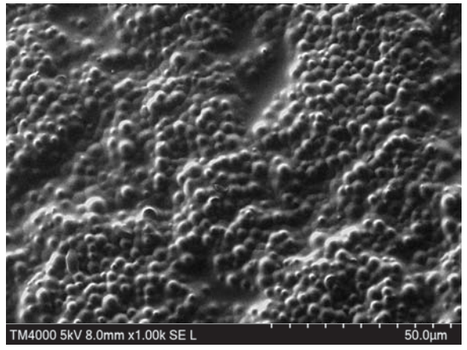
Fine surface structure observation



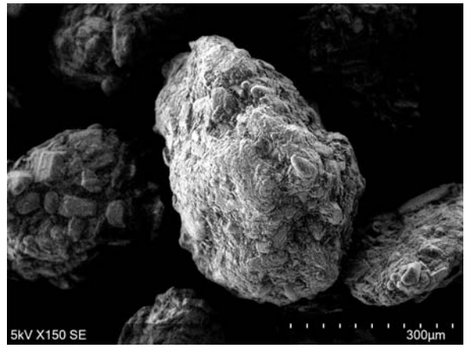
Accelerating voltage: 15 kV
Image signal: SE Magnification: 3,000x
Sample: Metal fracture surface



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



Accelerating voltage: 5 kV
Image signal: SE Magnification: 1,000x
Sample: Functional Film

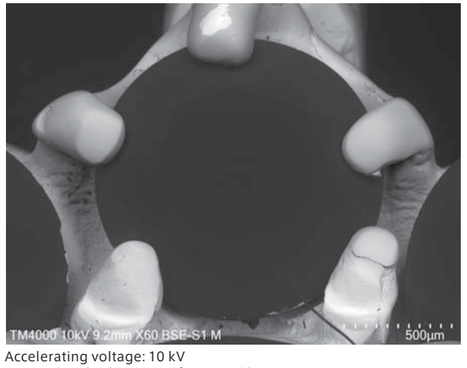


Accelerating voltage: 5 kV
Image signal: SE Magnification: 150x
Sample: Powder Medicine

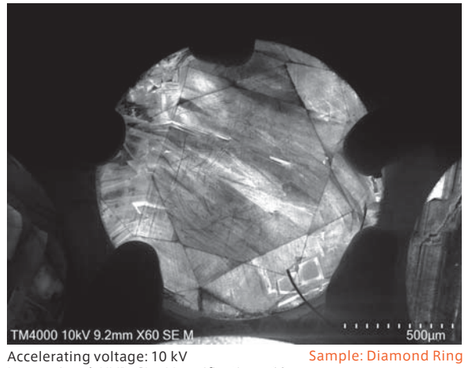
Application data

UVD-CL* image observation

UVD enables to obtain CL information instead of cathode luminescence (CL) detector.
In addition, simultaneous imaging of BSE and UVD-CL becomes possible.



Accelerating voltage: 10 kV
Image signal: BSE Magnification: 60x



Accelerating voltage: 10 kV
Image signal: UVD-CL Magnification: 60x
Sample: Diamond Ring

*UVD-CL: Image contains CL information captured by UVD

Image mixing (BSE+SE)

Simultaneous imaging of various information.

Mix image

A Single image includes both surface and compositional information

The BSE images shows the composition information and the SE image shows the surface information.
By layering the both images in one image as a mixed image, the both composition and surface information of a sample can be observed in one image.

Compositional information (BSE)

Surface detail information (SE)

Mixed image (BSE + SE)

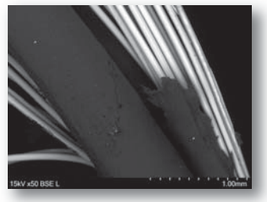
Accelerating voltage: 5 kV
Magnification: 2,000x
Sample: Sandpaper

Application data

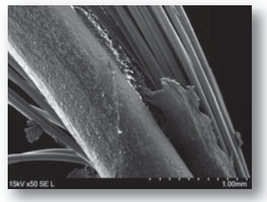
Advantage of mixing images

In addition to imaging of BSE and SE information, TM4000Plus II is capable of layering these images.
Therefore, the both characteristic information can be viewed in on image.
Furthermore, the BSE, SE and mixed image (BSE+SE) can be switched with one-click.

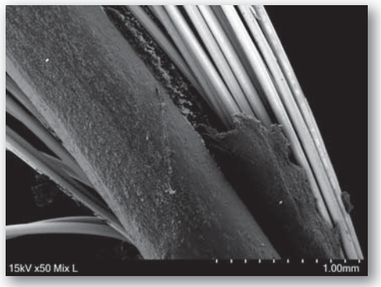
BSE



SE



BSE+SE



Accelerating voltage: 15 kV
Magnification: 50x
Sample: Power cord

Features

New!

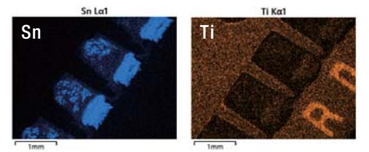
- 20 kV accelerating voltage for improving both imaging and analytical capabilities.
- Multi Zigzag for large area or multiple areas.

Advantages of 20 kV accelerating voltage

High accelerating voltage enables higher-speed EDS analysis.

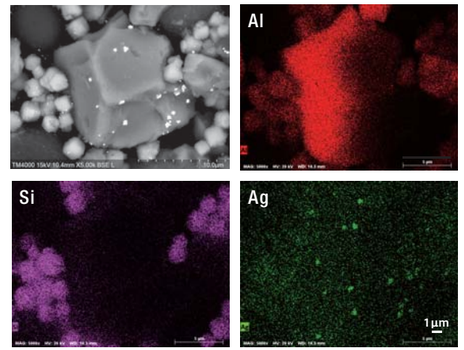
EDS mapping data at 20 kV in 2 min

20 kV accelerating voltage



Sample: Electronic components

EDS mapping data of Ag nano particles



Magnification: 5,000x Sample: Sprayed powder

Multi Zigzag*

A function that takes multiple high-magnification images and stitches them together to create a single high-resolution image.

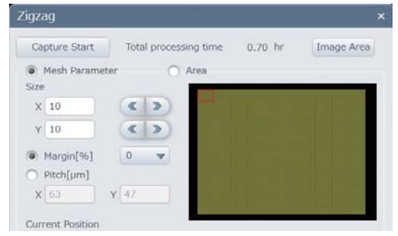
〈Optical image〉

〈Stitching〉

Acceleration voltage: 15 kV
Image signal: SE
Magnification: 30x
Field of view 10 vertically×12 horizontally
(some parts were trimmed)
Sample: Japanese ancient coin

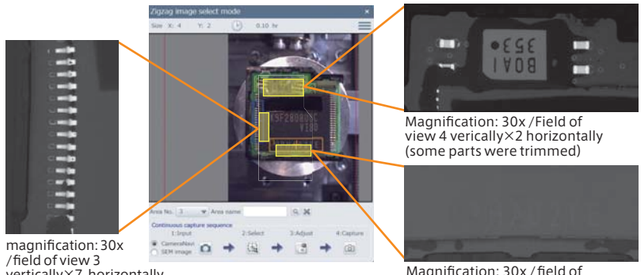
Zigzag conditions

Setting matrix parameters for image array such as field of view, number of images, pitch, and overlay from menu.



Zigzag specification

Multiple fields and locations can be specified for each sample.



magnification: 30x
/field of view 3
vertically×7 horizontally
(some parts were trimmed)

Magnification: 30x /Field of view 4 verically×2 horizontally (some parts were trimmed)

Magnification: 30x / field of view 4 vertically×2 horizontally (some parts were trimmed)

Sample: Electronic components

*Option for motor drive stage

Various EDS for elemental analysis.

Quantax 75

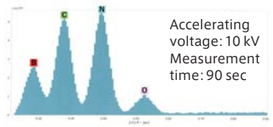
Produced by Bruker nano GmbH

High energy resolution detector and advanced user friendly analysis software.

Sample configuration in combination with a TM4000 series instrument

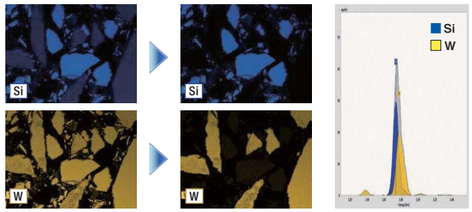
High-energy resolution detector

The high-energy resolution detector allows light elements such as boron to be analyzed with high accuracy.



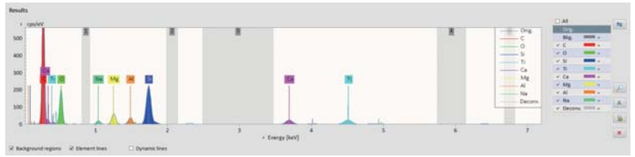
Live deconvolution to separate overlapping elements

Allows spectra with overlapping peaks to be separated and visually mapped in real time.



Peak fitting function

Automatic background subtraction and peak fitting (automatic/arbitrary) provide highly reliable element identification. To be able to estimate the self-measurement conditions, electron beam penetration depth, spread, and density in the actual sample, it is possible to simulate the actual measurement area.



Element

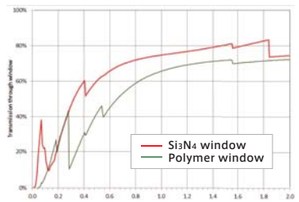
Advanced EDS features for tabletop SEM

Produced by EDAX Inc.

Sample configuration in combination with a TM4000 series instrument

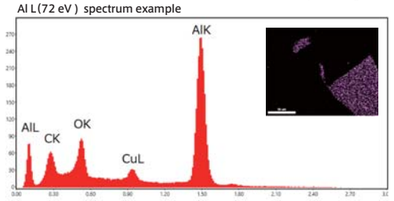
Si_3N_4 Window

Si_3N_4 Window to optimize low energy X-ray transmission for light element analysis. Compared with conventional detector window, there is improved mapping speed and detection limit.



High X-ray transmittance

Al L(72 eV) spectrum example

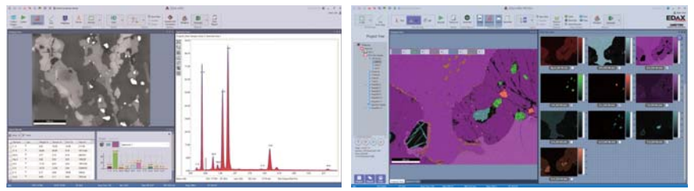


Extreme low energy detection

Hexagonal support grid for increased transmission

APEX Software

- Easy to Interpret Data
- Multi user logins
- User configurable windows
- Customizable reporting
- Simplified automation
- Fast mapping
- Collect/Review simultaneously
- Spectrum Match Libraries



Aztec Series

- Live Spectrum Viewer with Automatically labelled peaks can be shown. (AZtecLiveOne)
- High-throughput analysis with high-precision pile-up correction function and TruQ™ Technologies.
- TruMap generates element maps that peak overlaps removed in real time.

Produced by
Oxford Instruments NanoAnalysis

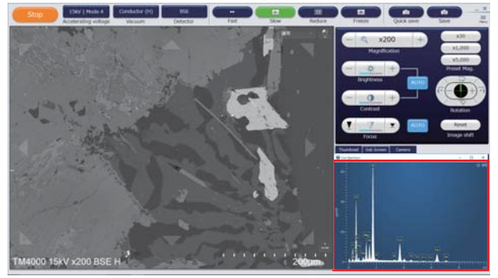
Sample configuration in combination with a TM4000 series instrument

Live EDS function

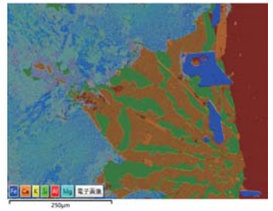
Live Spectrum View is available on the TM4000 User Interface to see the X-ray spectrum with Automatically labelled peaks. It allows you to confirm elemental information with secondary electron images and/or backscattered electron images, even while moving around your sample.

AZtecLiveOne

Live EDS spectrum



Mapping Image

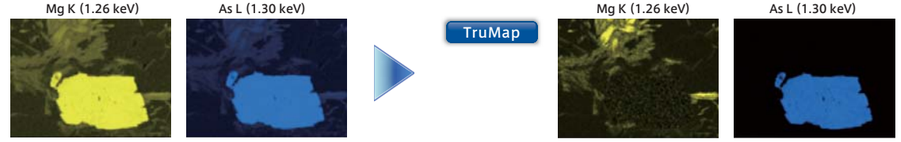


High precision/ Highly reliable TruMap

The TruMap feature allows multi-element spectra to be properly separated and background subtracted in real time, resulting in a precise elemental map with no image contamination due to overlapping peaks.

AZtecLiveOne: standard feature
AZtecOne: Option

Typical ROI MAP



Sample: Sulfide ore

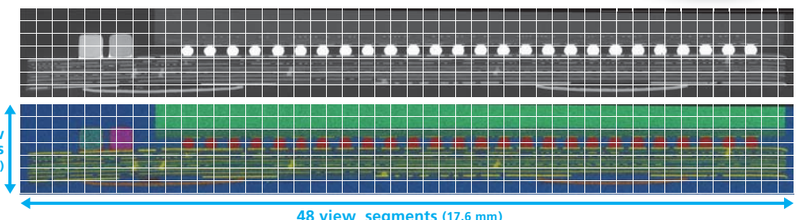
Advanced Analysis Functions

The AZtecEnergy system offers advanced analytical functionality and flexible configurations with an ability to automate analysis via a motorized stage. AztecEnergy enables large-area mapping and particle analysis.

AZtecEnergy

Large-area mapping

The mapping software automatically acquires data for multiple specified regions to produce a single combined set of mapping information.



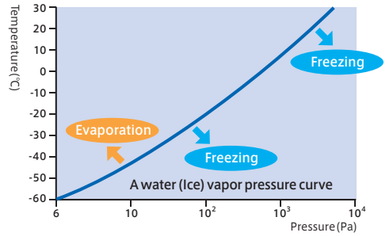
Magnifications: 400x
Sample: Cross section of electronic component

Selection of stages.

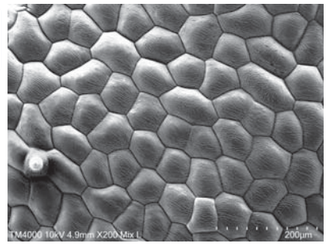
Cooling stage

Produced by Deben UK Ltd.

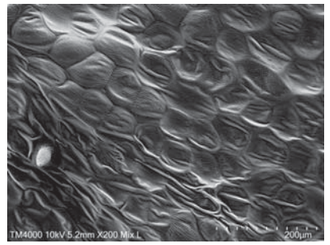
The cooling stage allows samples to be cooled to temperatures as low as -25 ℃ and kept at the temperature up to a few hours.
It is particularly well suited for observation of hydrated samples such as foods and biological tissues, or samples susceptible to thermal damage.



Low temperature Observation



Room temperature observation



Accelerating voltage: 10 kV
Image signal: Mix
Magnification: 200x
Sample: Petal

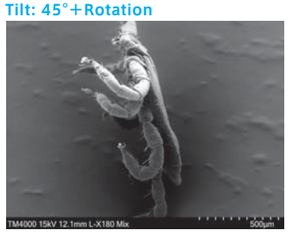
Tilt & Rotation stage

Produced by Deben UK Ltd.

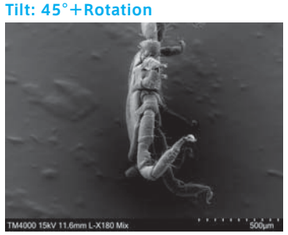
Observation range of 15° to 60° tilting angles and full 360° rotation are available on the tilt and rotation stage.

Tilt: 0°

Tilt: 45°+Rotation



Tilt: 45°+Rotation



Accelerating voltage: 15 kV
Image signal: BSE, Mix
Magnification: 150x
Sample: Haemphysalis longicornis
Sample courtesy of professor
Tomoyuki Shimano, Hosei University

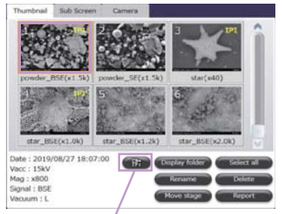
Software for image post-processing.
Easy maintenance.

Image Processing, Measurement, and Analysis Software: Image Pro® for Hitachi

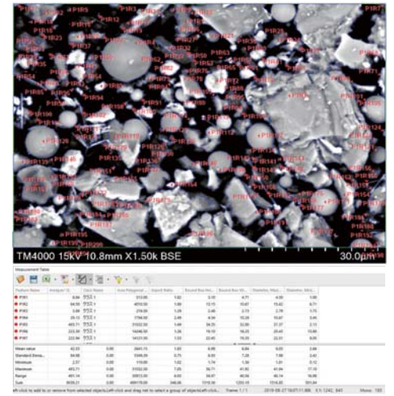
Produced by Media Cybernetics

The TM4000II features integration icon to transfer images into Image Pro® Software with a single click.

Capable to transfer images from SEM software

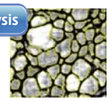


Particle size and distribution analysis example



Binary automatic measurement

Particle Analysis



Fiber measurement

Stitching Image

Easy maintenance

Oil-free vacuum pump and pre centered cartridge filaments are equipped a standard.

Diaphragm pump

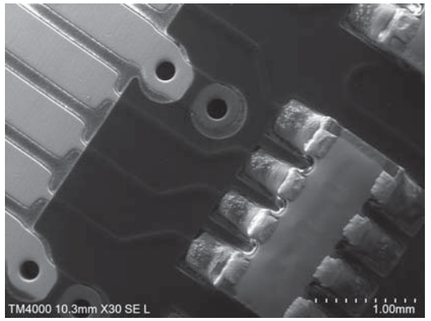
Pre-centered cartridge filament

Maintenance kit available for your daily use.*

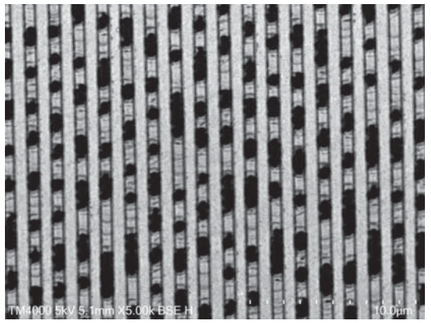
*Option

Application gallery

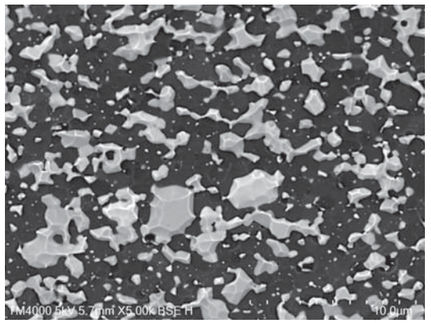
Electronic components



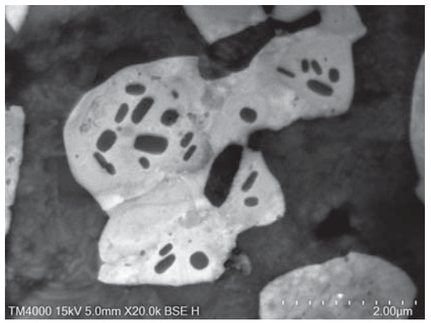
Accelerating voltage: 15 kV Sample : Electronic substrate
Image signal: SE Magnification: 30x



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

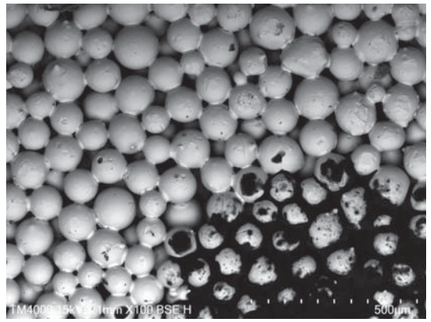


Accelerating voltage: 5 kV Sample: AlTiC
Image signal: BSE Magnification: 5,000x substrate



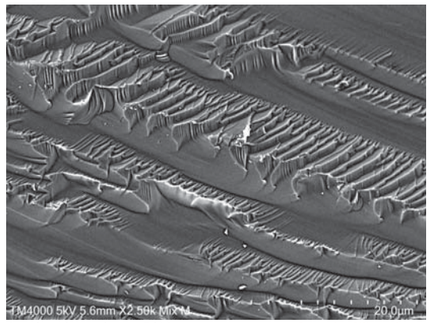
Accelerating voltage: 15 kV Sample: Solder
Image signal: BSE Magnification: 20,000x

Metal & inorganic materials

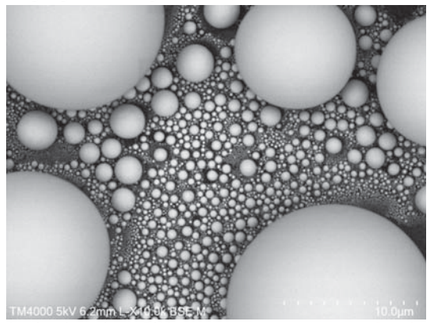


Accelerating voltage: 15 kV Sample: Oil on metal filter
Image signal: BSE Magnification: 100x

Accelerating voltage: 5 kV Sample: Nickel plating
Image signal: BSE Magnification: 1,500x Ion milling used

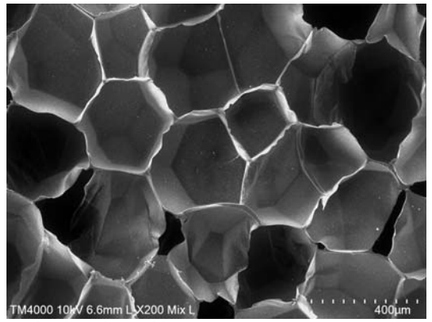


Accelerating voltage: 5 kV Sample: Silicon base
Image signal: Mix Magnification: 2,500x fracture surface

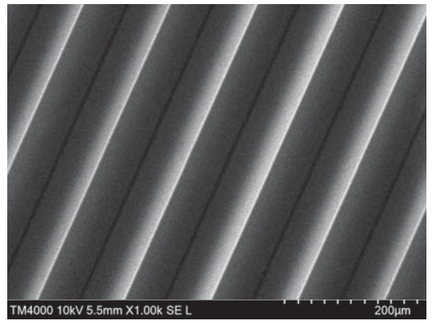


Accelerating voltage: 5 kV Sample:
Image signal: BSE Magnification: 10,000x Tin particles

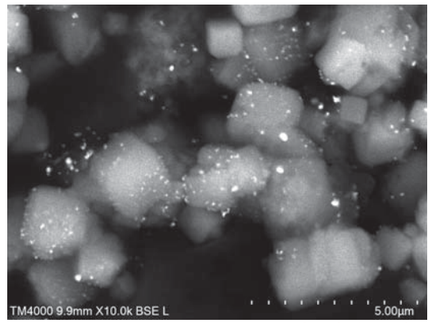
Processed product



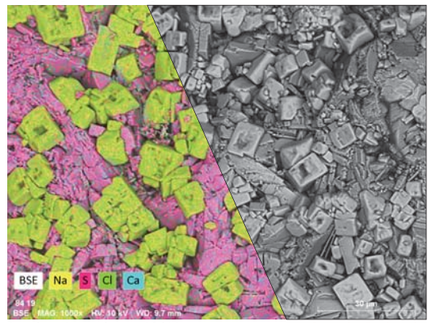
Accelerating voltage: 10 kV Sample: Form Resin
Image signal: Mix Magnification: 200x



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

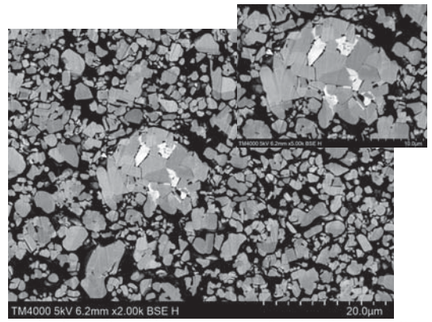


Accelerating voltage: 15 kV Sample: Ag catalyst
Image signal: BSE Magnification: 10,000x in powder spray

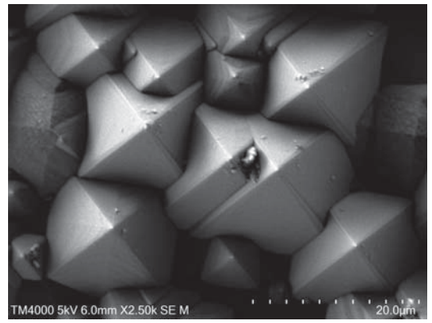


Accelerating voltage: 10 kV Sample: Bath salts
Image signal: Left EDS Mapping Right BSE Magnification: 1,000x

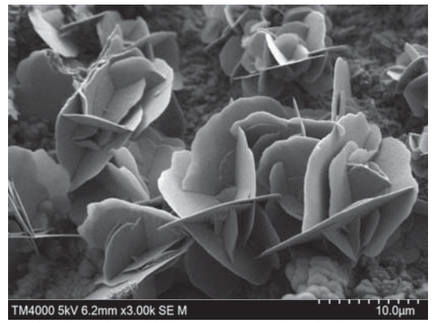
Enviromental & energy material



Accelerating voltage: 5 kV Sample: Lithium Ion battery
Image signal: BSE Magnification: 5,000x Ion Milling used



Accelerating voltage: 5 kV Sample: Solar cell
Image signal: SE Magnification: 2,500x



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

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

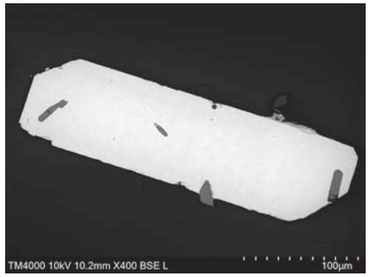
Secondary electron images and MIX images can only be observed in TM4000Plus II ＊Option

Minerals

Zircon UVD-CL[*1] observation example

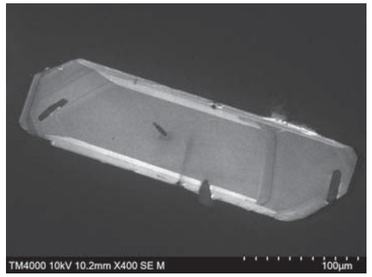
Following are BSE and UVD-CL images of a zircon cross section. Although the compositional difference cannot be confirmed from the BSE image, the UVD-CL image shows the difference via the striped pattern from the emission intensity. This zircon also contains apatite as an inclusion. Zr which is one of the components of "Zircon" and P which is the component of apatite are overlapped in each peak. Normally this combination of elements is difficult to identify with traditional EDS[*2] mapping, but the distribution of Zr and P can be distinguished by using a peak separation mapping.

BSE Image



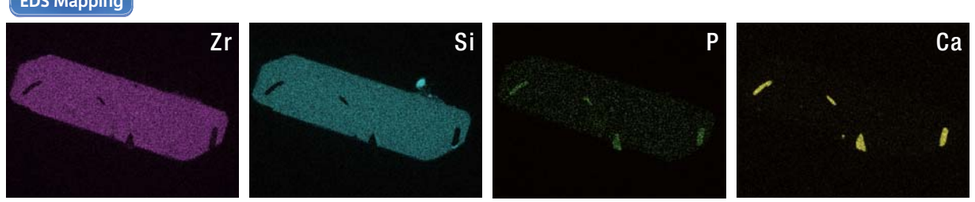
Accelerating voltage: 10 kV
Magnification: 400x

UVD-CL Image



Accelerating voltage: 10 kV
Magnification: 400x

EDS Mapping



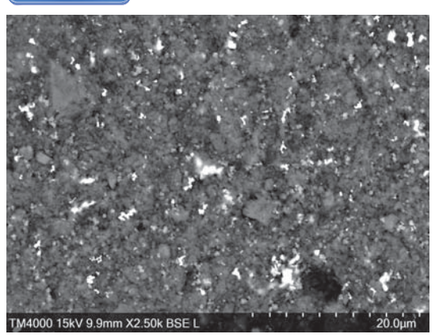
Sample: Zircon

Processed product

UVD-CL[*1] observaiton for fluorescence brightener on paper

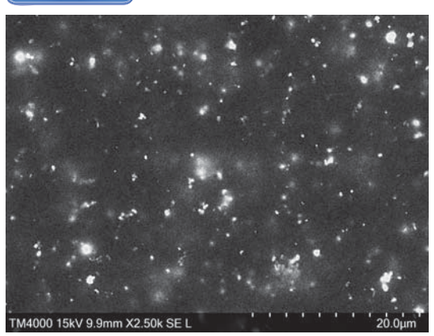
Dispersion of fluorescence brightener which is used for color development on paper is difficult to distinguish between SE and BSE detectors, but UVD-CL allows for these brightener particles to be visible.

BSE Image



Accelerating voltage: 15 kV
Magnification: 2,500x

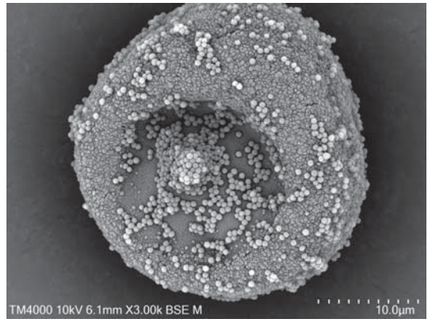
UVD-CL Image



Accelerating voltage: 15 kV
Magnification: 2,500x
Sample: fluorescence brightener

*1 UVD-CL: Image contains CL information captured by UVD *2 Option

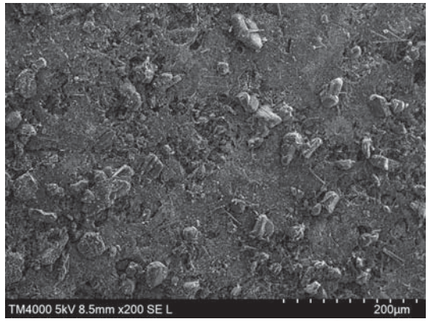
Biology & foodstuffs & Medicine



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

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

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

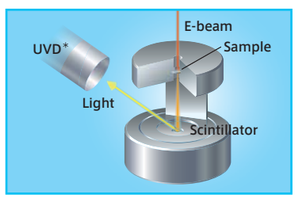


Accelerating voltage: 5 kV
Image signal: SE Magnification: 200x
Sample: tablet

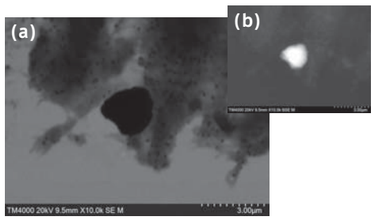
STEM Holder

Easily obtain transmitted images on thin samples

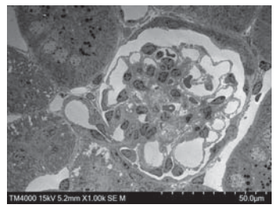
The newly developed STEM holder can be used to perform transmission images with the Hitachi UVD. Images of thin or biological samples can be obtained.



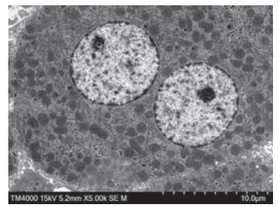
*UVD is a function of TM4000Plus II.



Accelerating voltage: 20 kV
Image signal: (a) STEM, (b) BSE
Magnification: 10,000 x
Sample: Abrasive



Accelerating voltage: 15 kV
Image signal: STEM
Magnification: 1,000 x
Sample: Rat kidney



Accelerating voltage: 15 kV
Image signal: STEM
Magnification: 5,000 x
Sample: Rat liver

UVD is function of TM4000Plus II *Option

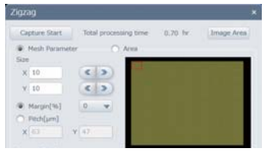
Application gallery

Workflow approach to asbestos analysis

The TM4000 II Series can count and analyze asbestos fibers by using EDS * along with Multi Zigzag.

Step1 ▶ Locating fiber on filter

Multiple fields of view can automatically be captured .



Ease of setting matrix parameters

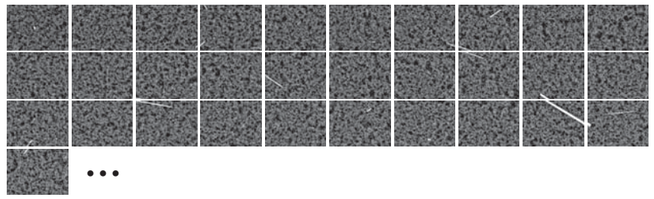
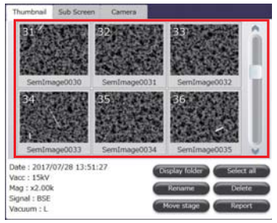
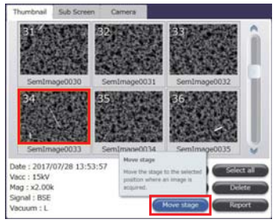


Image signal: BSE
Magnification: 2,000x
Sample: Tremolite (asbestos standard sample)

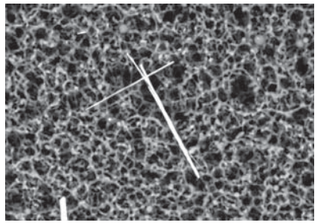
Step2 ▶ confirmation of fiber locations within matrix



Choose thumbnails with fibers

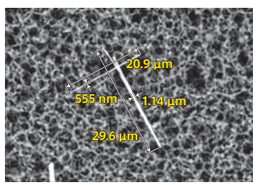


One click takes you to fiber of interest



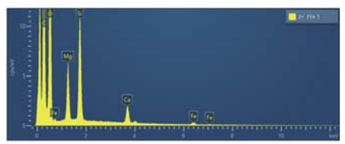
Fine tuning for best image quality

Step3 ▶ Measuring the fiber diameter and elemental confirmation



Confirm aspect ratio and fiber length

Spot analysis for elemental confirmation



Get EDS Spectrum*

＊Option

EDS specification (option)

Quantax75 specification

Made by Bruker nano GmbH

■Detector

Item	Description
Detector type	Silicon drift detector (SDD)
Detector area	30 mm^2
Energy resolution	148 eV(Cu-Kα) (Mn-Kα: equivalent of 129 eV or less)
Detection element	B_5～Cf_{98}
Cooling method	2-stage thermoelectric (peltier) cooling (without fan and LN_2 free)
Energy channel	4,096 channel (2.5 eV/ch at minimum)

■Software

Item	Description
Qualitative analysis	Auto/manual
Quantitative analysis	Standardless quantitative analysis, normalized to 100%
Analysis mode	Object mode (including point, rectangle, ellipse and polygon) Line scan Hypermap (mapping, spot analysis, line analysis)
Element mapping	Maximum map image resolution 1,600x1,200 Rainbow map Online deconvolution
Report preparation features	Templates for printing may be prepared PDF, Microsoft® Word, Excel

■Size/weight

Item	Description
Detector	100 (width) × 45 (depth) × 120 (height) mm, 1.45 kg
Scaning control unit	225 (width) × 230 (depth) × 150 (height) mm, 3.65 kg

■Installation conditions

Item	Description
Power supply	Single-phase AC, 100/240 V 50/60 Hz

Element specification

Made by EDAX Inc.

■Detector

Item	Description
Window type	Silicon Nitride Windows
Type of Sensor	Silicon drift detector (SDD)
Sensor size	30 mm^2
Energy resolution	129 eV (Mn-Kα)
Detection range	Be_4～Am_{95}
Cooling system	Thermoelectric Peltier cooling (fan and LN free) No cooling required when not in use

■Software

Item	Description
Qualitative analysis	Auto/Manual, HPD
Quantitative analysis	Standardless Method, Graph view/Statistics display
Analysis mode	Spectrum (Point, Area, Free Draw, Grid) Linescan (Spectral Linescan, Review and Rebuild) X-ray Map (Spectral Map, Review and Rebuild)
X-ray Map	1,024×800 (Max.) Spectral Map (Review Spectrum, Line from Map, Rebuild Map) Comp Map (Real-time Peak deconvalution map) Quant Map (Concentration map) Drift Collection
Reporting	Report Template for Printing PDF, Microsoft® Word, Excel, PowerPoint

■Size/weight

Item	Description
PC Workstation	169 (width) × 435 (depth) ×356 (height) mm, 12 kg
Detector	100 (width) × 45 (depth) ×120 (height) mm, 0.5 kg
DPP Box	73 (width) × 171 (depth) ×121 (height) mm, 1.6 kg

■Installation conditions

Item	Description
Power supply	Single-phase AC100/240 V 50/60 Hz

Aztec series specification for TM4000 series

Made by Oxford Instruments NanoAnalysis

■Detector

Item	AZtecOne	AZtecLiveOne	AZtecEnergy
Detector Type	Silicon drift detector (SDD)		
Detector Area	30 mm^2		
Energy resolution	158 eV (Cu Ka) (Mn Ka: equivalent of 137 eV)		
Detection Element	B_5～U_{92}		
Thermal Cycle	Detector cool down on demand		
Cooling Method	2 stage thermoelectric cooling (without fan/LN_2 free)		

■Software

Item	AZtecOne	AZtecLiveOne	AZtecEnergy
Live spectrum	—	Live Spectrum Monitor on Viewer window with automatically labelled peak	Live Spectrum Monitor on Mini View with automatically labelled peak
Spectrum display	Scaling display in horizontal and vertical directions, KLM markers and/or peak profile displayed		
Qualitative analysis	Auto / Manual by TruQ™ technology, Pulse Pile		
Quantitative analysis	Standard less analysis by XPP correction, 100% normalized		
Image acuisiton	2,048×1,536, 1,024×768, 512×384		64 - 8,192 pixels
Element mappping	1,024×768, 512×384, 256×192, 128×96, Tiled or Layered view layered Image: No limit on the number of X-ray maps that can be overlaid on SEM image Reconstruct Spectrum from mapping during/after acquisition		64 - 4,096 pixels layered Image: No limit on the number of X-ray maps that can be overlaid on SEM image Reconstruct Spectrum from mapping during/after acquisition
Line Scan	Arbitrary line position and direction may be specified; The colour and thickness of the Linescans for each element may be changed. Linescans can be viewed in a Vertical tiled,Stacked or table of values Spectra can be reconstructed from any point on the linescan		
Point & ID	Acquire from point, rectangle, ellipse or freehand Overlap a spectrum from any project in the Data Tree over the current spectrum		
TruMap	optional	Overlap and background corrected mapping and LineScanning during/after acquisition	optional
Assistance	Operation guide functionality		
Data management	Data saved in individual projects		
Report preparation	Quick and easy reporting functionality ・Content selectable via radial buttons ・Exports in Microsoft® Word format (reports can be viewed in free Microsoft viewer)		Comprehensive list of Report templates that can be exported in Word and Excel format Image, Maps and Spectra can be saved as selectable image files with user control over resolution and format
Option	—	—	TruMap (TruLine), AZtec Large Area Mapping, AZtec Feature, etc,

■Size/weight

Item	AZtecOne	AZtecLiveOne	AZtecEnergy
Detector	145 (width) × 150 (depth) × 200 (height) mm, 2.7 kg		
Analyzer unit	290 (width) × 260 (depth) × 330 (height) mm, 10 kg		Mics F+ ; 180 (width) × 260 (depth) ×330 (height) mm, 2.6 kg X-stream2: 180 (width) × 260 (depth) ×330 (height) mm, 2.6 kg

■Installation conditions

Item	AZtecOne	AZtecLiveOne	AZtecEnergy
Power supply	Single Phase AC, 100-240 V, 50/60 Hz, 400 VA		Single-phase AC, 100-240 V, 50/60 Hz, 1,500 VA