

## TM3030 specification

### ■ Specifications

Items	Description
Magnification	15 to 30,000× (digital zoom: 2×, 4×)
Observation condition	5kV/15kV/EDX
Observation mode	Standard mode Charge-up reduction mode
Image mode	COMPO/Shadow 1/Shadow 2/TOPO
Sample stage traverse	X: ±17.5mm, Y: ±17.5mm
Maximum sample size	70mm in diameter
Maximum sample height	50mm
Electron gun	Pre-centered cartridge filament
Signal detection system	High-Sensitivity semiconductor 4-segment BSE detector
Auto image adjustment function	Auto start, Auto focus, Auto brightness/contrast
Frame memory	640 × 480 pixels, 1,280 × 960 pixels
Image data memory	HDD of PC and other removal media
Image format	BMP, TIFF, JPEG
Data display	Micron marker, micron value, date and time, image number and comments, Image mode, Observation condition, D* (Distance), Observation mode
Evacuation system (vacuum pump)	Turbomolecular pump: 30l/s × 1 unit, Diaphragm pump: 1m <sup>3</sup> /h × 1 unit
Operation help functions	Raster rotation, Magnification preset (two steps) Image shift (±50μm @ D*≈4.5mm)
Safety device	Over-current protection function, built-in ELCB

\*D (Distance) is defined as the distance between lower surface of a high-sensitive semiconductor BSE detector and sample surface.

### ■ Required PC specifications

Items	Description
OS	Windows7 Professional (32/64bit version)
CPU	Intel®Core™ i5-2520M (Equivalent or higher)
Memory	2GB minimum
Display resolution	1,280×800 pixels or 1,366×768 pixels
Display size	15-Type display
Interface connector	Installing USB2.0 and PC-card slot (IEEE1394 (6pin) for Oxford EDX is indispensable.)
Memory device	With HDD DVD-ROM Drive
Other	More than 100MB of free space in HDD is required

\*An associated PC to be procured locally.

\*Windows is a registered trademark of Microsoft Corporation in the United States and/or other countries.

\*Intel is a registered trademark of Intel Corp. or its affiliated companies in the United States and/or other countries.

\*Specifications of a PC are subject to change.

### ■ Dimensions and weight

Items	Description (Width × Depth × Height, Weight)
Main unit	330 × 606 × 565mm, 63.0kg (manual stage) 330 × 630 × 565mm, 66.0kg (motor drive stage)
Diaphragm pump	145 × 256 × 217mm, 4.5kg

### ■ Optional Accessories

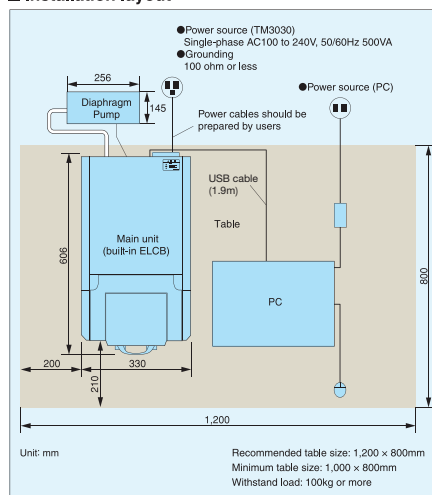
Energy Dispersive X-ray spectrometer (EDX)  
3-dimensional image display/measurement function 3D-VIEW  
Cool stage  
Tilt & Rotate stage

### ■ Installation condition

Items	Description
Room temperature	15 to 30°C (Δt=±2.5°C/h or less)
Humidity	45%-70%RH
Power source (TM3030)	Single-phase AC100 to 240V (Minimum: 90 [V], Maximum: 250 [V])
Grounding	100 ohm or less

\*Another power source for PC is required.

### ■ Installation layout



\*A table with casters is not suitable to put a main unit of TM3030 on.

\*Recommended table size: 1,200 × 800mm, withstand load: 100kg or more.

\*Periodical maintenance is required for this apparatus.

\*Limited to indoor operation.

\*TM3030 is not approved as a medical device.

\*Powercables, earth terminal and table should be prepared by users.

\*Please put a diaphragm pump under the table.

\*Please make room for more than 200mm to the left side of a main unit and put it the closest to the center position of the table.

\*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.

## Hitachi Tabletop Microscope TM3030

**Hitachi High-Tech**  
HITACHI

Gateway to Innovation

## Tabletop Microscope



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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**Hitachi High-Technologies Corporation**

Tokyo, Japan

<http://www.hitachi-hitec.com/global/em/>

24-14, Nishi-shimbashi, 1-chome, Minato-ku Tokyo, 105-8717, Japan

For technical consultation before purchase, please contact: [contact@nst.hitachi-hitec.com](mailto:contact@nst.hitachi-hitec.com)

HTD-E209 2013.5

Tabletop Microscope is further improved and explores the world.

A New Dimension in Image Quality.

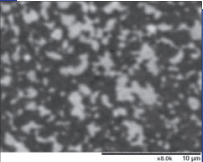
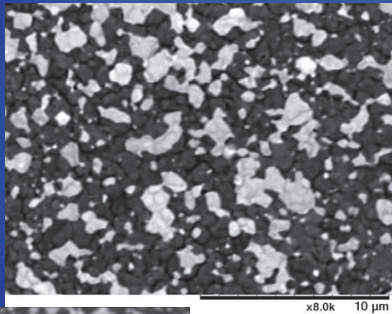


Screen shows simulated image

NEW

5kV mode

Surface detailed image resolution enhanced.  
TM3030



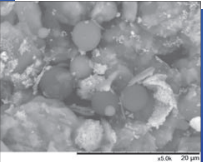
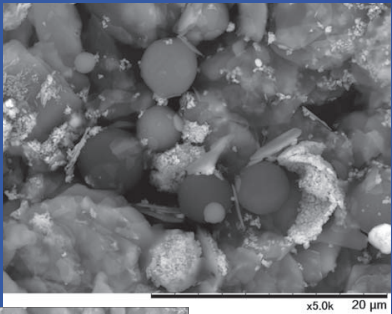
Conventional model (TM3000)

5kV, standard mode  
Magnification : x8,000  
Specimen : Magnetic head

NEW

Enhanced sharpness & contrast capability

Image quality being sharpened and enhanced.  
TM3030



Conventional model (TM3000)

15kV, charge-up reduction mode  
Magnification : x5,000  
Specimen : Foundation

Refer to page 9.10

Tabletop Microscope TM3030

Ease of Use

Simple operation  
with extensive auto functions

▶ P3

No Sample  
Preparation

No need for specimen coating  
with TM3030's charge-up reduction

▶ P5

Multi-observation modes  
switchable with just one-click

No adjustment is required  
when switching between modes

▶ P7

NEW

Unparalleled  
Image Quality

Optimized electron optics,  
enhanced observation capability

▶ P9

Multi purpose  
observation

Directional imaging using  
the 4-segment detector

▶ P11

Variety of  
optional accessories

EDX, 3D-VIEW, & Cool Stage, etc.

▶ P17

## Ease of Use

# Compact and portable, with incredibly simple operation.

With a width of just 330mm, laptop-PC based operation and no special installation requirements the TM3030 can be installed almost anywhere. Comprehensive auto-functions ensure it can also be used by anyone.



## Tabletop installation

The space saving and lightweight design of TM3030 means it can be conveniently installed on a table\*. No cooling water is needed, so installation is quick and easy and requires only a standard 100-240V AC power supply.

\* requires a table capable of supporting 100kg.



\* Typical configuration of TM3030 with PC. \* Screen shows simulated image.



70×50mm

## Large specimen handling

The large specimen stage allows mounting of a specimen up to 70mm diameter and 50mm thick. X/Y specimen motion: ±17.5mm

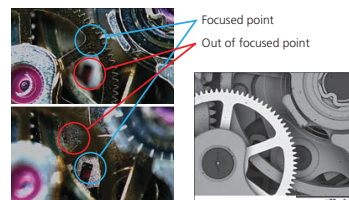


Recommended to put gloves to avoid contamination.



## Topographic imaging with a large depth of focus

Complex specimen structures are easily observed with a resolution and depth of focus far beyond what is achievable by optical microscopy.



Optical microscope image

TM3030 image

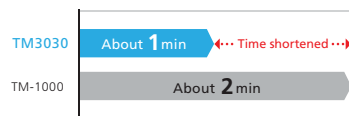
Specimen: Movement of wristwatch



## Fast specimen exchange

The high-performance vacuum system provides fast pumpdown and chamber venting. It takes 1 minute to vent the TM3030 specimen chamber, twice as fast as the TM-1000.

Comparison of chamber venting time



## Environmentally-friendly pumping system

The TM3030 features a dry (oil-free) vacuum system, consisting of a diaphragm pump for rough evacuation and a high performance turbo-molecular pump for main pumping.



\* Typical configuration of TM3030 with PC. \* Screen shows simulated image.

Tabletop Microscope TM3030

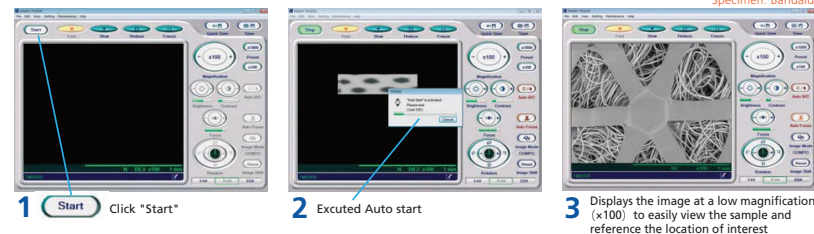
# Tabletop Microscope TM3030



## Comprehensive auto-functions, with one-click "Start".

Imaging with the TM3030 couldn't be simpler. Pressing the "Start" button automatically turns on the beam, adjusts focus, brightness and contrast, as well as displays the image at an easy-to-view starting magnification of x100.

Specimen: Bandaid



## Smooth magnification adjustment

Since magnification is increased simply by narrowing the scanned area, continuous magnification adjustment from x15 to x30,000 is achieved by clicking and dragging the mouse. This makes it quick and easy to find the area of interest.

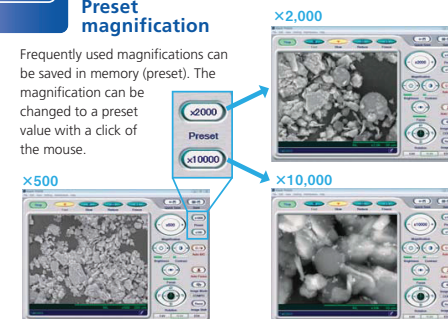


Specimen: Cloth

## Preset

## Preset magnification

Frequently used magnifications can be saved in memory (preset). The magnification can be changed to a preset value with a click of the mouse.



Specimen: Foundation



## Tools for measurement and annotation

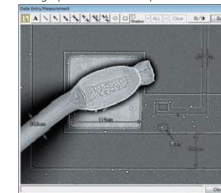
### Distance measurement

Distance can be quickly and easily measured by dragging the mouse between two points of interest.

### Graphics/comment input

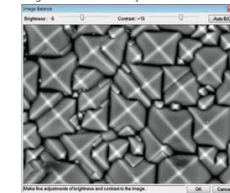
Simple graphics and comments can be added to the image.

Simple length measurement and graphics/comment input



Specimen: Wire bonding

Brightness/contrast adjustment window



Specimen: Solar battery



## No Sample Preparation

# Versatility is assured - with a wide magnification range and multiple operating conditions.

Not only can surface details be observed without any specimen preparation (such as metal coating), there is also a quick turnaround time for beam and vacuum sensitive materials. The TM3030 has the ability to utilize a low vacuum environment which allows for non-conductive, water and oil-based samples to be observed in their natural state.

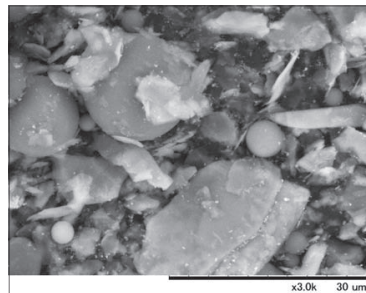
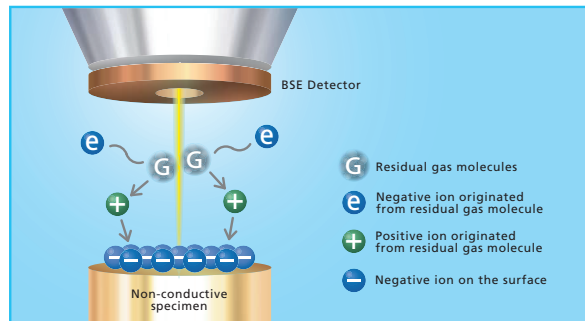


## Image non-conducting specimens with ease.

When a non-conductive sample is observed with a high-vacuum SEM, electrons accumulate on the specimen surface causing a charge-up phenomenon. Charging prevents imaging. In order to resolve the charge, the sample is usually coated with a thin layer of metal prior to observation. This process is not only time consuming, but also interferes with optical imaging of surface details as well as EDX analysis. The TM3030 overcomes this problem with "charge-up reduction mode." This mode uses low-vacuum functionality to dissipate the charge.

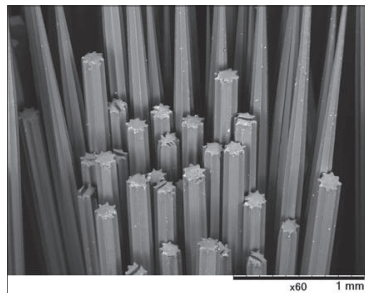
## Low-vacuum microscopy

By utilizing a low vacuum level inside the specimen chamber, more gas molecules are present. These gas molecules  $G$  can collide with the electron beam to generate positive ions  $+$  and electrons  $e$ . Each positive ion  $+$  can be neutralized by one of the excess electrons  $e$  on the specimen surface. In this way the excess electrons on the surface of the sample are removed and the charge-up effect is eliminated or reduced.



5kV, charge-up reduction mode  
Magnification: x3,000

Specimen: Face powder



EDX, charge-up reduction mode  
Magnification: x60

Specimen: Tooth brush

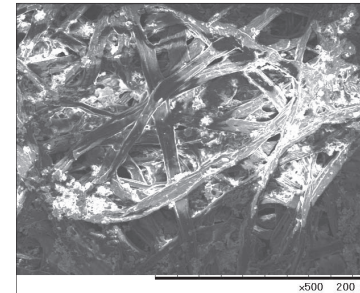


Down

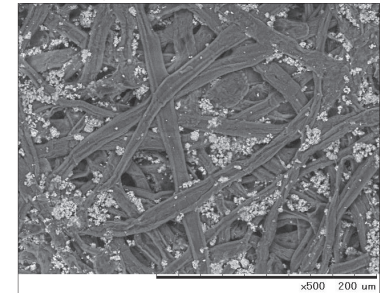
## Charge-up reduction mode

The TM3030 can operate either in "standard mode" or "charge-up reduction mode" depending on the extent of the specimen charging.

### With image artifact due to charge-up



### Without image artifact due to charge-up



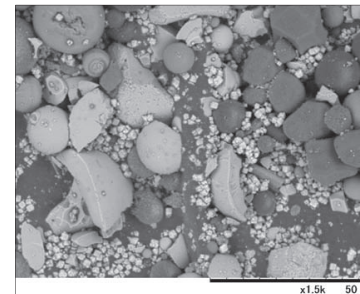
Charge-up reduction mode

Specimen: Recycled paper



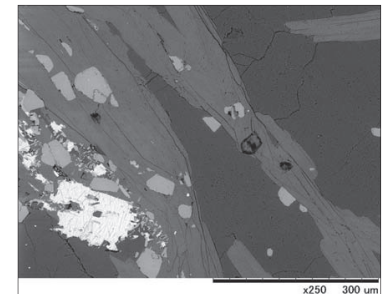
## Compositional imaging

In addition to traditional topographic imaging, the TM3030 can produce compositional images, where the different brightness levels represent different composition in the sample. In this mode, higher brightness corresponds to higher atomic number.



15kV, charge-up reduction mode  
Magnification: x2,000

Specimen: Powder spray



EDX, charge-up reduction mode  
Magnification: x250

Specimen: Garnet-muscovite-albite schist

Specimen courtesy of:  
Nagoya University Museum  
Designated Prof. Mamoru Adachi

Tabletop Microscope  
TM3030



Multi-observation modes  
switchable with just one-click

## Three independent observation condition modes.

The TM3030 features three beam conditions to choose from depending on the information required in the image. The '5kV', '15kV' and 'EDX' modes greatly simplify operating condition setup, and no adjustment is required when switching between modes.

5 kV

[ 5kV Accelerating voltage ]  
emphasizes surface detail

15 kV

[ 15kV Accelerating voltage ]  
can be used throughout the  
magnification range and gives  
the best resolution

EDX

[ 15kV Accelerating voltage ]  
with large current mode  
used for elemental analysis or  
low contrast specimens

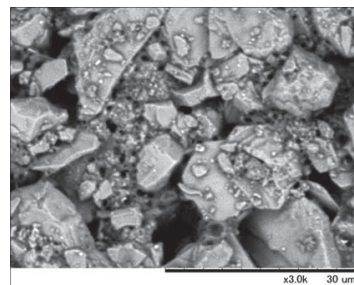
### Accelerating voltages

By providing different accelerating voltages in '5kV' and '15kV' modes, and using the high sensitivity backscattered electron detector, different types of imaging are possible with the TM3030. An accelerating voltage of 15kV is used for most imaging applications and offers the best resolution. At 5kV, the electron beam does not penetrate so far into the sample, so the images show more surface detail.

#### Accelerating voltage and image quality

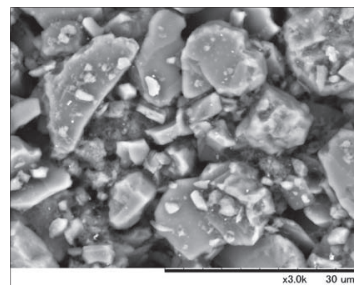
Accelerating voltage	5kV	15kV
Resolution	Lower	Best
Image information	Surface	Subsurface
Beam damage	Low	High

Accelerating  
voltage  
5kV



5kV, charge-up reduction mode

Accelerating  
voltage  
15kV



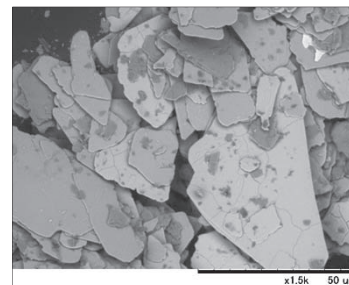
15kV, charge-up reduction mode

Specimen: Tooth paste

## Tabletop Microscope TM3030

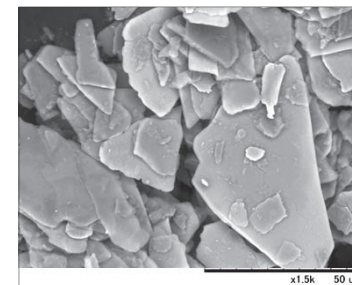
### Difference in image appearance using different observation condition modes

Accelerating  
voltage  
5kV



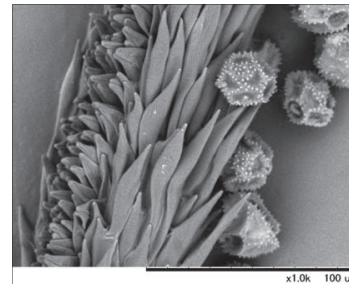
x1.5k 50 um

Accelerating  
voltage  
15kV

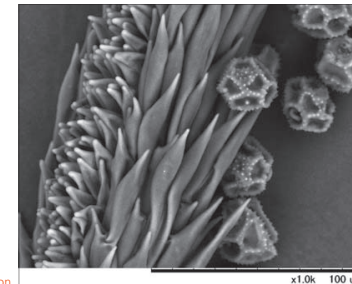


x1.5k 50 um

Specimen:  
Eye shadow

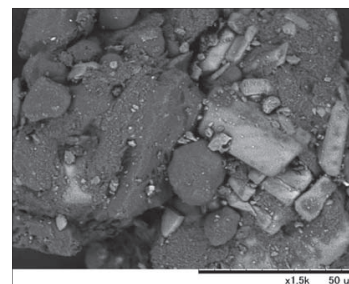


x1.0k 100 um

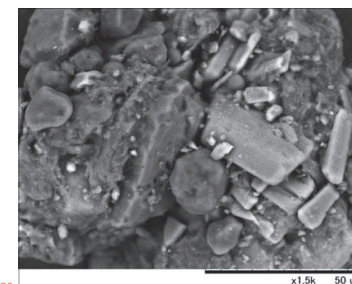


x1.0k 100 um

Specimen:  
Pistil of dandelion



x1.5k 50 um



x1.5k 50 um

Specimen:  
Powdered medicine

**NEW**  
Unparalleled  
Image Quality

## Surface detailed image resolution enhanced.

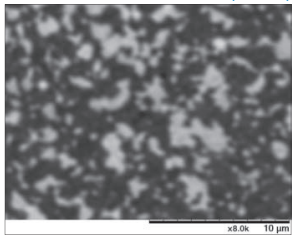
Thanks to optimized electron-optics, 5kV observation is further enhanced throughout high magnifications.

### 5kV mode

The 5kV accelerating voltage allows for observation of surface details, it not only offers traditional topographic imaging but also compositional imaging information. The 5kV observation condition is further enhanced throughout high magnifications by improving the electron optics.

TM3030

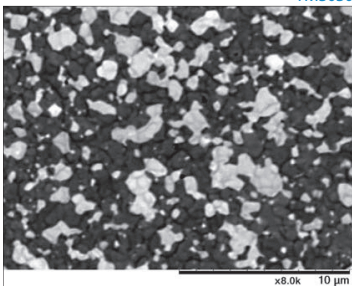
Conventional model (TM3000)



5kV, standard mode  
Magnification: x8,000



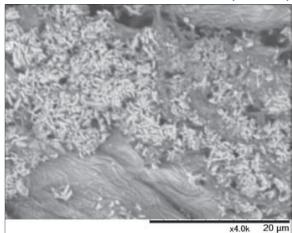
Specimen:  
Magnetic head



5kV, standard mode  
Magnification: x8,000

TM3030

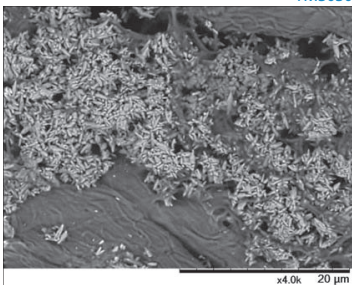
Conventional model (TM3000)



5kV, charge-up reduction mode  
Magnification: x4,000



Specimen:  
Premium  
grade paper



5kV, charge-up reduction mode  
Magnification: x4,000

**NEW**  
Unparalleled  
Image Quality

## Image quality being sharpened and enhanced.

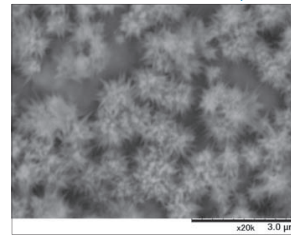
Image further enhanced and optimized by various automatic functions and software algorithm.

### Enhanced sharpness & contrast capability

These functions will be utilized to enhance image quality at any observation condition modes and will be very effective for higher magnification specimens.

TM3030

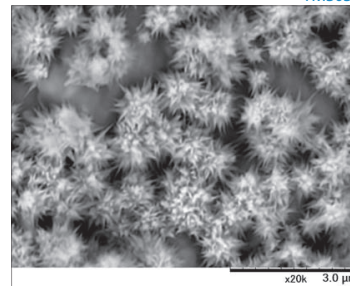
Conventional model (TM3000)



15kV, charge-up reduction mode  
Magnification: x20,000



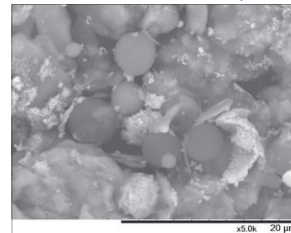
Specimen:  
Metal hydride



15kV, charge-up reduction mode  
Magnification: x20,000

TM3030

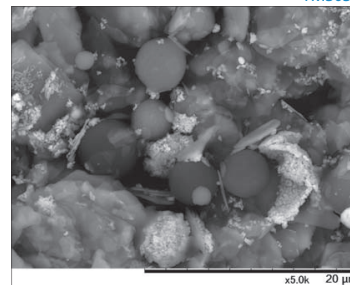
Conventional model (TM3000)



15kV, charge-up reduction mode  
Magnification: x5,000



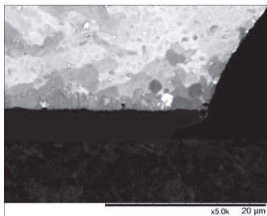
Specimen:  
Cosmetic  
foundation



15kV, charge-up reduction mode  
Magnification: x5,000

### Application Gallery

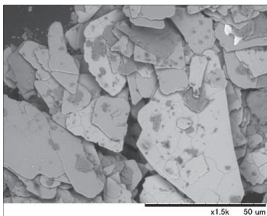
Grain contrast is observed by reducing accelerating voltage.



5kV, standard mode  
Magnification: x5,000

Specimen:  
Electronic component

Organic materials covered over surface which are normally not available at higher accelerating voltage, can be observed.



5kV, charge-up reduction mode  
Magnification: x1,500

Specimen:  
Eye shadow

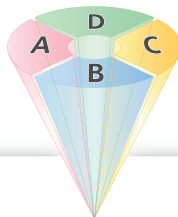
Tabletop Microscope  
TM3030



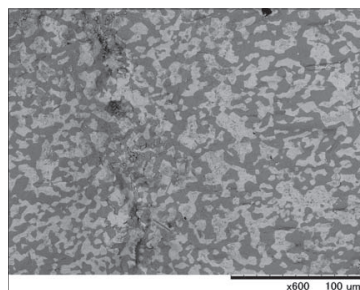
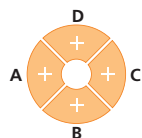
## Multi purpose observation

## Directional imaging using the 4-segment detector.

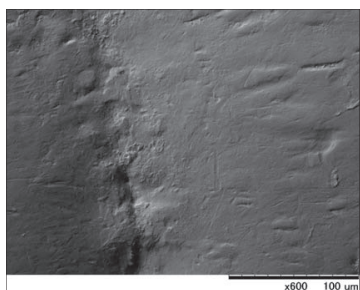
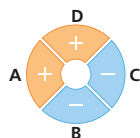
The TM3030 features a backscattered electron detector with 4 independent segments. By adding or subtracting the signals from the segments in different combinations it is possible to emphasize compositional or topographic detail in the image, as well as produce 'shadowed' images which highlight the sample from a particular direction.



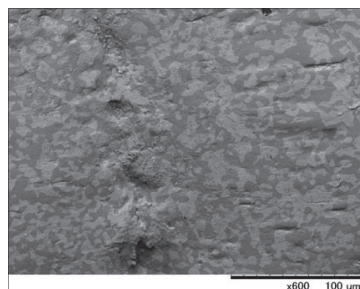
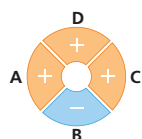
### Compo



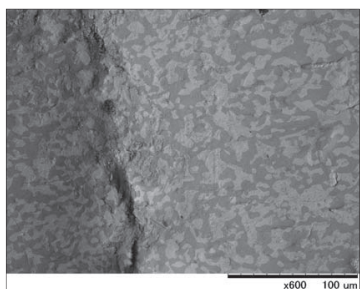
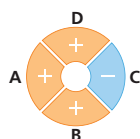
### Topo



### Shadow 1



### Shadow 2

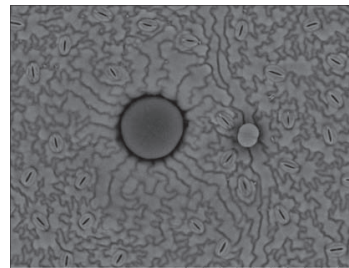


Specimen: Solder

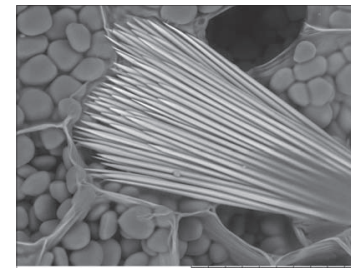
## Tabletop Microscope TM3030

### Application Gallery

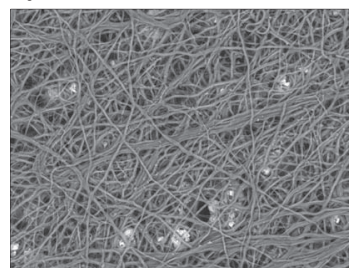
#### Food and Medicine



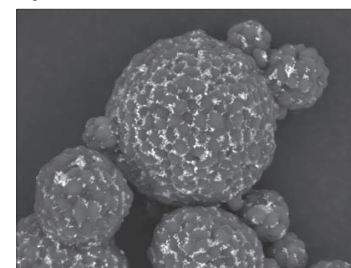
15kV, charge-up reduction mode  
Magnification: x4,500  
Specimen: Perilla (Japanese Basil) leaf



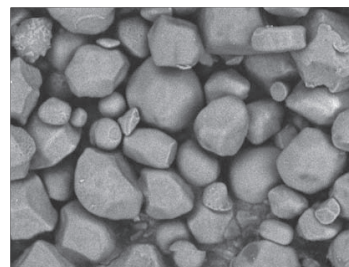
15kV, charge-up reduction mode  
Magnification: x800  
Specimen: Cross section of Chinese yam



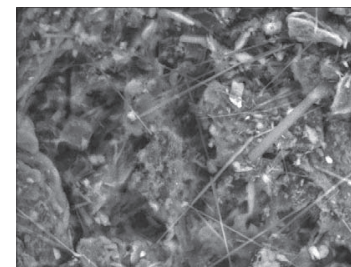
15kV, charge-up reduction mode  
Magnification: x500  
Specimen: Egg shell membrane



15kV, charge-up reduction mode  
Magnification: x2,000  
Specimen: Yeast containing zinc



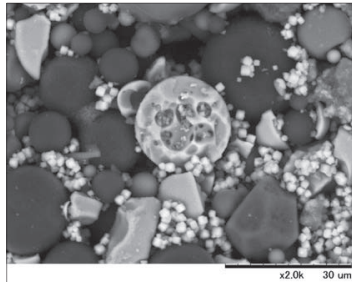
5kV, charge-up reduction mode  
Magnification: x2,000  
Specimen: Surface of stick gum



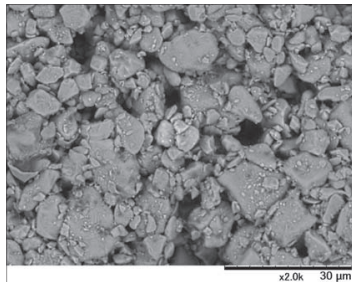
15kV, charge-up reduction mode  
Magnification: x1,500  
Specimen: Headache remedy tablet



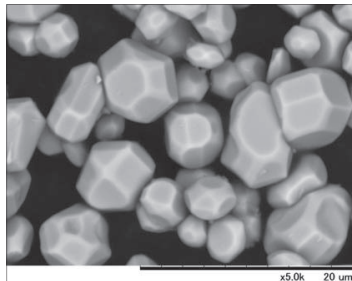
## Application Gallery



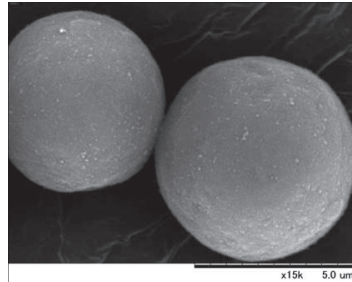
5kV, charge-up reduction mode  
Magnification: x2,000  
Specimen: Powder spray



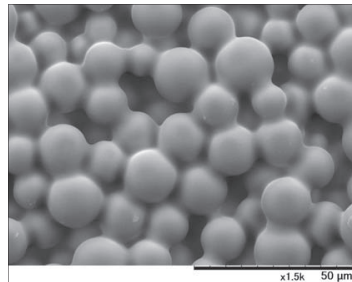
5kV, charge-up reduction mode  
Magnification: x2,000  
Specimen: Coated paper



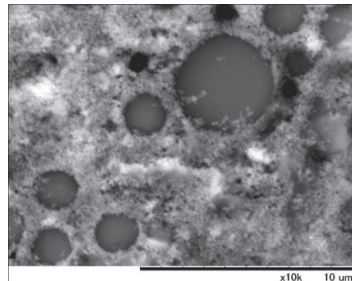
15kV, charge-up reduction mode  
Magnification: x5,000  
Specimen: Fluorescent material



15kV, standard mode  
Magnification: x15,000  
Specimen: Toner (Pt coated)

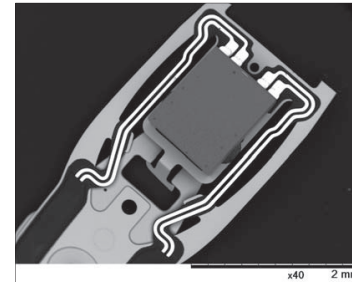


15kV, charge-up reduction mode  
Magnification: x1,500  
Specimen: Optical sheet for liquid crystal TV (Pt coated)

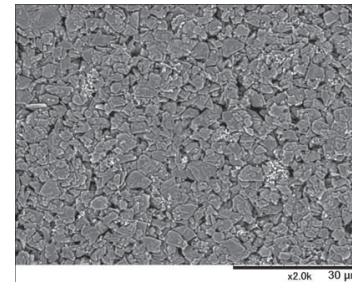


15kV, charge-up reduction mode  
Magnification: x10,000  
Specimen: Sunscreen lotion

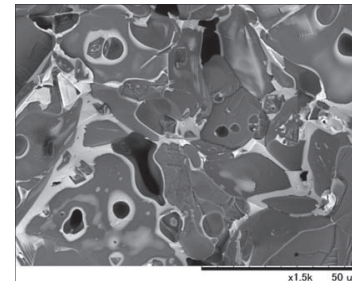
## Application Gallery



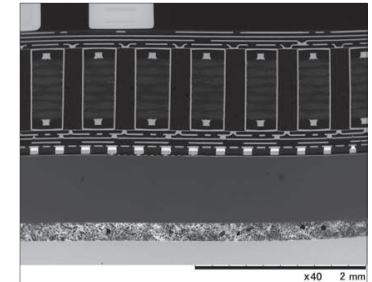
5kV, standard mode  
Magnification: x40  
Specimen: Magnetic head



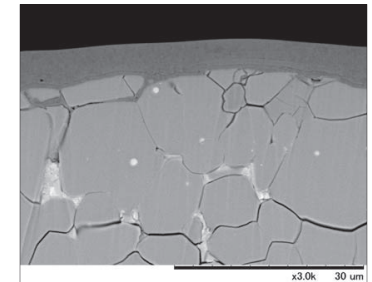
5kV, standard mode  
Magnification: x2,000  
Specimen: LIB anode material



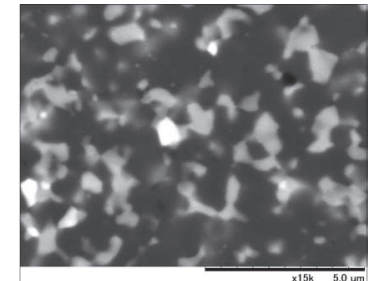
EDX, charge-up reduction mode  
Magnification: x1,500  
Specimen: Varistor



15kV, charge-up reduction mode  
Magnification: x40  
Specimen: Cross section of electronic circuit board

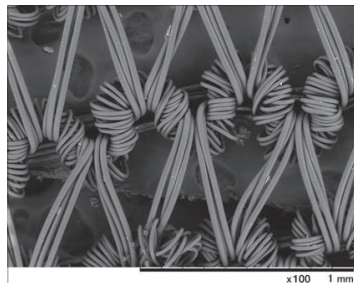


15kV, charge-up reduction mode  
Magnification: x3,000  
Specimen: Neodymium magnet

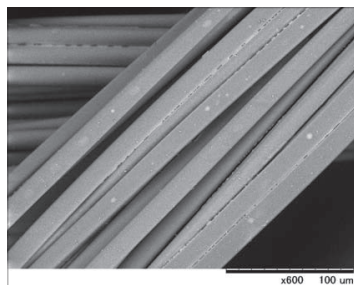


15kV, charge-up reduction mode  
Magnification: x15,000  
Specimen: ATIC circuit board

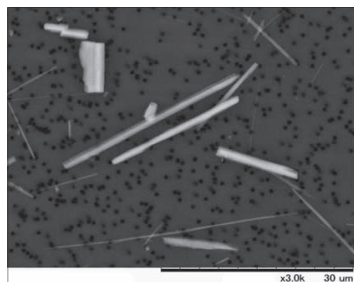
## Application Gallery



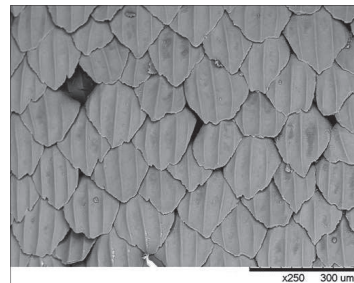
15kV, charge-up reduction mode  
Magnification:  $\times 100$   
Specimen: Nylon stocking



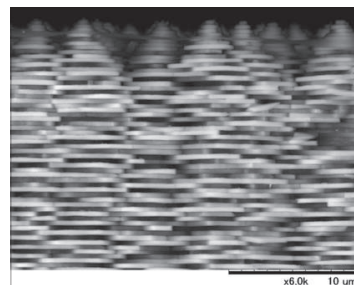
5kV, charge-up reduction mode  
Magnification:  $\times 600$   
Specimen: Photocatalyst fiber



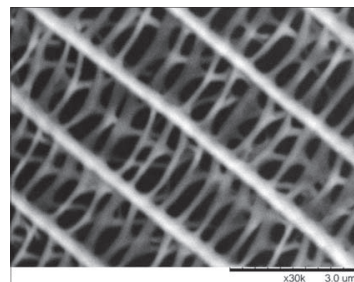
15kV, standard mode  
Magnification:  $\times 3,000$   
Specimen: Asbestos



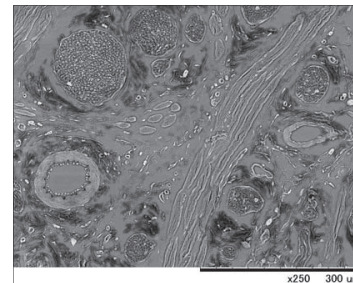
15kV, standard mode  
Magnification:  $\times 250$   
Specimen: Shark skin



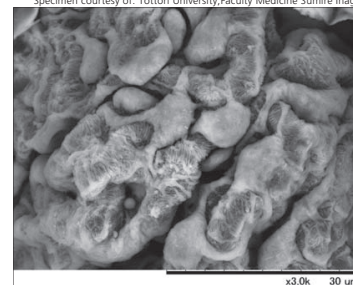
15kV, charge-up reduction mode  
Magnification:  $\times 6,000$   
Specimen: Cross section of abalone shell



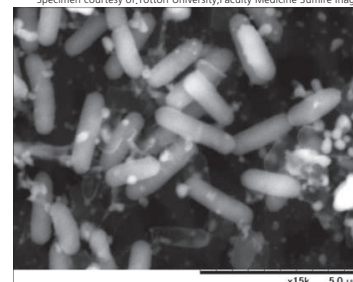
15kV, charge-up reduction mode  
Magnification:  $\times 30,000$   
Specimen: Butterfly wing



EDX, charge-up reduction mode  
Magnification:  $\times 250$   
Specimen: Tongue of rat (deparaffinated section)  
Specimen courtesy of: Tottori University, Faculty Medicine Sumire Inaga



15kV, charge-up reduction mode  
Magnification:  $\times 3,000$   
Specimen: Renal glomerulus of rat  
Specimen courtesy of: Tottori University, Faculty Medicine Sumire Inaga

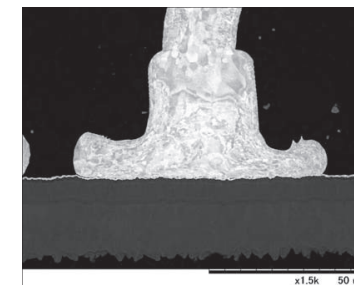


15kV, charge-up reduction mode  
Magnification:  $\times 15,000$   
Specimen: Fermented soybean bacteria

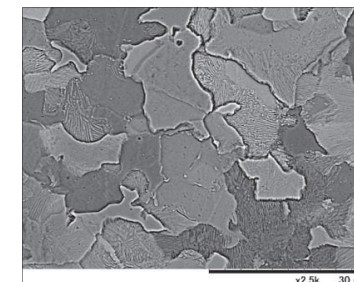


## Specimen treated by Hitachi Ion Milling System

TM3030 can be used to check the surface of specimen after milling. It is possible to transfer the specimen stub of IM4000 directly to the TM3030.



5kV, charge-up reduction mode  
Magnification:  $\times 1,500$   
Specimen: Au bonding wire



EDX, standard mode  
Magnification:  $\times 2,500$   
Specimen: Metallographic structure

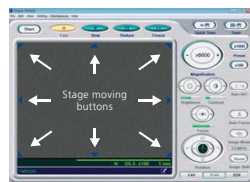




## Motorized Stage Version

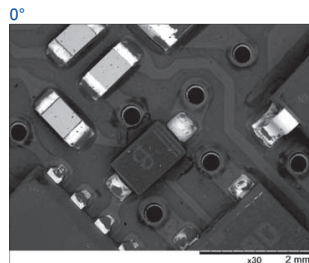
With the optional\* motorized specimen stage, all functions of the TM3030 can be operated using the mouse alone.

\* Please specify manual or motor-drive stage when ordering the TM3030

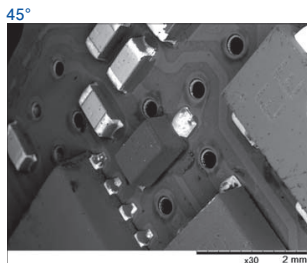


## Tilt Rotate Stage

Tilt Rotate Stage enable observation at -15° to 60° degree angles. It is allowable to monitor the positioning in the sample chamber through a chamber scope.



15kV, charge-up reduction mode  
Magnification : x30



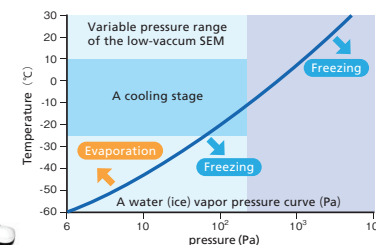
15kV, charge-up reduction mode  
Magnification : x30  
Specimen: Electronic component



## Cooling System

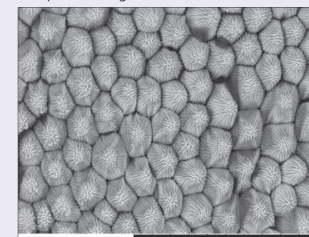


The cooling stage for the TM3030 is manufactured by Deben UK, Ltd. The stage is coolable -25°C. This stage allows for observation and analysis of samples containing water for up to a couple of hours without deformation of samples from the vacuum pressure.



### At an ambient temperature

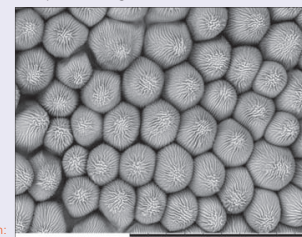
Sample shrinkage is seen after 5 minutes.



5kV, standard mode  
Magnification: x1,000

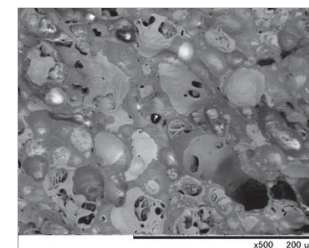
### At -20°C (A cooling stage was used)

Sample shrinkage is not seen after 5 minutes.



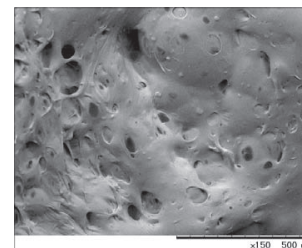
5kV, standard mode  
Magnification: x1,000

Specimen:  
Rose petal



5kV, charge-up reduction mode  
Magnification: x500

Specimen:  
Chocolate mousse



EDX, charge-up reduction mode  
Magnification: x150

Specimen:  
Marshmallow



Variety of  
optional accessories

## Elemental Analysis made easy.

EDX\* for the TM3030 is available using 2 different systems.

Each system is equipped with the latest SDD (silicon drift detector). The detectors are compact and designed to be housed within the main TM3030 unit. Liquid nitrogen is not required, as with all modern EDX systems.

\* EDX: Energy Dispersive X-ray Spectrometer



Example of configuration with TM3030 Detector built-in type

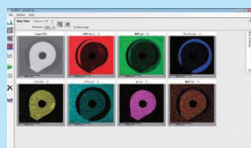
\*Typical configuration of TM3030 with PC. \*Screen shows simulated image.

### SwiftED3000



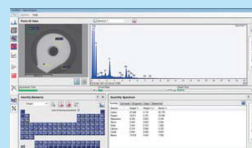
- Detectable elements: B5 to U92
- Swift multi-point analysis by POINT&ID

### SwiftED3000 operation window



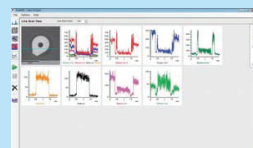
#### Element mapping

The distribution for each element present can be displayed. In addition, 3 elements can be displayed simultaneously, in RGB, overlaid upon the BSE image.



#### Point & ID

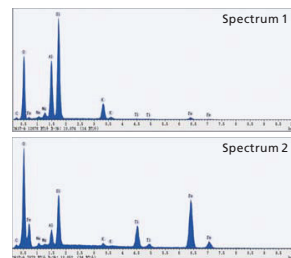
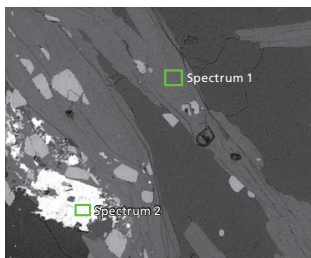
POINT&ID enables the user to specify multiple points or areas and acquire spectra sequentially.



#### Line scan

For a user-defined line, the intensity profile of each element selected can be displayed.

### Example measurement with SwiftED3000 Analysis of ground thin-section rock specimen (non-coated)



Continuing the "Simple Operation" design concept of the TM3030,

all users can take full advantage of the powerful analytical capability including point analysis, area analysis and element mapping.

## Tabletop Microscope TM3030



Example of configuration with TM3030 Detector built-in type

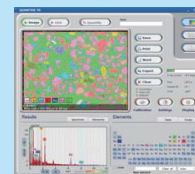
\*Typical configuration of TM3030 with PC. \*Screen shows simulated image.

### Quantax70



- Detectable elements: B5 to Am95
- Capable of full EDX analysis via spectrum map even after measurement

### Quantax70 operation window



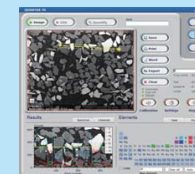
#### Element mapping

The elemental distributions are displayed and overlaid on the BSE image. The intensity and colour of each element can be adjusted to maximize and highlight the data acquired.



#### Point/Area analysis

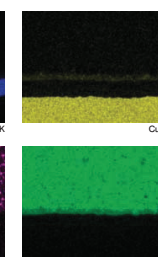
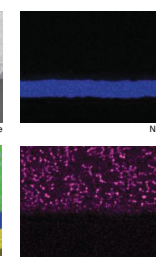
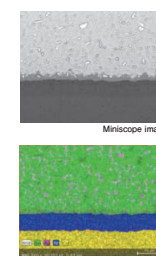
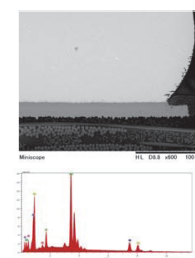
The spectrum at any point or area can be displayed by expanding or contracting a "selective area" target. Spectra can be displayed after measurement by use of smart map.



#### Line scan

The intensity profile of each element is overlaid on a microscope image of the specific target area.

### Example measurement with Quantax70 Analysis of electronic component sample embedded in resin (non-coated)

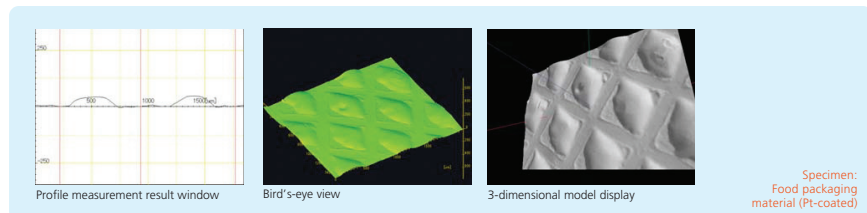
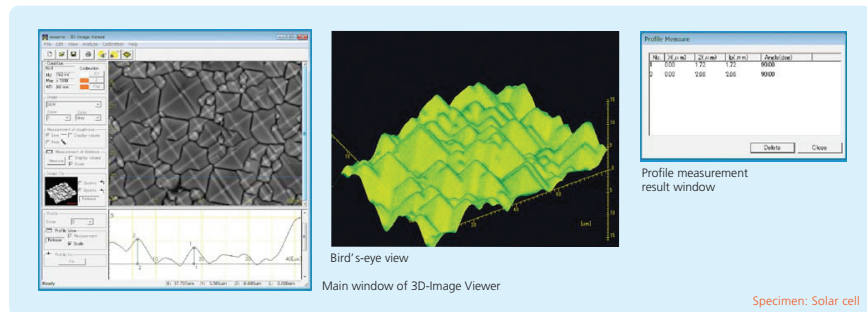


Variety of  
optional accessories

## 3-dimensional image display / measurement function.



- A 3-dimensional model can be generated without sample tilting and alignment, using 4 directional surface profiles from the signals acquired with each segment of the 4-segment backscattered electron detector.
- Surface roughness can be measured easily based on the height measurement between 2 points, the surface area and cross-sectional profile.
- The 3-dimensional model under observation can be manipulated (rotated and zoomed), while rotational manipulation of the model can be recorded in a dynamic image file (AVI format).



### 3D-VIEW main specifications

#### 3D-Image viewer function

Items	Description
Import function	Automatic select and read function of four elements image data (Equipped with automatic SEM condition acquisition function)
Measurement performance	Depth accuracy $\pm 20\%$ (Reference) Measurement performance is different depending on calibration accuracy, the condition of the kind of the specimen, the observation mode, and the observation condition. Detectable angle range: $\pm 50$ (Reference) (Observation condition: Standard mode) Unavailable in the combination of "Charge-up reduction mode" and "5kV mode".
Measurement function	Section profile display / Calibration function (X/Y, Z and Flat) / Distance of X and Y, length and angle measurement between two points specified on the image / Surface area measurement / Distance of X and Y, length and angle measurement between two points specified on section profile / Surface roughness measurement on section profile / Depth direction zoom-in function in section profile display / Base line correction function (straight line and curved line) / Bird's-eye view display / Color contour line display
Three-dimensional display function	Rotation and zoom-in / Animation record function of observation screen (AVI file)
PC OS	Windows® 7 Professional

#### 3D-Image capture function

Items	Description
Capture function	Automatic image data acquisition by four elements of quad BSE detector
Capture pixel count	640 × 480 pixels (Quick Save), 1,280 × 960 pixels (Save)
Brightness adjustment	Automatic

\*A steep topographical surface that exceed detectable angle might not be displayed accurately.  
\*Windows® is a registered trademark of Microsoft Corporation in the United States and/or other countries.

### SwiftED3000 specification

\*Manufactured for Hitachi High-Technologies Corporation by Oxford Instruments Analytical Ltd.

#### Detector

Items	Description
Detector type	Silicon Drift Detector (SDD)
Detection area	30mm <sup>2</sup>
Energy resolution	161eV (Cu-K $\alpha$ ) (equivalent to 137eV with Mn-K $\alpha$ )
X-ray window	SATW (Super Atmosphere Thin Window)
Detection element	Bs ~ Uis
Thermal cycle	Detector cool down on demand.
Cooling method	2-stage thermoelectric (Peltier) cooling (without fan and LN <sub>2</sub> free)

#### X-stream, mics

Items	Description
Pulse processor	Digital
Multi-channel analyzer	2,048 channel (10eV/ch)

#### Software

Items	Description
Spectrum display	Expand and contract scale in vertical and horizontal, KLM marker display
Qualitative analysis	Auto ID and manual peak ID
Quantitative analysis	Standardless quantitative analysis, normalize to 100%
Image capture	1,024 × 768, 512 × 384, 256 × 192 pixel
Point & ID (Beam control)	Selectable points: 128 points Recrange: Arbitrary size settable
Element mapping	Resolution: Select from 128, 256, 512 pixel Max. measurable elements: 32 Mix map: 3 elements
Line scan	Spectrum comparison: two spectra
Help function	On-line
Data management	Managed by project
Spectrum exporting	BMP, TIFF, JPEG, EMSA, Text
Data reporting	Print report template Export to Microsoft® Word

#### Dimensions and weight

Items	Description (Width × Depth × Height, Weight)
Detector unit	145 × 150 × 200mm, 2.7kg
Analyzer unit	290 × 265 × 332mm, 9.3kg

#### Installation condition

Items	Description
Power (SwiftED3000)	Single-phase AC100~240V ( $\pm 10\%$ ) 50/60Hz 100VA, 3P cable

### Quantax70 specification

\*Manufactured for Hitachi High-Technologies Corporation by Bruker Nano GmbH

#### Detector

Items	Description
Detector type	Silicon drift detector (SDD)
Detection area	30mm <sup>2</sup>
Energy resolution	154eV (Cu-K $\alpha$ ) (equivalent to 137eV with Mn-K $\alpha$ )
X-ray window	For light element detection
Detection element	Bs~Amis
Thermal cycle	Detector cool down on demand.
Cooling method	2 stage Peltier cooling (No fan, No liquid nitrogen needed) Cooling temperature about $-25^{\circ}\text{C}$ Cooling is not needed when not in use. No detector warm-up needed during venting or sample changing. After power supply is turned on and cooling starts, it can be used in two minutes.

#### MIN SVE signal processing unit

Items	Description
Signal processor	Up to 60,000cps output count rate
Multi-channel analyzer	2,048 channel (10eV/ch)

#### External scan box

Items	Description
Interface to TM3030 notebook	USB 2.0 or Ethernet
Interface to microscope	via DBC cable

#### Software

Items	Description
Spectrum display	Scale expansion in vertical and horizontal direction, Automatic scaling, KLM marker display
Qualitative analysis	Automatic ID and manual peak ID
Quantitative analysis	Standardless quantitative analysis, normalize to 100%
Image capture	1,024 × 768, 640 × 480, 320 × 240 pixel
Element mapping	Displays as single element map Display of several maps as overlaid image Overlay of single and mixed element map with BSE image Color of each map can be changed
Line scan	Flexible line positioning in all directions Individual selection of line colors for each element Overlay of line scan profile with scan image Display of line scan spectrum
Spot/area analysis	Spot can be positioned anywhere on the image Single circle but can be moved and resized (10~768pixels). Analysis results of spot: Display of spectrum, results table and graphic display Automatic element ID of spot Automatic quantification of spot Manual selection/deselection of elements
Data reporting	Report template for printing Export of spectra to BMP, TIFF, JPEG, Excel 2007 and Text Export of spectra and results to Microsoft® Word 2007

#### Dimensions and weight

Items	Description (Width × Depth × Height, Weight)
Detector (housed within TM3030)	145 × 130 × 105mm, 1.5kg
MIN SVE signal processing unit	228 × 116 × 66mm, 1.0kg
External scan box	228 × 116 × 66mm, 1.0kg

#### Installation conditions

Items	Description
Power (Quantax70)	MIN SVE signal processing unit Single-phase AC100~240V ( $\pm 10\%$ ) 50/60Hz 25VA, 3P cable External scan box Single-phase AC100~240V ( $\pm 10\%$ ) 50/60Hz 15VA, 3P cable