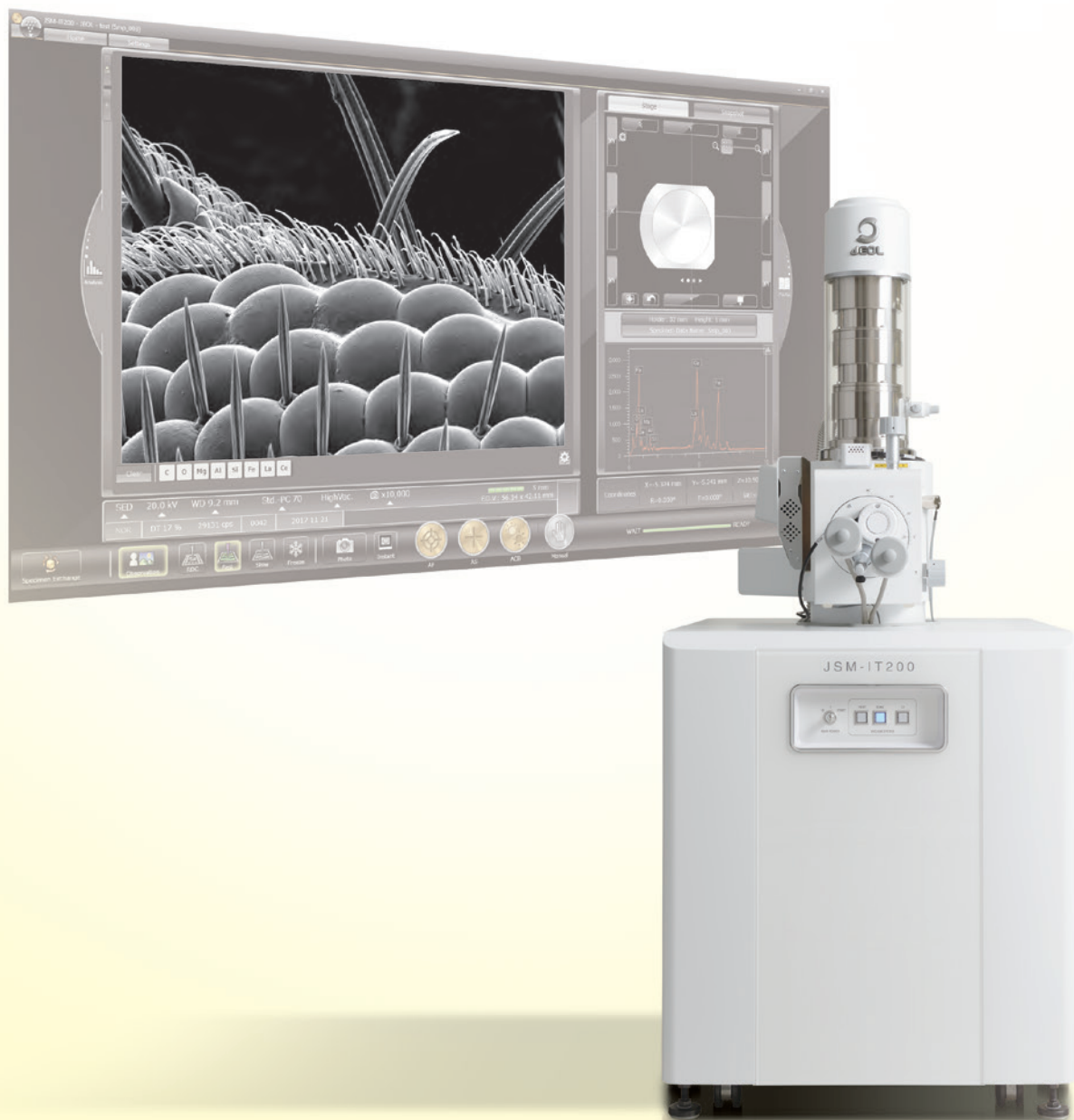




Scientific / Metrology Instruments
Scanning Electron Microscope

Solutions for Innovation

JSM-IT200



JEOL Ltd.

In
TouchScope™ series

JSM-IT200 Series

Scanning Electron Microscope

Latest Advancements from JEOL

*Fast Observation, Analysis and Report Generation !
High Performance Analytical Tool !*





High Performance With Faster and Easier Analysis

■ Main screen – Zeromag –

You can locate the specimen area or specify analysis positions with Holder Graphics or CCD image^{*1} displayed on the Main screen.

■ Element / Spectrum display – Live Analysis^{*2} –

The characteristic X-ray spectrum from the measurement area and the main constituent elements are always displayed.

■ Data management button – SMILE VIEW™ Lab: Integrated data management –

A single click of the data management button displays the Data management screen allowing you to generate a report of all images and analysis data, as well as review or re-analyze already-acquired data.

*1 To take a CCD image, SNS (option) is required.

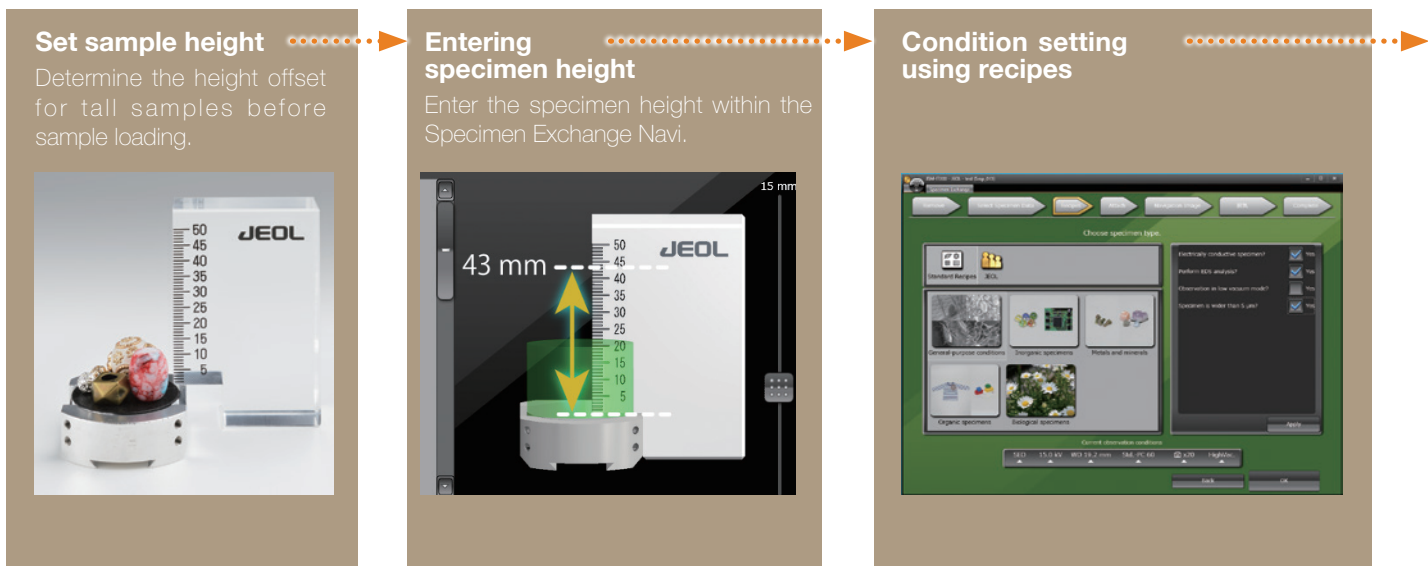
*2 Applicable to (A) Analysis/(LA) Low Vacuum and Analysis versions.

Guided operation from sample introduction to observation

The JSM-IT200 navigation flow guides the user step-by-step from sample introduction to automatic image formation.

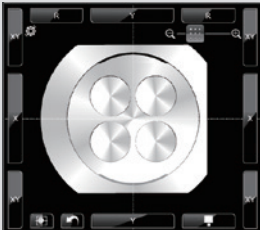
■ Specimen Exchange Navi

A step-by-step guide to sample exchange, condition setting and automatic image formation.

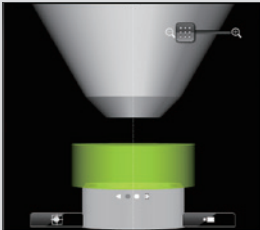


● **Holder Graphics**

Holder Graphics allows you to immediately observe the specimen position by showing the current specimen position including specimen tilt and rotation.



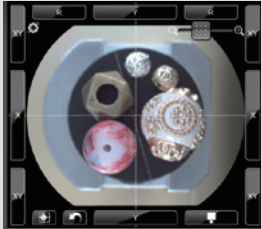
Top view



Side view

● **Stage Navigation System (SNS)** Option

Switch between the Holder Graphics and CCD (color) image. You can specify the observation area by double-clicking the acquired color image. Displaying the color image on the Zeromag screen allows for an easy search of the specimen area.



CCD image area: 6 x 4.5 cm
Number of pixels: 5,000,000
Digital zoom: up to x 20

● **Chamber Scope (CS)** Option

Switch between Holder Graphic and Chamber Scope view. A camera which displays the relationship of the specimen to the detectors and objective lens pole piece, is available.





Specimen loading

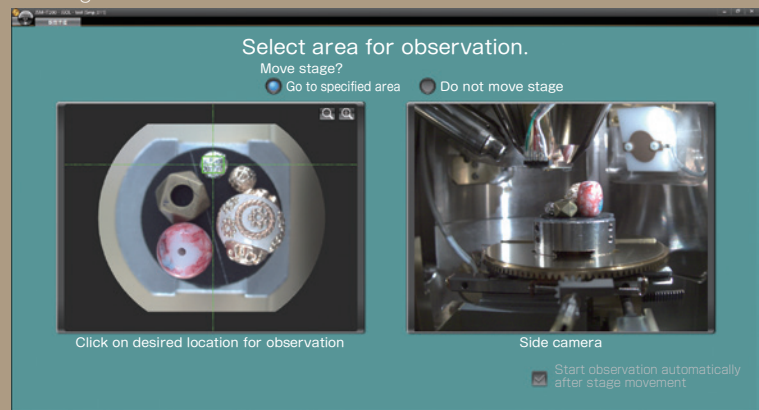
Draw-out method enables smooth exchange of any form or size of specimen.



Maximum specimen diameter: 150 mm dia.
Maximum specimen height: 48 mm H

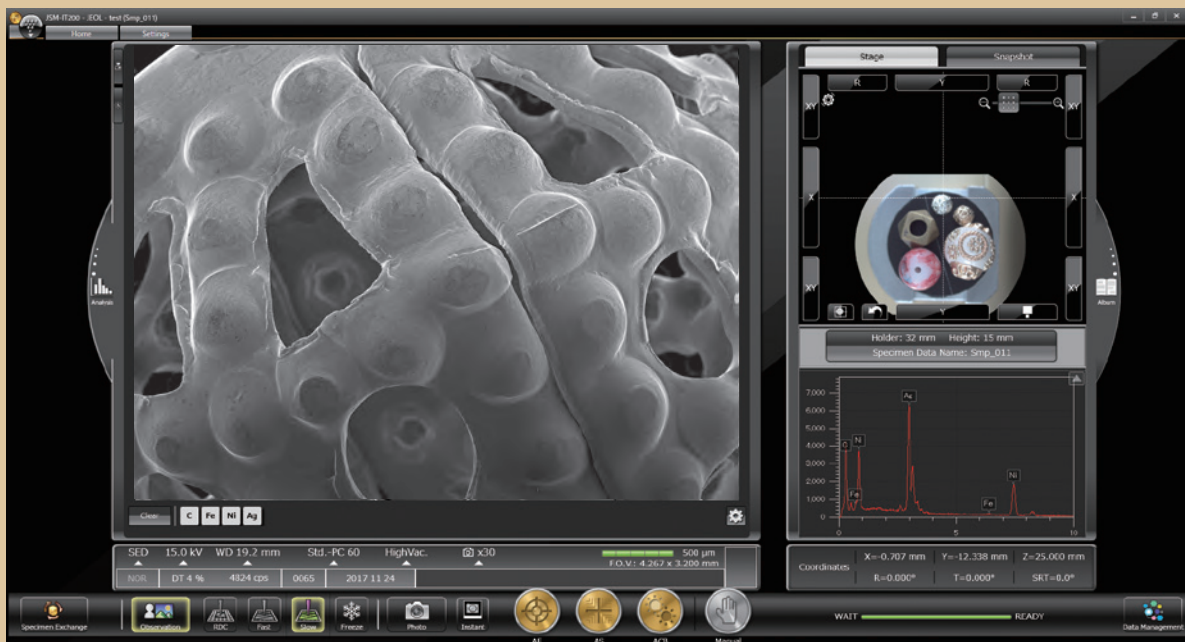
Chamber evacuation starts after acquisition of CCD image

Observation area can be specified on CCD image* during evacuation.



Completion of chamber evacuation

Then, the target observation area is specified, observation conditions are set, image adjustment is completed. You can observe the image at designated magnification.



* To take a CCD image, SNS (option) is required.

True Integration of Optical and SEM imaging

Zeromag

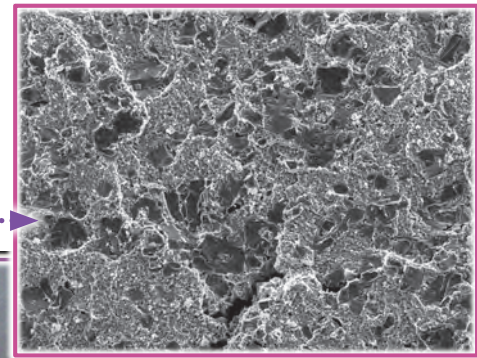
Smooth transition from optical to SEM imaging

Zeromag is a function that links the SEM image with Holder Graphics or CCD image* (optical image) where all are linked to the stage coordinates. This facilitates navigation with seamless transition from the CCD image to a high magnification SEM image.

Features of Zeromag

- Seamless transition from optical to SEM image.
- Can pre-set multiple analysis positions across your specimen set.
- Displays the areas analyzed for easy review or fast return for additional study.

Magnify SEM image▶

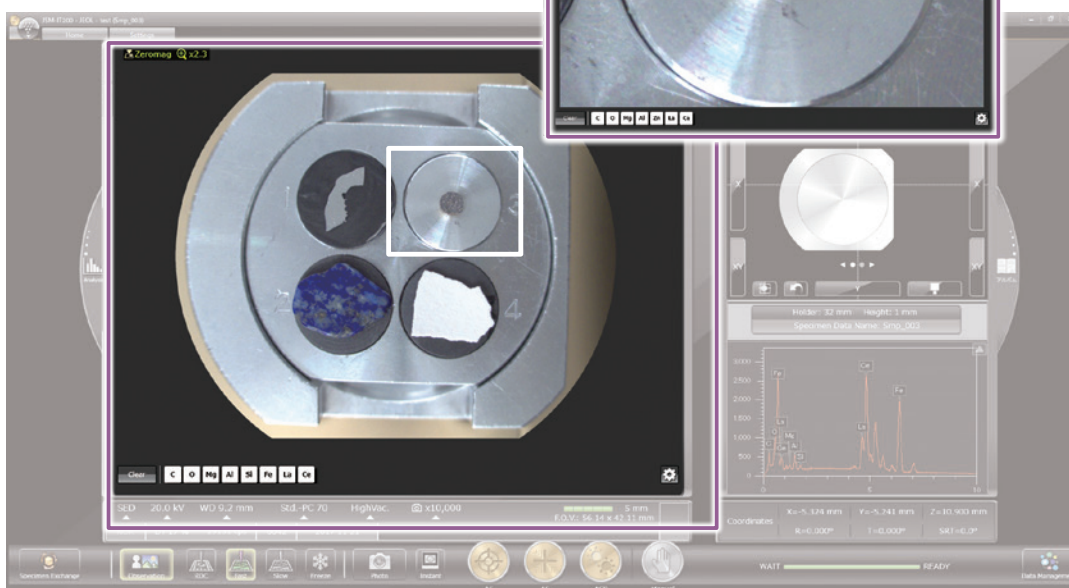


100 μm

Magnify OM image▶



Zeromag



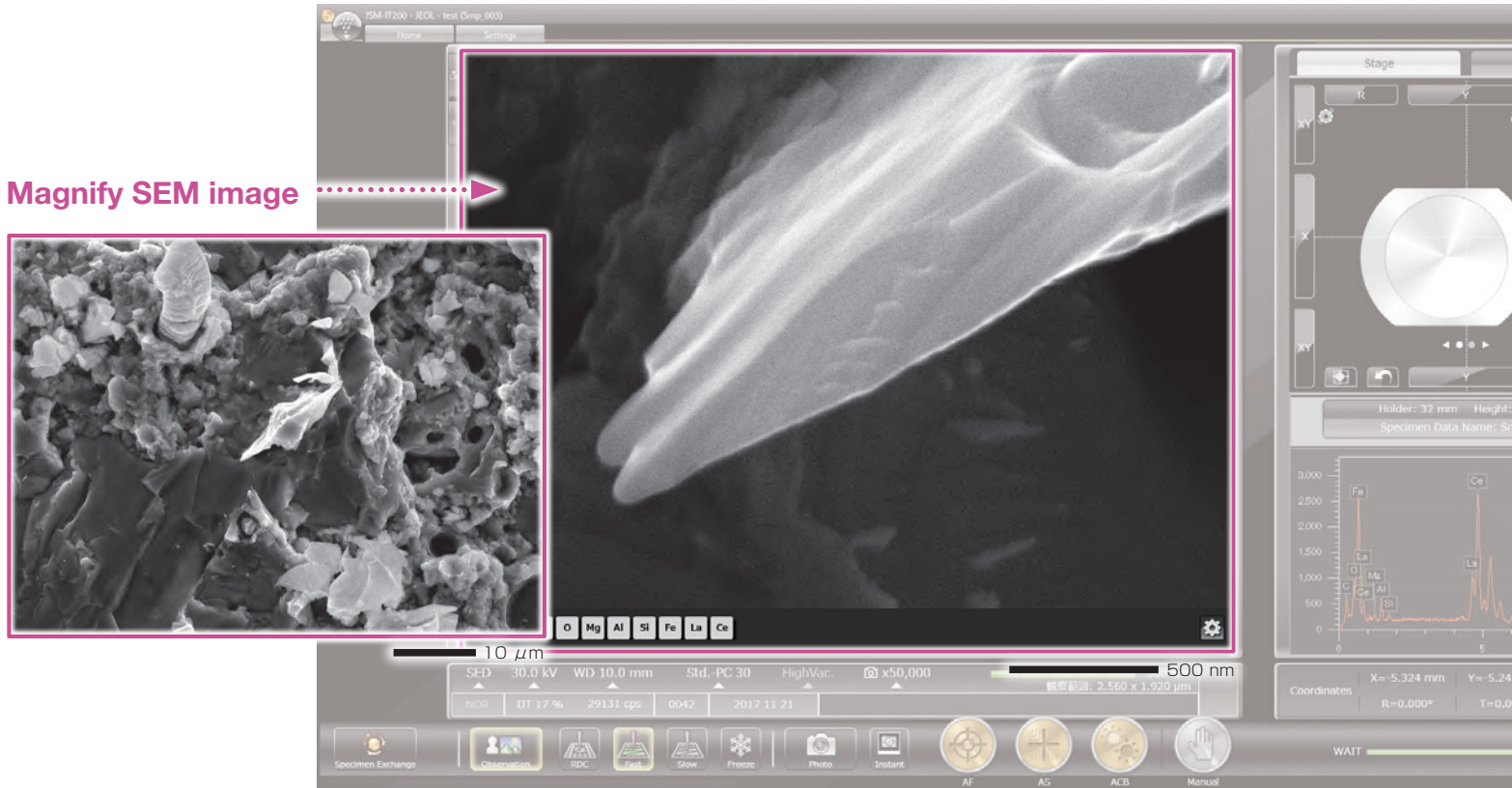
Zeromag image displayed on the Main screen



Secondary electron image

This high magnification image highlights fine surface morphology of the specimen.

Magnify SEM image

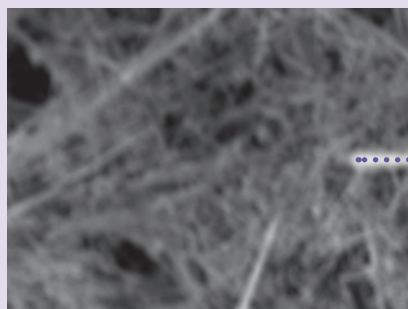


Specimen: Ignition stone
 Accelerating voltage: 30 kV
 Magnification: $\times 200$, $2,000$ and $50,000$ (left to right)
 High-vacuum mode, Secondary electron image

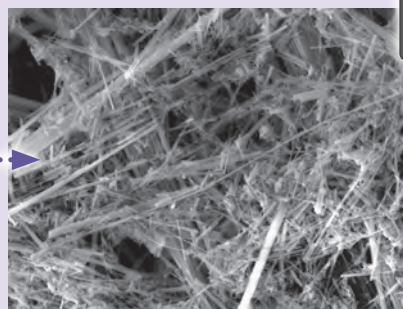
● Auto functions

Our advanced automatic functions simplify operation.
 Automatically adjust Focus, Contrast, Brightness and Stigmator with a single click.

Photography



Auto



Specimen : Asbestos
 Accelerating voltage: 10 kV
 Magnification : $\times 5,000$
 High-vacuum mode
 Secondary electron image

* To take a CCD image, SNS (option) is required.

Easy Elemental Analysis

Live Analysis Standard for (A) / (LA)

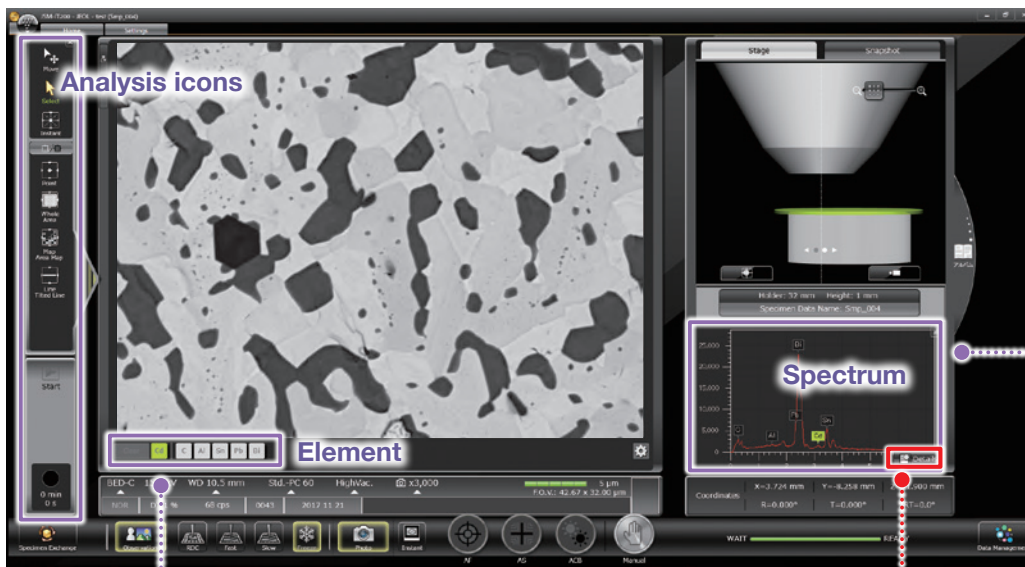
Real time display of elemental analysis results during observation of a high-magnification SEM image.

With our Analytical series, seamless transition is made from high magnification SEM imaging to elemental analysis. The embedded EDS system shows a real time EDS spectrum during image observation, making it easy to find elements of interest or unexpected elements.

Features of Live Analysis

- Always displays the X-ray spectrum.
- Display of the main constituent elements.
- Alert display of elements of interest

SEM observation screen



Spectrum

The X-ray spectrum from the measurement area and automatic qualitative analysis results are always displayed.

Single-click to switch the screen

Single-click enables you to switch between the SEM observation screen and analysis detail display screen.

Specimen: Wood metal, Accelerating voltage: 15 kV, Magnification: x3,000
High-vacuum mode, Backscattered electron composition image

Toggle to SEM View



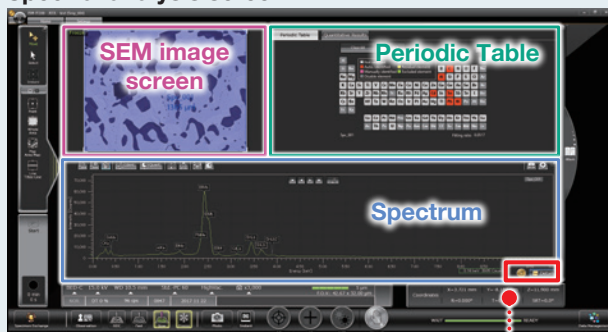
Element

The main constituent elements detected in the measurement area are displayed. You can display an "Alert" by specifying an element.

Analysis Detail display screen

The Spectrum screen, Map screen and other screens are displayed automatically.

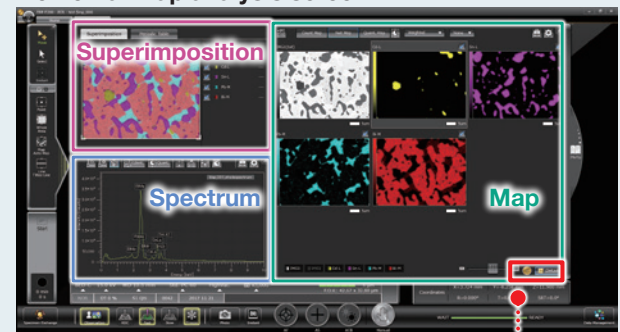
Spectral analysis screen



Specimen: Wood metal

Toggle to SEM View

Elemental map analysis screen

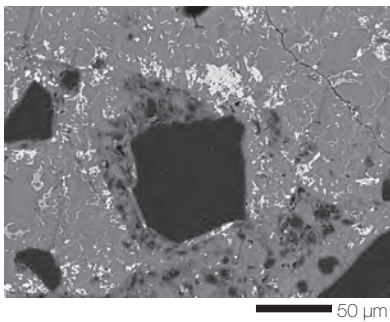
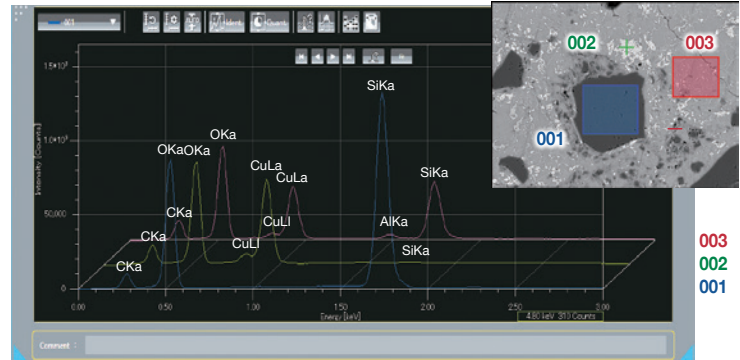


Toggle to SEM View



Qualitative & quantitative analysis

Select analysis areas directly in the SEM observation screen. After spectral acquisition, the Quantitative Result tab automatically displays the quantification results.



Specimen: Chrysocolla
 Accelerating voltage: 15 kV
 Magnification: x500
 High-vacuum mode:
 C coating, Backscattered electron composition image

Spectra and qualitative analysis result

Name	C	O	Al	Si	Cu	Fe	Total
001	16.13	45.55	0.01	35.43	0.03	0.03	100.00
002	14.03	35.37	0.15	0.16	0.02	0.19	50.08
003	18.96	35.82	0.91	14.45	0.29	1.53	28.42
Average	17.04	38.65	0.36	16.68	0.11	0.52	26.44
StandardDeviation	2.16	4.14	0.40	14.49	0.12	0.59	20.15

Elemental map

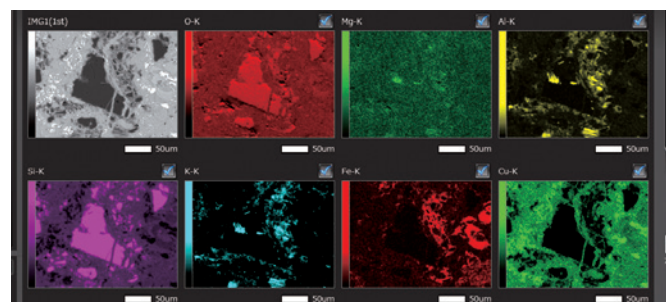


Using the Whole/Area icon on SEM observation screen, you can acquire elemental maps from the whole area or a specified area.

• Net map / Quantitative map

The Net map separates spectral peaks at each pixel and shows an elemental map with a reduced effect of overlapping peaks. Compared to the Count map which unavoidably reflects the peak intensity of other elements close to a specified element, the Net map enables a real-time display of an inherent intensity map even from a specimen containing many elements.

The Quantitative map is also available, which compensates for the Net map and displays the analysis results with the quantification values.

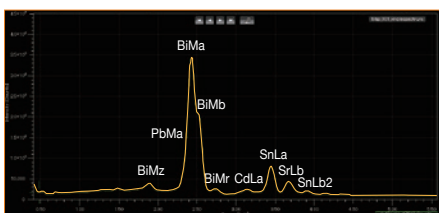


Backscattered electron composition image and elemental maps
 Specimen: Chrysocolla

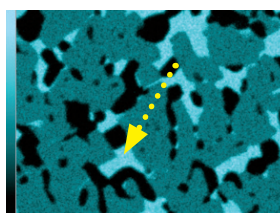
• Comparison of Count map and Net map

Spectral peaks of Pb-Mα (2.342 keV) are close to Bi-Mα (2.419 keV).

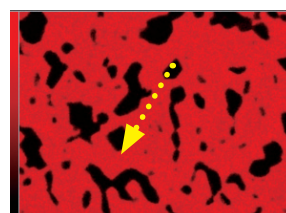
Thus in the Count (intensity) map, it is difficult to separate Pb from Bi. Applying the Net map enables you to confirm the inherent Bi distribution.



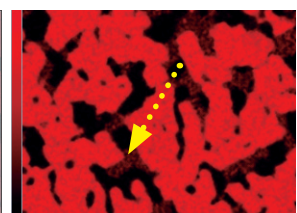
Peaks of Pb and Bi
 Specimen: Wood metal



Pb intensity map



Bi intensity map



Bi net map

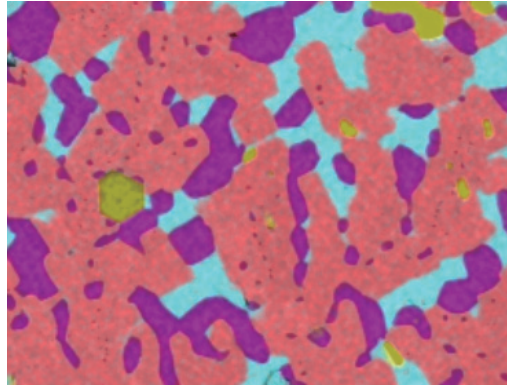
Easy Elemental Analysis

Elemental map

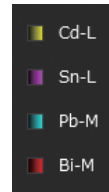


● Color-overlay display of an elemental map

The system allows you to overlay elemental maps on the SEM image in real time. The area is displayed with a composite color.



Multi-color overlay display



Specimen: Wood metal

Line analysis



Line analysis performs elemental analysis along a line set on the SEM image. The X-ray intensity of the specified elements is plotted to show the change in concentrations across the line. You can change elements to show during or after completion of data acquisition.



Line analysis result

■ Functions to improve analysis accuracy

Visual Peak ID (VID)

This function enables you to confirm whether the constituent elements are correctly identified in the qualitative analysis result. A spectrum is reconstructed based on the X-ray intensity of the elements identified.

Probe tracking

With long data acquisitions, the system periodically compares the SEM image at analysis start with the current image, so as to maintain the same analysis area. This capability helps you to monitor any change in a specimen or specimen drift during long acquisitions.

■ SMILE VIEW™ Lab for analysis

Pop-up spectrum

Since the stored map has spectral information, you can extract spectra from anywhere within the map data set.

SMILE VIEW™ Lab

- Re-specifies elements by spectrum, elemental map, line analysis, etc.
- Multi-color overlay display of elemental maps.
- Changes the colors of elemental maps, line analysis results, etc.

■ Other functions

Real-time filter

The system allows for image processing during a map acquisition to signal to noise ratio. This feature provides fast confirmation of the elemental distribution.

Pinpoint Navi

Automatic serial analysis can be made by specifying multiple areas in advance. Pinpoint Navi detects small image shifts by probe tracking, for precise repositioning of the analysis area.

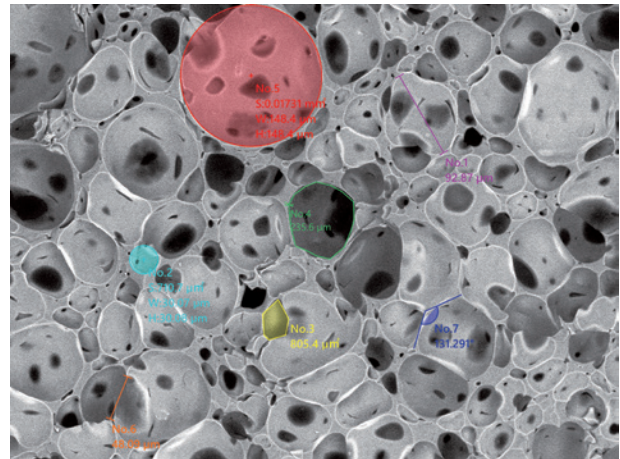
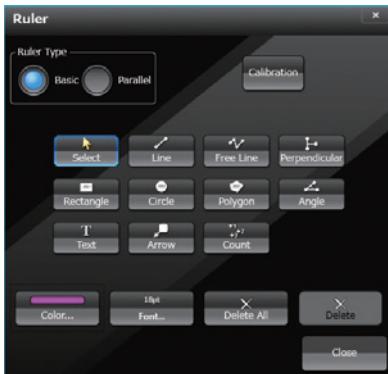
Relocating analysis areas

The stage position and magnification are linked with the analysis data. Return to any analysis area on the SEM image screen for additional study.



Measurement

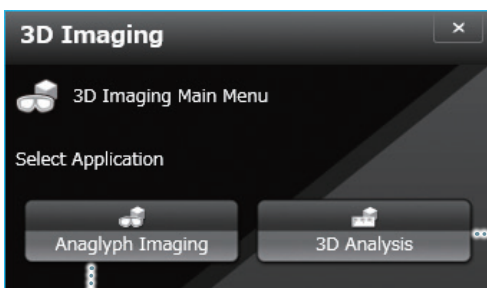
Measurements are performed on the observation screen, and their results (distance, angle, area, etc.) can be recorded and saved on SEM images.



Specimen: Marshmallow

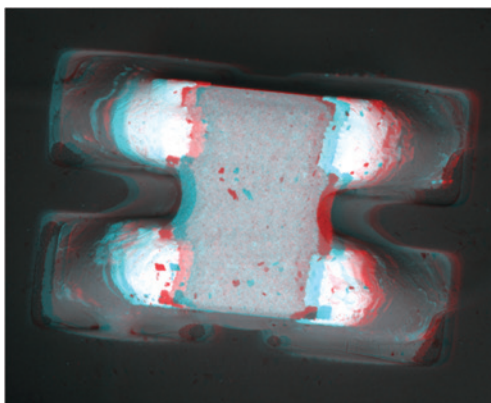
3D imaging

Optional software for creation of 3D image and analysis.



• Anaglyph

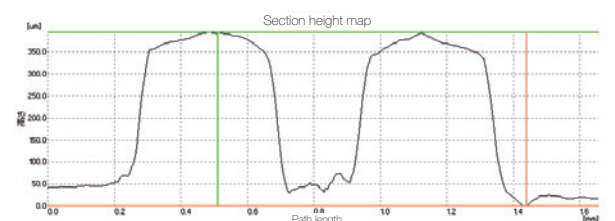
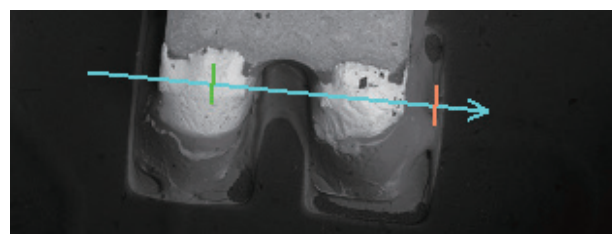
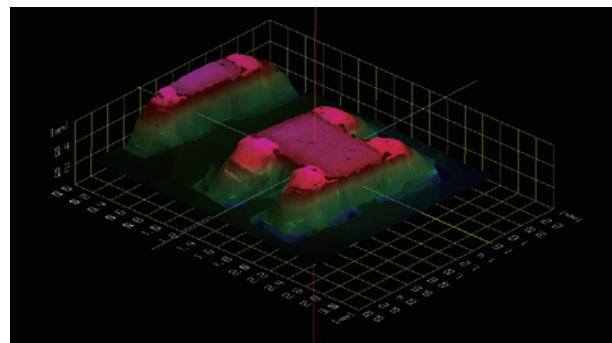
Step-by-step guide to collecting images for creation of an anaglyph image.



• 3D measurement image

Option

Dedicated software for 3D measurement. A 3D image can be created from two SEM images. The topographic status of the specimen surface can be measured.



Specimen: Memory device

Seamless report generation

■ Integrated data management software SMILE VIEW™ Lab

SMILE VIEW™ Lab is a fully integrated data management software which links the CCD image*1, SEM images, EDS analysis results*2, and corresponding stage coordinates for fast report generation or recall of specimen position for further study.

SMILE VIEW™ Lab Data management screen

SMILE VIEW™ Lab Data management screen allows you to easily handle all your data. Our data manager links the observation position, observation & analysis results, and a low magnification image acquired by Holder Graphics or CCD image*1. You can review or reanalyze already-acquired data and export selected data to a report.

Features of SMILE VIEW™ Lab

- Performs integrated management of CCD image*1 data, SEM image data and EDS analysis results*2.
- Allows for immediate understanding of data in each field.
- Enables data searching.
- Screen layout is easy to change.

The screenshot shows the SMILE VIEW™ Lab interface. Callouts point to various elements:

- Grp_004, Grp_005, Grp_007:** Name of each field is displayed.
- Search icon:** Data search is enabled from specimen name, creation time, data type, etc.
- Image view:** Positions of each field are displayed on Holder Graphics or CCD image*1.
- Data table:** Data is displayed in list form, which includes analysis data, quantitative analysis result of elemental map, spectra, etc., in the selected fields.

Mark	Name	User Name	Date Created	Date Modified	Folder Name	Data Type	Comm	C	O	Al	Cd	Sn	Pb	Br
	Line_001	JEOL	2017/11/20 12:51	2017/11/20 12:58	test\Smp_001\View_001	Line								
	Map_001	JEOL	2017/11/20 11:58	2017/11/20 12:07	test\Smp_001\View_001	Map								
	Map_002	JEOL	2017/11/20 12:25	2017/11/21 16:57	test\Smp_001\View_001	Map								
	Sem_BED-C...	JEOL	2017/11/20 11:49	2017/11/20 11:49	test\Smp_001\View_001	Fov Image								
	Spc_001	JEOL	2017/11/20 11:49	2017/11/20 11:51	test\Smp_001\View_001	Spectrum				0.25	2.23	17.22	12.40	67.90
	Spc_002	JEOL	2017/11/20 11:56	2017/11/20 11:58	test\Smp_001\View_001	Spectrum				0.30	2.23	17.27	12.56	67.64
	Spc_003	JEOL	2017/11/20 12:20	2017/11/20 15:47	test\Smp_001\View_001	Spectrum				2.39	1.20	89.34	1.08	5.99
	Spc_004	JEOL	2017/11/20 12:21	2017/11/20 15:36	test\Smp_001\View_001	Spectrum				3.94	0.44	1.51	51.46	42.66
	Spc_005	JEOL	2017/11/20 12:23	2017/11/20 15:35	test\Smp_001\View_001	Spectrum				8.04	0.75	0.64	1.80	88.77

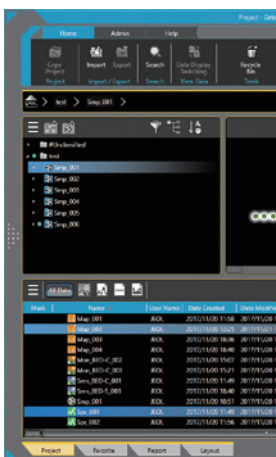
*1 To take a CCD image, SNS (option) is required.

*2 Applicable to (A) Analysis/(LA) Low Vacuum and Analysis versions.

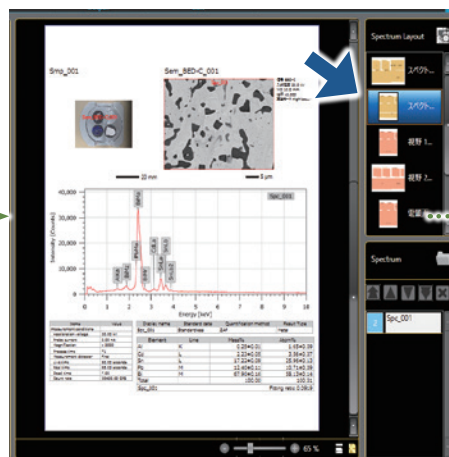


Automatic layout function Patent applied for

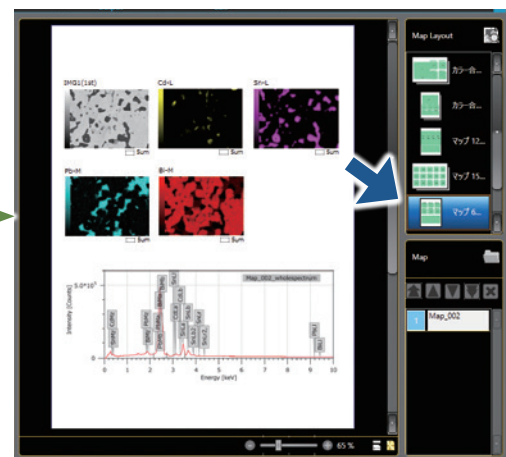
The SEM image data is linked with its EDS data. The report is automatically laid out with all related data included. If the data set is large, additional pages are allocated automatically. When you change the layout, all related data is updated with a single click.



Select the data for report generation and click "Add to the report".



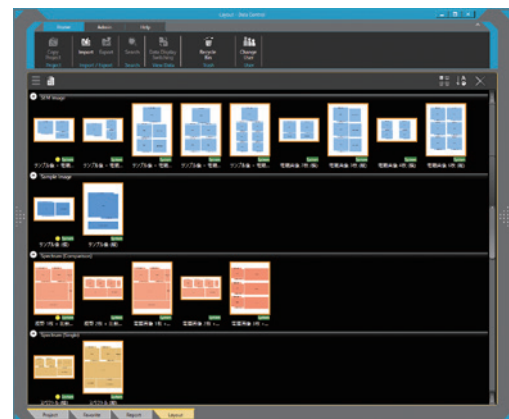
Based on the layout chosen, the linked data is automatically included.



When you select another layout button, only the layout is changed where the data is updated to the new format.

User layout

You can create templates for your reports.



User layout

Offline analysis software Option

Improving productivity

Offline analysis software is available. You can process all your data offline and generate reports. You can create quantitative maps and extract spectra (Pop-up Spectrum) from your map data sets.

Functions & Applications

Various functions of the JSM-IT200 and their applications are presented.

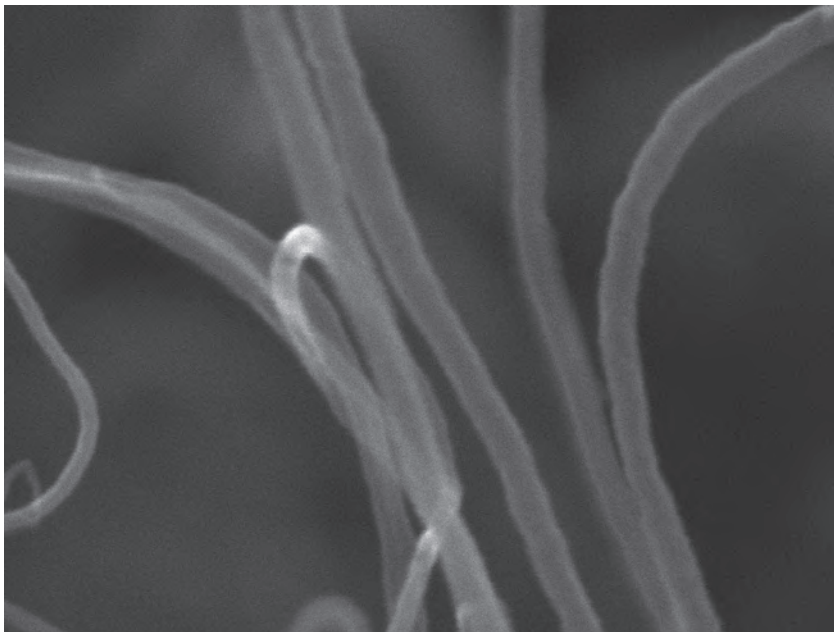
Secondary electron image

Secondary electron image is used most often to observe the surface morphology of a specimen.

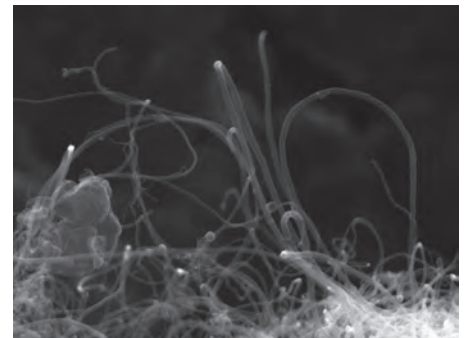
The following secondary electron images show carbon nanotubes at high accelerating voltage. The sharp high magnification image to the left ($\times 100,000$) enables length measurement of each tube.



**Accelerating voltage
30 kV**



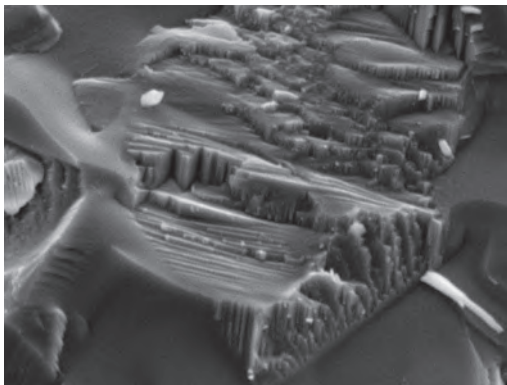
100 nm



0.5 μm

Specimen: Carbon nanotubes
Accelerating voltage: 30 kV
Magnification (left): $\times 100,000$
(right): $\times 30,000$
High-vacuum mode, Secondary electron image

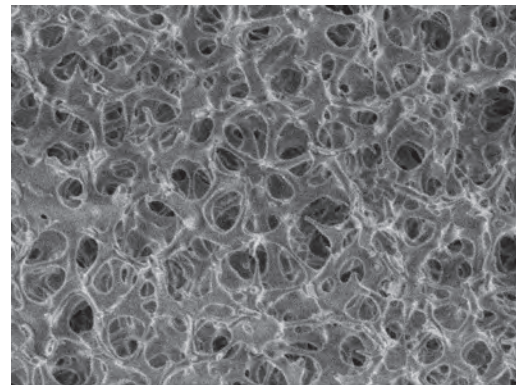
This image shows a cross section of an insulator.



1 μm

Specimen: Insulator
Accelerating voltage: 5 kV
Magnification: $\times 20,000$
High-vacuum mode, Secondary electron image

This hollow fiber specimen has a complicated pore structure. Executing CF scan mode at low voltage allows for clear observation without the need to add a conductive coating.

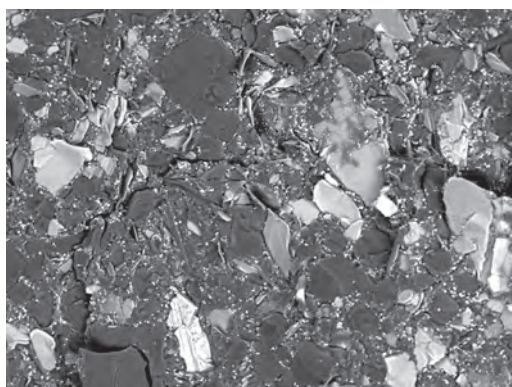


1 μm

Specimen: Hollow fiber
Accelerating voltage: 1.0 kV
Magnification: $\times 10,000$
High-vacuum mode, Secondary electron image

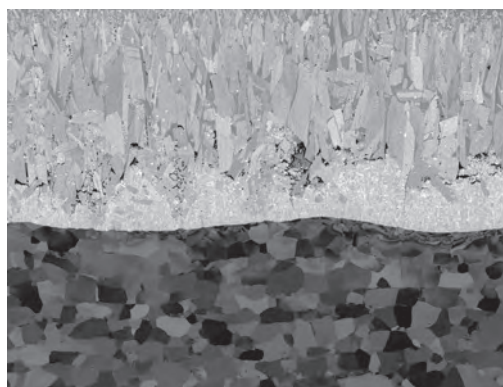
Backscattered electron image

Backscattered electron composition image shows differences in composition (average atomic number) with different intensity. The backscattered electron image enables confirmation of the distribution of lubricants on the surface of a vitamin pill.



Specimen: Vitamin pill (sugar portion)
Accelerating voltage: 5 kV
Magnification: $\times 2,000$
High-vacuum mode, Backscattered electron composition image

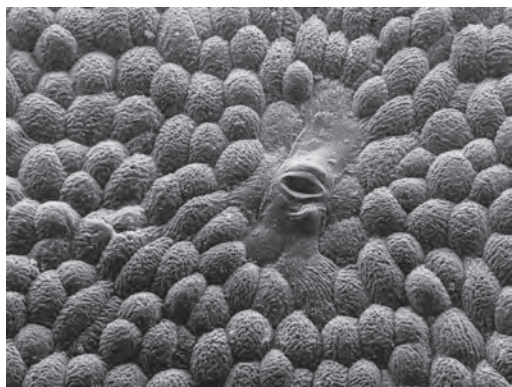
A flat surface prepared with our CROSS SECTION POLISHER™ (CP) was observed by a backscattered electron composition image at low accelerating voltage. The channeling contrast of zinc-plated and iron (substrate) was confirmed.



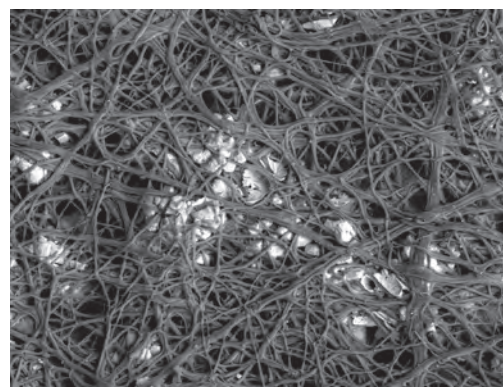
Specimen: Hot dip galvanizing on iron
Accelerating voltage: 5 kV
Magnification: $\times 500$
High-vacuum mode, Backscattered electron composition image

Low-vacuum (LV) mode

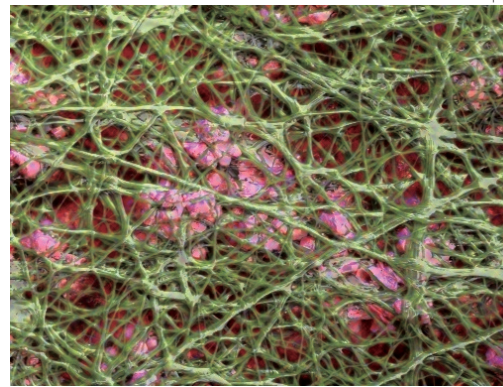
The JSM-IT200(LV)/(LA) comes with LV mode. The LV mode neutralizes air charging on the specimen surface by introducing the air into the chamber, enabling observation of a non-conductive specimen in its native state. Another merit of the (LA) version is easy elemental analysis without specimen pre-treatment.



Specimen: Peel of banana
Accelerating voltage: 5 kV
Magnification: $\times 500$
Low-vacuum mode, Low-vacuum secondary electron image*



50 μm



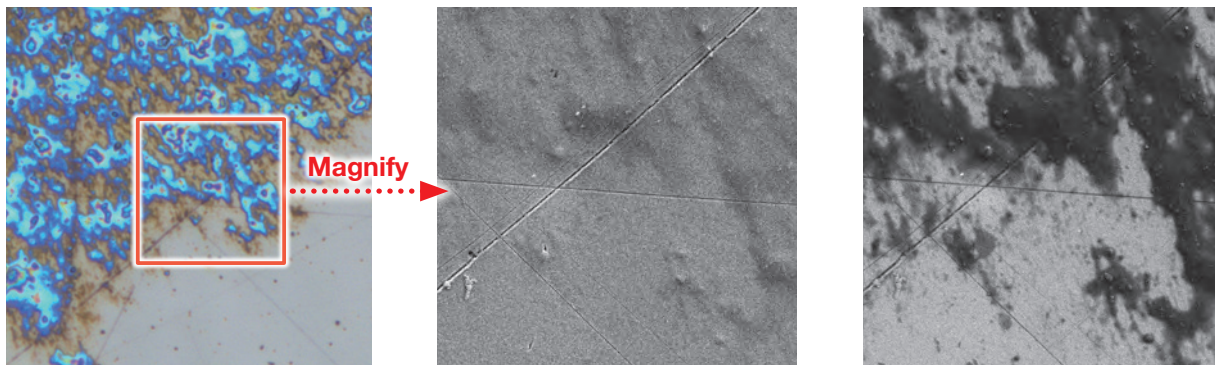
Specimen: Egg-shell membrane
Accelerating voltage: 10 kV, Magnification: $\times 500$
Low-vacuum mode
Top: Backscattered electron stereoscopic image
Bottom: Composite elemental map (Green: C, Blue: O, Red: Ca)

* To observe a low-vacuum secondary electron image, Low Vacuum Secondary Electron Detector (option) is required.

Functions & Applications

Low accelerating voltage

Observation at low accelerating voltage enables finer surface structures to be studied. Contaminants on the surface viewed with an optical microscope are difficult to observe at an accelerating voltage of 15 kV. Lowering the voltage to 2 kV clearly visualizes the contaminants.



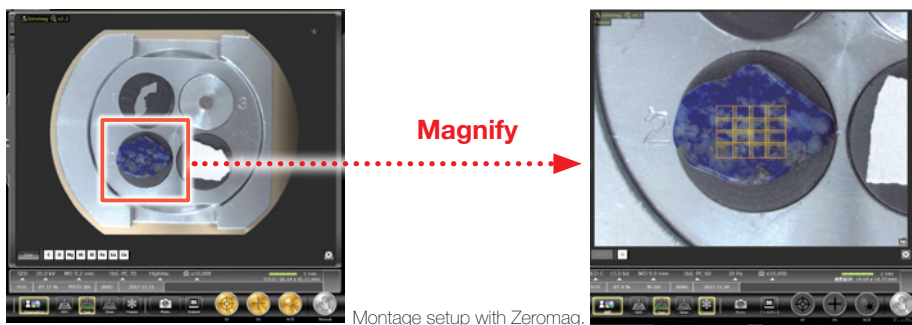
Optical microscope image
Specimen: Micro SD
Magnification: x3,000
High-vacuum mode, Secondary electron image

Accelerating voltage: 15 kV 5 µm

Accelerating voltage: 2 kV 5 µm

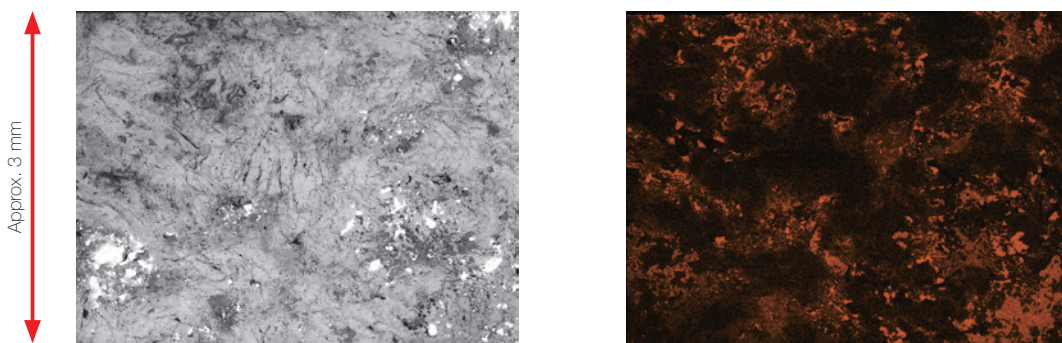
Montage: Automated large-area observation and analysis using Zeromag.

Montage is an effective function for analyzing materials over large areas (for foreign materials, ductile or brittle fracture, etc.). With Zeromag, it is easy to set up one or more montage areas for imaging and analysis. "Tilt Correction", "Field Overlap" and "Autofocus Point Setting" functions are built in.



Montage setup with Zeromag.

Montage is an effective function to acquire detailed information across a specimen area.



Montage result: 4 × 4
(Left: Backscattered electron composition image, Right : Na map)
Specimen: Lapis lazuli
Accelerating voltage: 15 kV, Low-vacuum mode

Maintenance

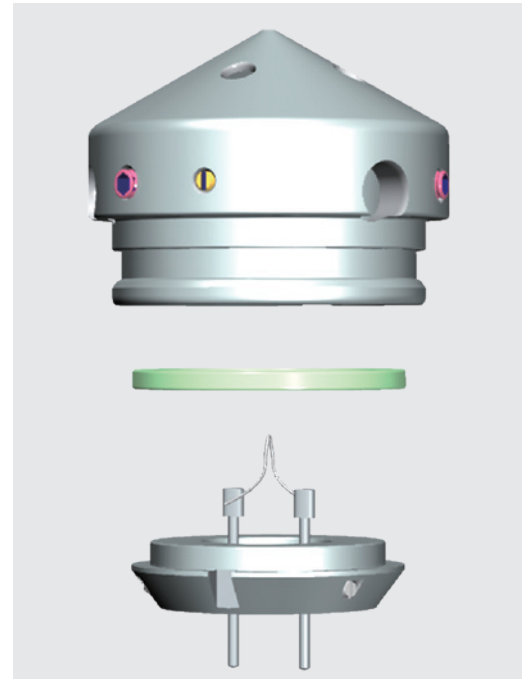


Filament

Filaments for the JSM-IT200 are pre-centered and require no centering by the operator.

Gun alignment

Fully automated alignment function is built in.

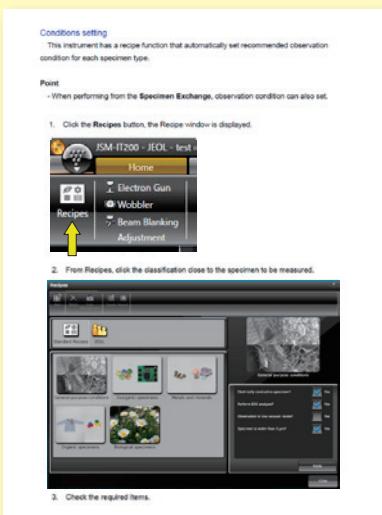


By simply inserting the filament into the Wehnelt and fixing it, the filament is automatically aligned to the center axis.

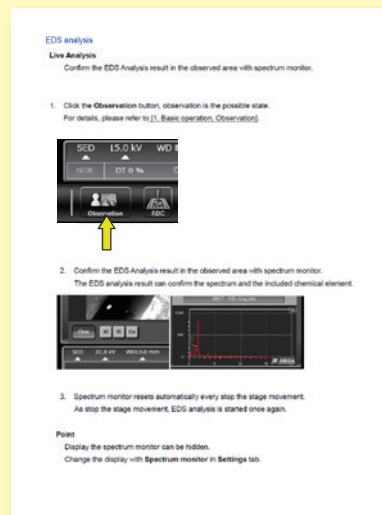
Help Guide for any operation

The help guide, makes it easy to understand operation methods of SEM and EDS, as well as maintenance procedures. With this guide, novice users can quickly achieve results.

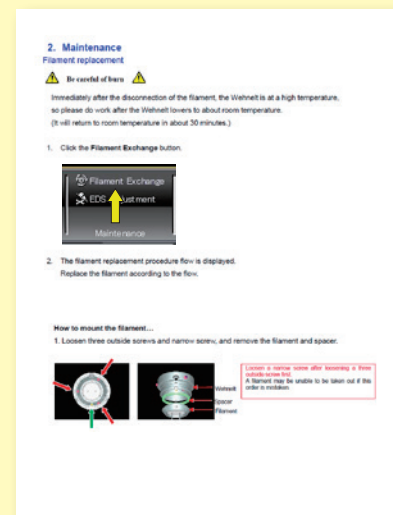
Help guide



Condition setting



Analysis



Maintenance

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