

A scanning electron microscope (SEM) image showing a detailed cross-section of a pine needle. The image reveals the intricate structure of the needle, including the central vascular bundle, the surrounding mesophyll cells, and the protective cuticle. The needle is shown in a longitudinal section, highlighting its cylindrical shape and the arrangement of its internal tissues.

# Tabletop SEM

The Ultimate Solution

*Scanning Electron Microscopy*

Tabletop SEM



# e-beam pioneer

Specialized corporation in E-beam technology, leading the nano era



*Superior Service & Exciting Challenge!*

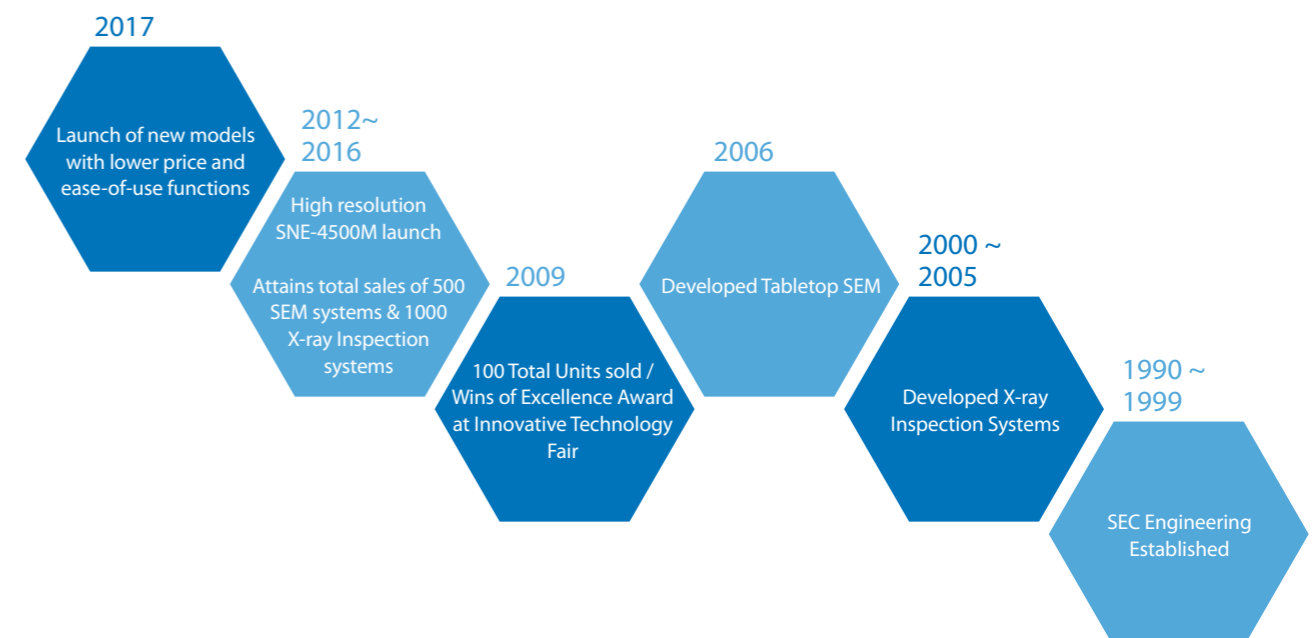
## History

SEC Co., Ltd. has been developing and selling equipment for inspection and analysis for over 20 years. Since our establishment in 1991, we have been continually developing the highest quality e-beam inspection equipment in Korea. With the ability to locally source all components and constantly developing new technologies, SEC has distinguished itself amongst the global competition. With the ability to adapt to changes in technology, SEC offers products that can satisfy the customers needs.

## "Speedy Entertaining Microscope"

With over 600 units sold since its introduction in 2006, the Tabletop SEM's developed by SEC offer the capabilities of the full size SEM in a compact form. With its ease of use, even a novice SEM user can obtain high quality data with minimal training.

*Seeking the best! Walking the right path! Keeping the faith!*





# What is Tabletop SEM?

## Major Features

- ▶ 5 models optimized for Basic to Advanced imaging requirements
- ▶ Fast, high quality imaging
  - Chamber evacuation time within 3 min.
  - Chamber vacuum released within 1 min.
- ▶ Simple installation and transporting
  - Setup within 30 minutes
  - Minimized installation space
- ▶ Reduced maintenance and service costs compared to full-size SEM
- ▶ Elemental Micro-Analysis using Energy Dispersive Spectroscopy (EDS)

## Application

- ▶ Material Science
  - Metals, Ceramic, Pharmaceuticals, Fibers, CNT, Battery
- ▶ Semiconductor / Electronics / Automobiles
  - Wafer, Package, Pattern, PCB, OLED
  - Polymer, Display, Nano tech
- ▶ Environmental / Energy / Education / Medical
- ▶ Bio / Food
  - Biomedical, Biology, Plants, Organisms, Bacteria, Cosmetics

Performance					
Models	SNE-4500M Plus(A)	SNE-4500M Plus(B)	SNE-4500M	SNE-3000MS	SNE-3200M
Resolution	5nm			15nm	
Magnification	150,000x		100,000x	60,000x	
Detector	SE	SE/BSE	SE	SE	SE/BSE
Vacuum	High	High/Low	High	High	High/Low
Stage	X,Y,R,Z,T : Fully Motorized		X,Y,R,Z,T : Manual	X,Y,R : Manual	

Specifications			
Stage Movement	X,Y : 40mm, R : 360°, Z : 0~40mm, T : -15~90°	X,Y : 40mm R : 360° T : 0~45° Z : 0~35mm	X,Y : 35mm, R : 360°
Max. Sample Size	80mm(D) / 50mm(H)	80mm(D) / 35mm(H)	70mm(D) / 30mm(H)
CCD Camera	Top-view CCD Camera	-	-
O.L Aperture Type	30,50,50,100um (Variable type)		200um (single)
Electron Beam source	Pre-centered Tungsten Filament Cartridge		
Acceleration Voltage	1kv ~ 30kv(1/5/10/15/20/30) - 6Step		
Display Mode	320×240, 640×480, 1,280×960, 2,560×1,920, 5,120×3,840		
Automation Function	Start, Focus, Stigmator, Contrast & Brightness		
Image Format	BMP, JPEG, PNG, TIFF		
Vacuum Pump	Rotary + Turbo molecular Pump (Fully Automation System)		

# SNE-4500M Plus



SNE-4500M Plus model provides ease-of-use and the best performance of all.

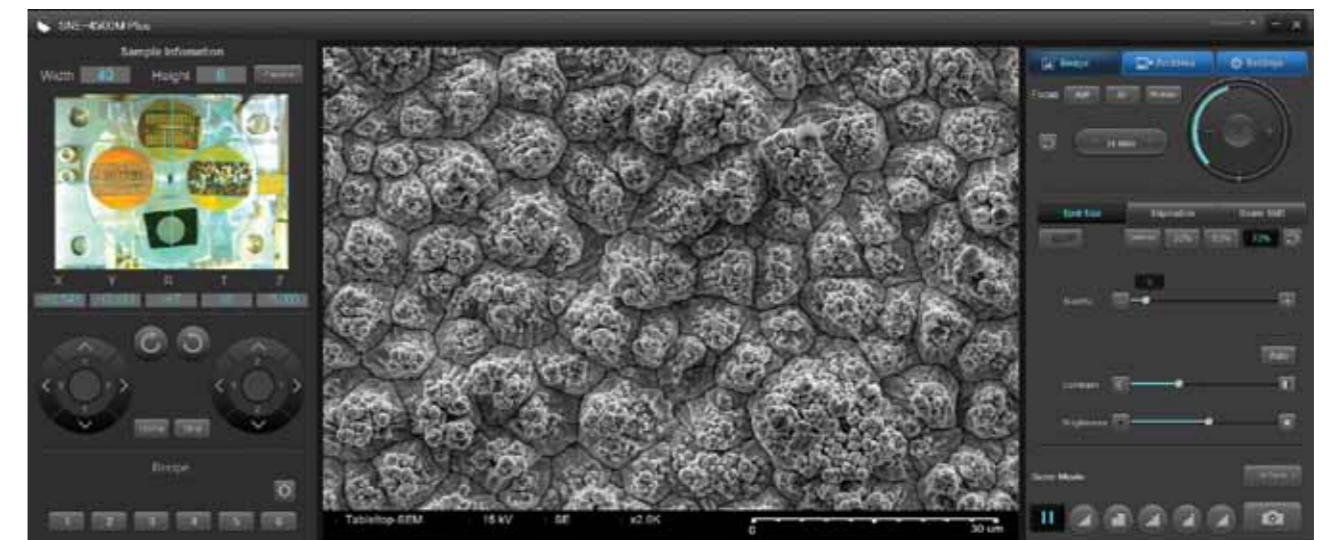
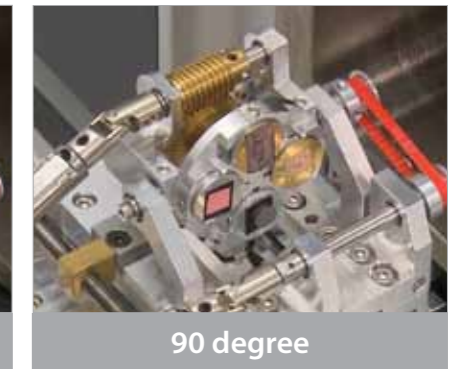
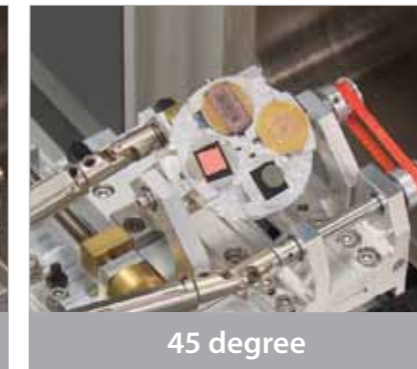
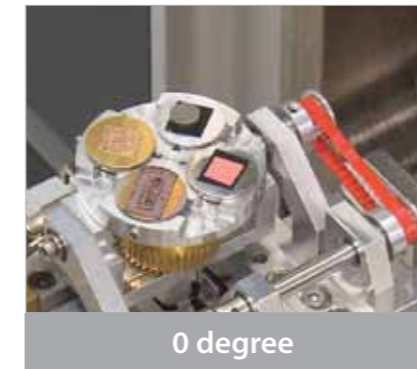
Fast moving by fully motorized stage and easy to find sample analyzing location with Top-view CCD camera.

SNE-4500M has magnification of Maximum 150,000X, and it is optimized to surface / cross section analysis with the wide stage composition.

▶ A type : SE detector and high vacuum

▶ B type : SE & BSE detector and high & low vacuum

## " Tilting -15 to 90° degree "



### Navigation Camera Mode

Sample Images Snap shot : Image saving function / Image rotates with Rotation / contrast and brightness adjustment function.

### Stage Control Mode

X, Y, R, Z, T - 5 axis moving, Motor speed control, Move to Home, anti-collision function.

### Recipe Function

Save location(up to 6) and recall -> re-analyze the same location

Able to save SEM analysis conditions and re-analysis in the same condition.

## SNE-4500M



### High Resolution Table-top SEM

The high resolving power allows real-time specimen inspection up to 100,000X. Obtaining high quality images of extremely small features or particles is made possible by utilizing the standard Variable Aperture (30, 50, 100 um) and optimal sample positioning with omnidirectional control of the 5 axis stage.

## SNE-3200M



### Advanced Table-top SEM

Both SE and BSE Detectors are included for SEM image analysis to enable diverse analysis for a wide variety of sample types. Both High and Low (charge reduction) Vacuum modes are standard allowing nonconductive sample analysis without metal coating.

## SNE-3000MS

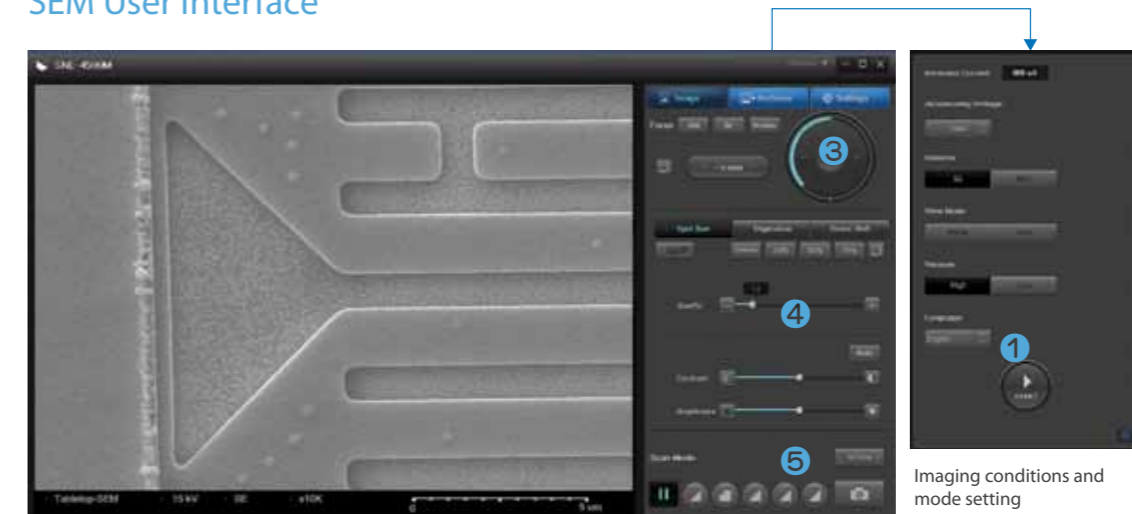


### Entry-level Table-top SEM

The most economical model with optimized specifications for easy SEM imaging. Able to image samples within 3 minutes from exchanging samples. Optional EDS is available also at entry level prices for precise elemental micro-analysis.

## Main Features

### SEM User Interface



Imaging conditions and mode setting

User centric software interface provides an easy-to-learn and conveniently organized interface.

### Easy Operating Procedures

- ① Set accelerating voltage, detector, and vacuum mode → Beam on
- ② Navigate to sample with Stage motion controls
- ③ Set magnification and adjust focus
- ④ Adjust contrast and brightness
- ⑤ Choose scan mode and save high resolution image

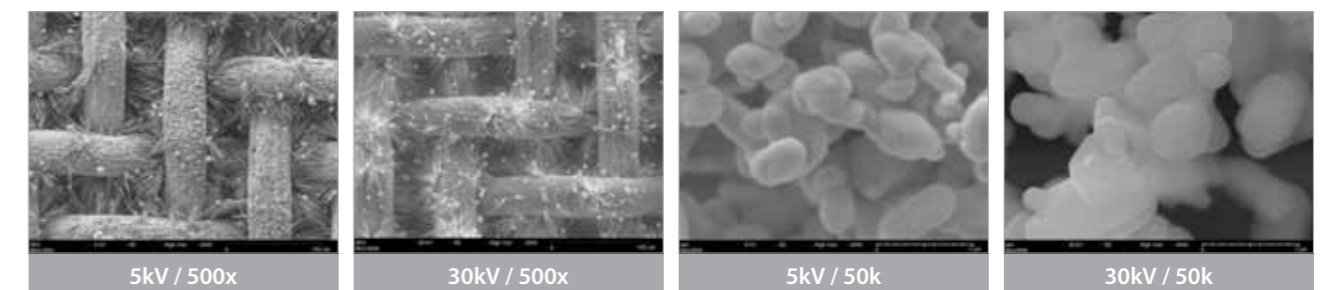
### Additional Functions



- ▶ Easy operation with Auto focus, brightness and contrast.
- ▶ Dual view mode displays SE/BSE images simultaneously and saves the detector images selectively.
- ▶ GUI is offering the measurement tools for size, angle and extent of the sample and edits tools for the brightness and contrast of saved images.
- ▶ Shortcut key commands support more precise and rapid SEM imaging.
- ▶ It is capable to operate image analysis and measurement tool programs such as 3D-view, Auto Count and Colorization by Image analyzer.

### Wide Range of Accelerating Voltages

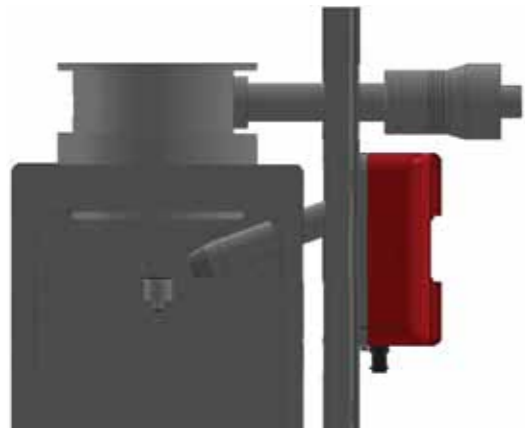
With 1~30kv accelerating voltages, it is capable to get various images suitable for each sample's condition.(1/5/10/15/20/30kV)





# EDS

Energy Dispersive Spectroscopy (EDS) is optionally available for analyzing sample composition. EDS is used for qualitative and quantitative elemental analysis by detecting characteristic X-rays generated as a result of the electron beam excitation of the atomic structure. EDS Detectors can be installed on all SEC SEM models and are available with both compact, simplified EDS software or more advanced spectroscopy solutions, all from well known industry standard EDS suppliers.

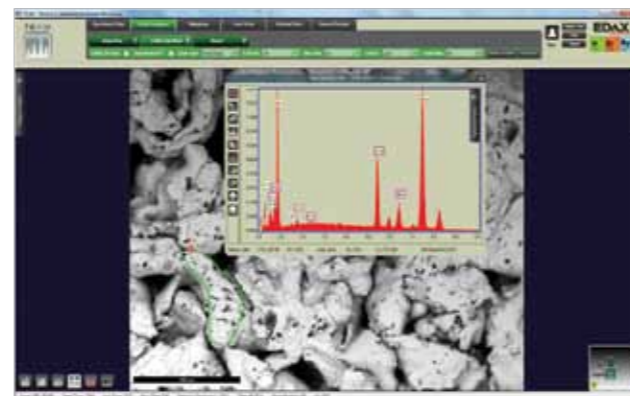
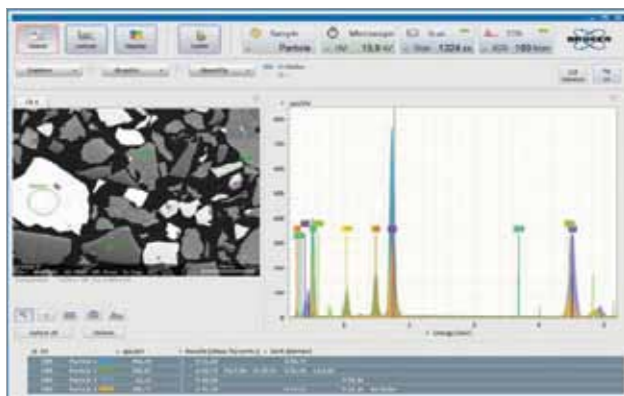


## Features

- ▶ SDD Type – no LN2 required
- ▶ Able to analyze light elements with good resolution.
- ▶ Provides reliable weight or atomic based quantitative elemental analysis results.
- ▶ User-friendly interface with fast and simple manipulation
- ▶ Main functions include Elemental Mapping, Point Analysis, Line Scan, automated Reporting and more.

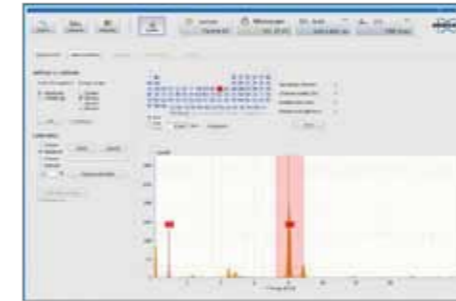
Specifications		
Brand	BRUKER	EDAX
Model		
	X Flash Series	Element
Detector type	Silicon Drift Detector (SDD)	Ultra-thin Silicon Nitride (Si <sub>3</sub> N <sub>4</sub> ) window
Energy resolution	Mn Ka ≤ 129eV	Mn Ka ≤ 129eV
Detector active Area	30mm <sup>2</sup>	25mm <sup>2</sup>
Detection range	Boron(5) ~ Americium(95)	Boron(5) ~ Americium(95)
X-ray throughput	> 150,000 cps	> 100,000 cps

## EDS Software



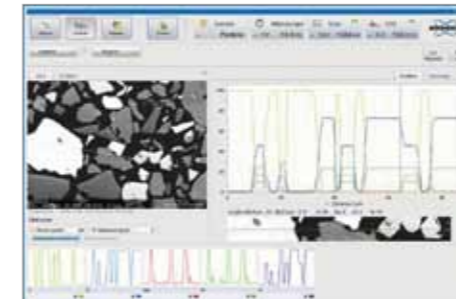
## Qualitative or Quantitative Analysis

Acquire fast and accurate qualitative or quantitative analysis results with automatic peak deconvolution providing higher accuracy and reliable results for the defined area or point of interest.



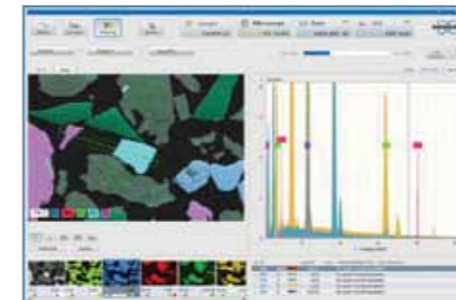
## Line Scan

The line scan mode provides comparative elemental analysis along a user defined line with element profiles graphically represented. Great for cross section thickness and elemental transition mixing studies.



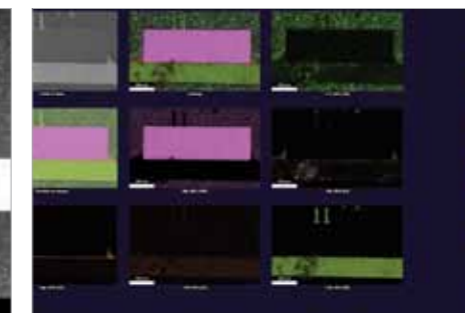
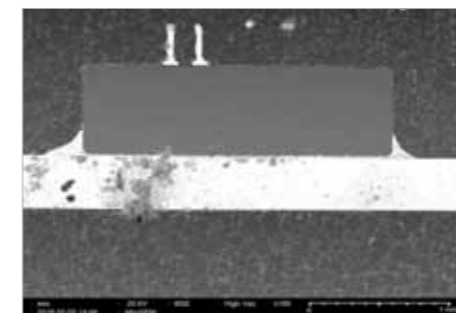
## Mapping

Produce colorized maps with color-coded elemental distributions to represent to all the elements present and where they are located within an area of the specimen.

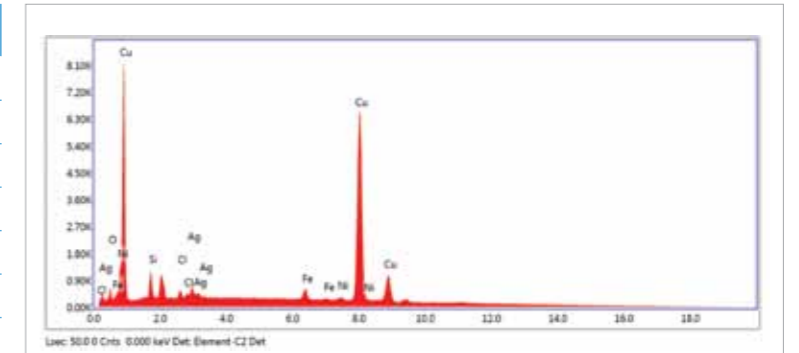


## Report

Available for variable report formats and editable with desired formats.



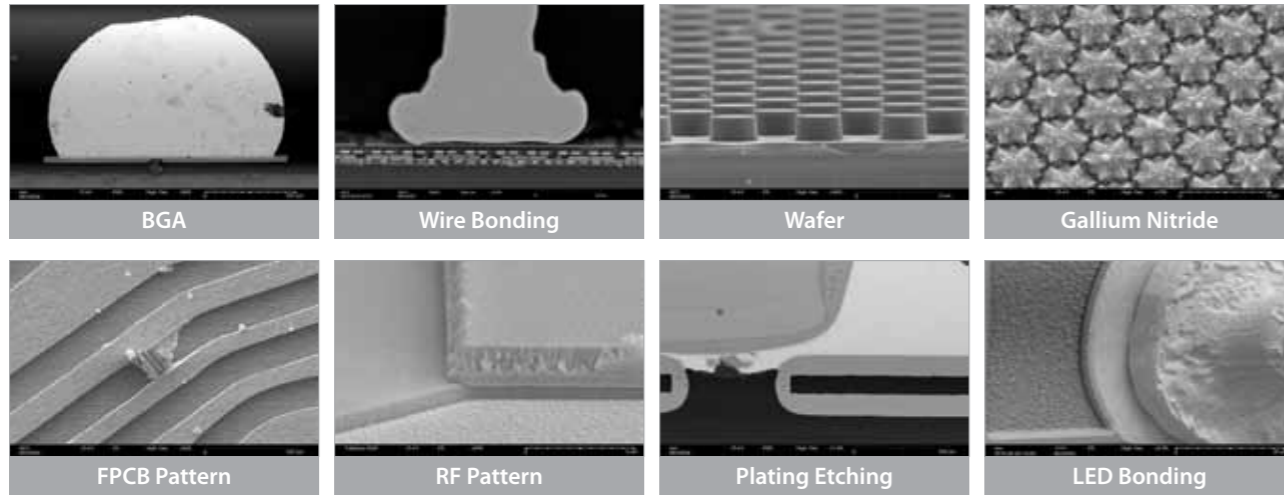
Element	Weight %	Atomic %	Net Int.	Error %
O	1.54	5.66	68.23	11.83
Si	2.62	5.50	152.87	9.59
Cl	0.52	0.86	41.08	15.79
Ag	1.97	1.08	85.82	10.24
Fe	2.18	2.30	114.16	8.88
Ni	1.33	1.34	43.87	13.53
Cu	89.83	83.27	2061.44	2.20



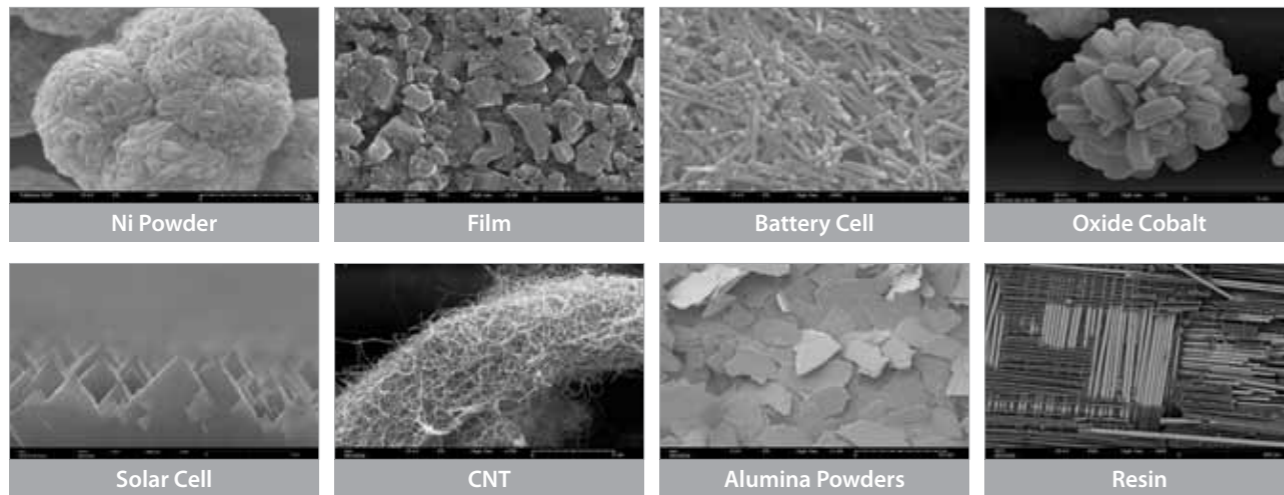


# SEM APPLICATION

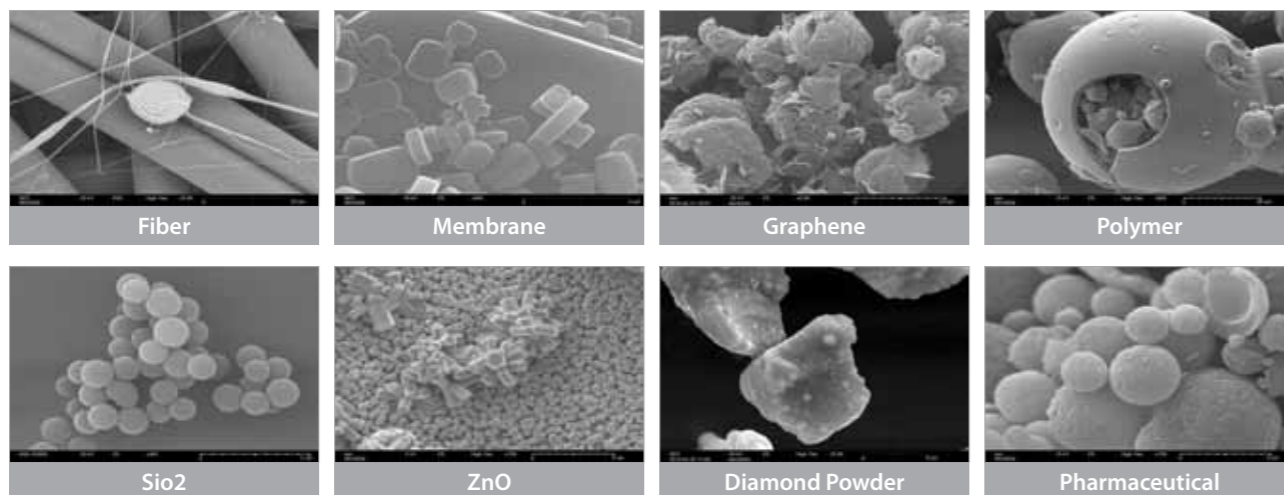
## Semiconductor & Electronics



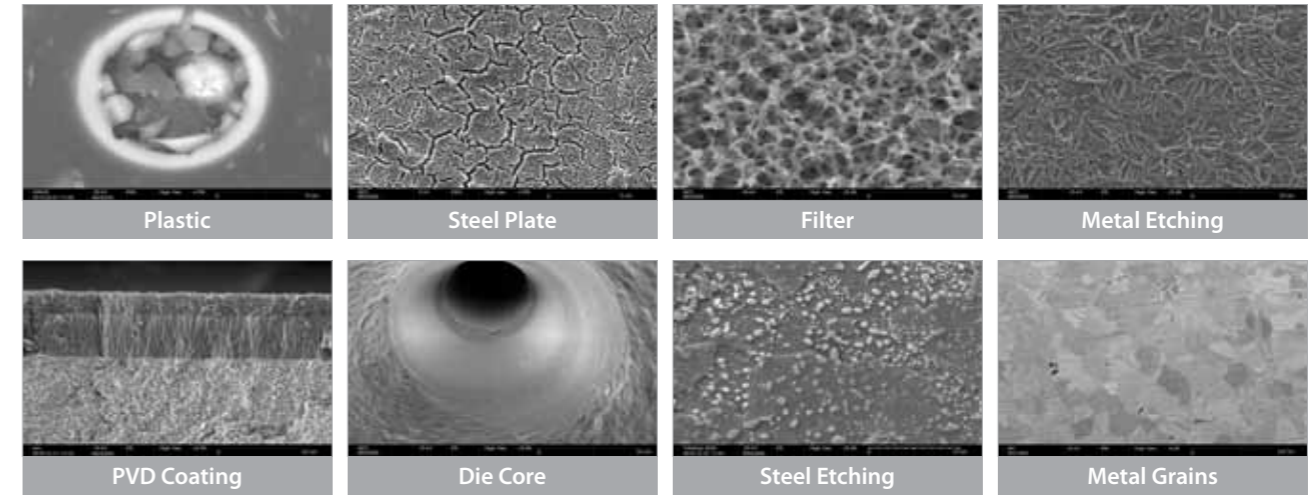
## Energy & Chemistry



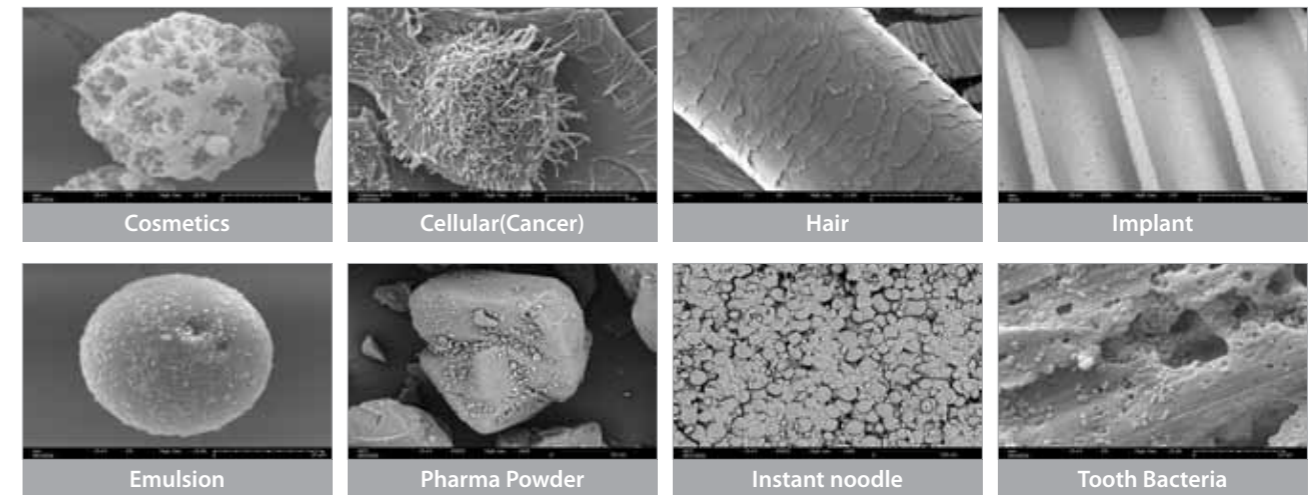
## Materials



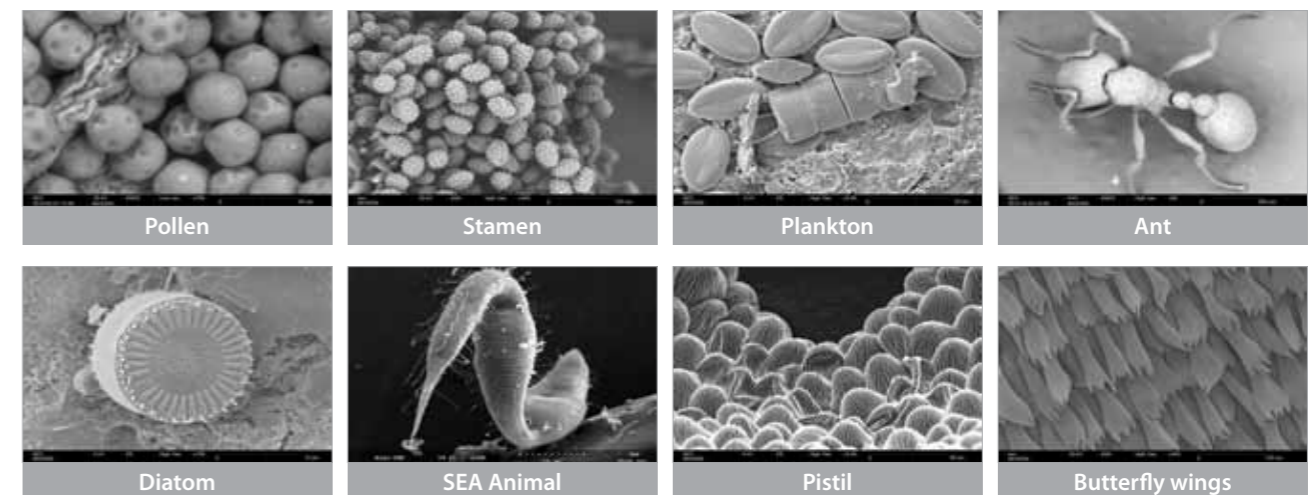
## Automotive & Metals



## Medical & Health



## BIO





## COMPARISON OF SE & BSE IMAGING

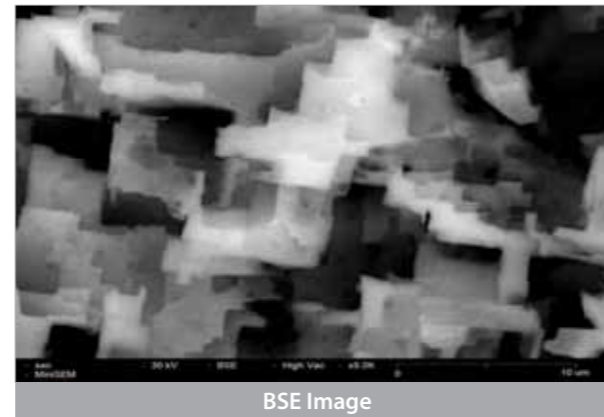
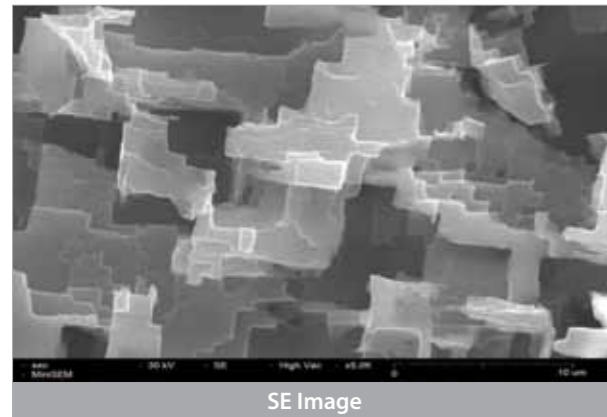
### SE - Secondary Electron

Provides images with surface topography depicted in fine detail.

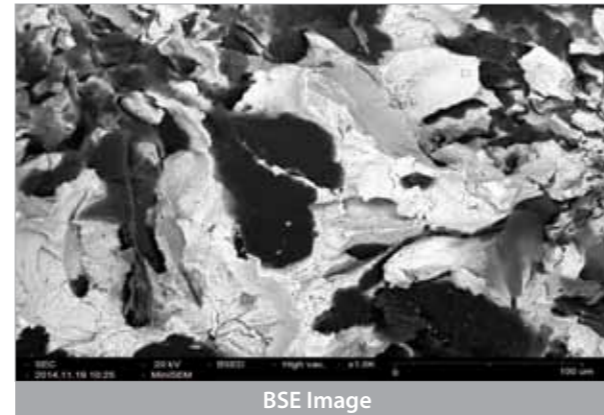
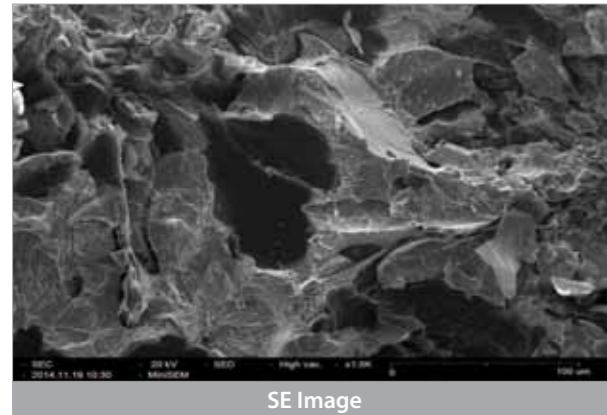
### BSE - Back Scattered Electron

Provides images with atomic weight contrast as brightness follows the elemental atomic number.

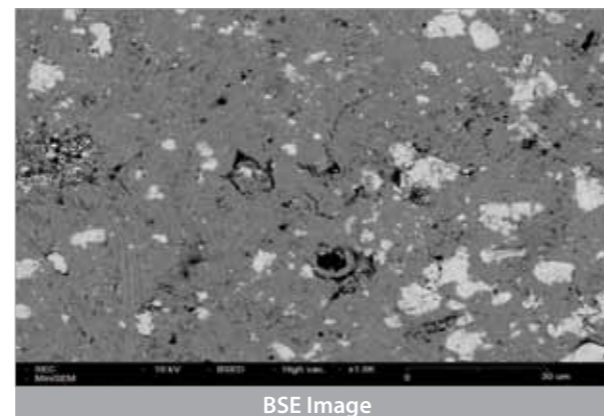
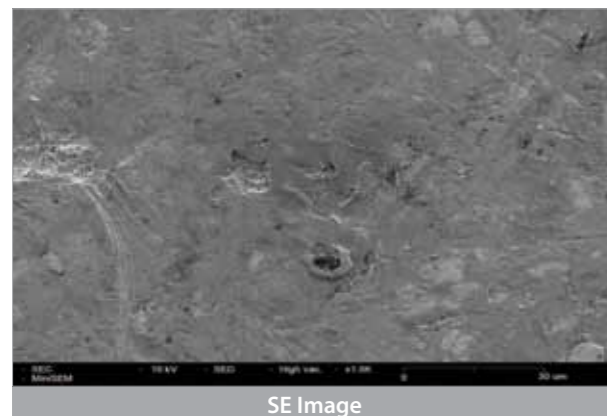
#### Smartphone Metal Case



#### Mineral



#### Metal Alloy

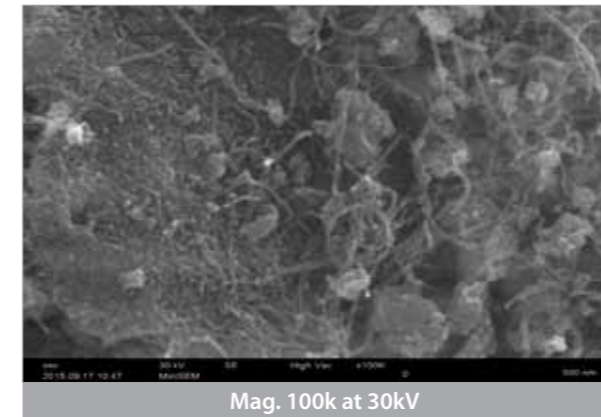


## HIGH RESOLUTION PERFORMANCE

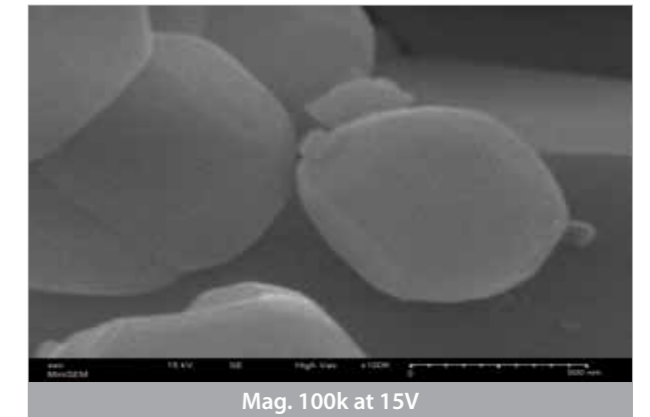
SEC's SEM models provide "live" imaging up to 150,000X.

It is offering the high-level resolution image among Tabletop-SEM models and it is able to get the optimal images for sample's features by accelerating voltage.

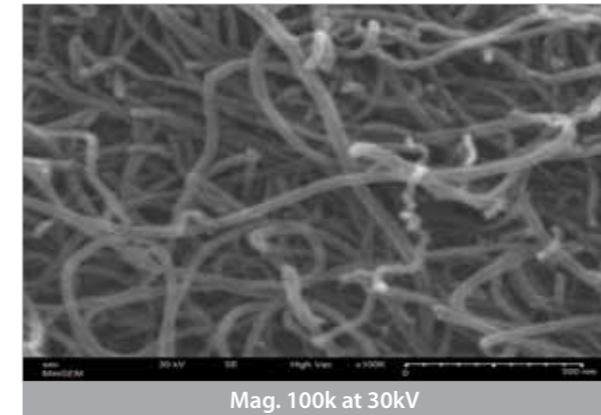
#### Lanthanum Powder



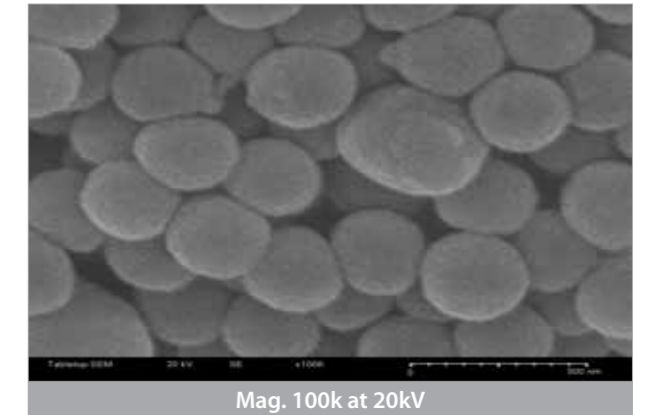
#### Ceramic



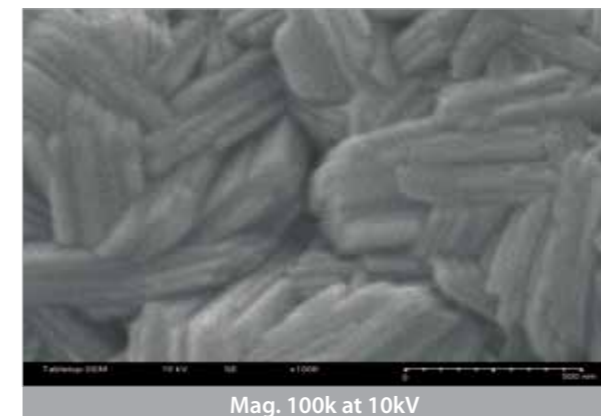
#### Carbon Nano Tube



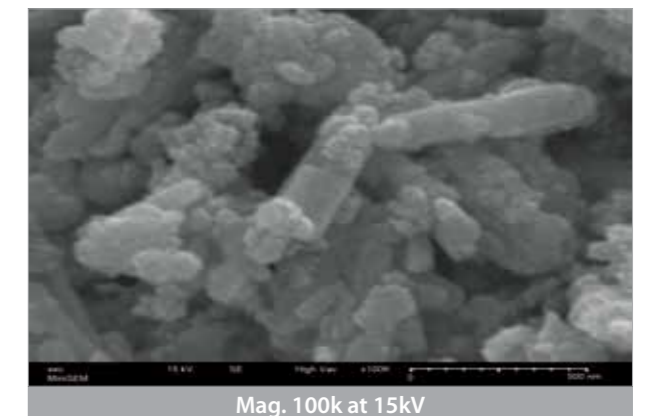
#### TiO2



#### Battery



#### Emulsion



## OPTION

### Ion Sputter Coater



The Ion Sputter Coater allows for imaging of nonconductive samples in high vacuum mode for the highest resolution imaging. Sputter coaters increase conductivity by coating the test specimen with a few nanometer thick metal film of Au or Pt. The higher conductivity increases the amount of secondary electron generation and creates higher resolution images. \* Coating Target : Au or Pt

- ▶ MCM-100 : Quick Mode
- ▶ MCM-200 : Touch PAD – Advanced Mode

### Motorized Stage

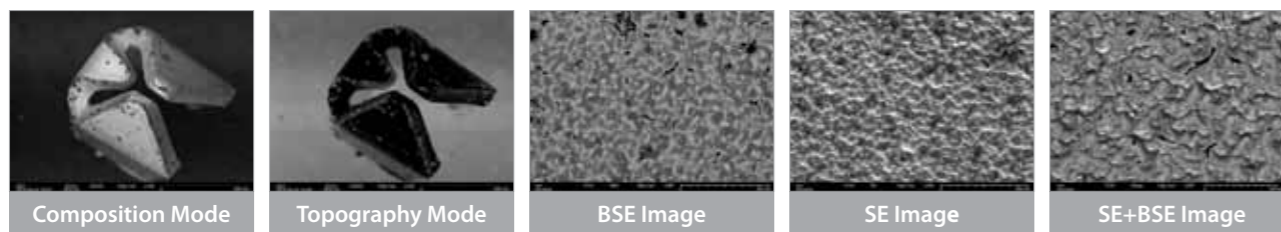


A motorized stage is available for all SEM models and increases imaging throughput by allowing the user to quickly navigate around the specimen to find features of interest. Movement is done with either the provided joy stick or simply clicking a point of interest within the image to move that point to the image center.

### BSE Detector

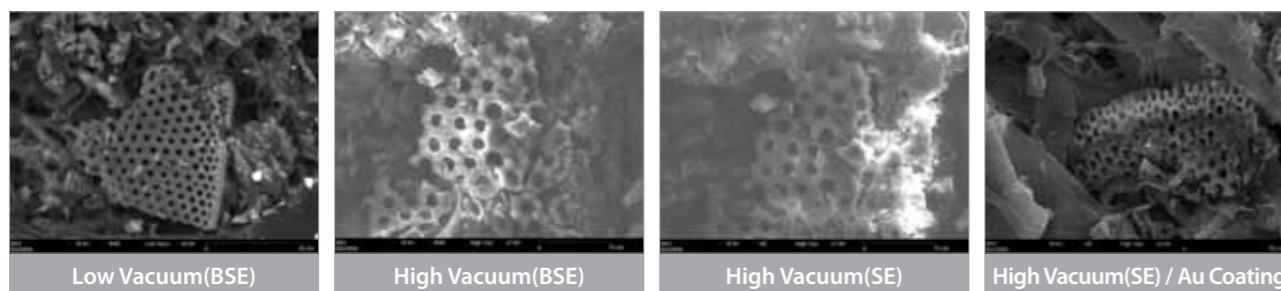
Using both SE and BSE detectors, the software allows creating composite images that reveal both topographic and composition combined into a single image - able to get 3-dimensional image

\* 4-Channel Solid State type : 4 segment Silicon Diode



### Low Vacuum Mode

Analyze non-conductive samples – NO conductive coating required.



## SEM SPECIFICATIONS

Control System	
Operating System	Microsoft Windows® 7 or 10
CPU	Intel® Core™ I5
Memory / HDD	4GB / 500G
Interface Connector	USB 2.0
Monitor	22 inch Wide

Dimensions and Weight	
Main Unit	390(W)x380(D)x560(H), 88kg
Controller Unit	390(W)x325(D)x560(H), 30kg
Rotary Pump	400(W)x160(D)x340(H), 24kg

Installation Condition	
Temperature	15 to 30°C
Humidity	Less than 80%
Power Source	Single Phase AC 100 ~ 240V 1kW, 50/60Hz

Spare-Parts	
Tungsten Filament (pre-centered cartridge assembly)	
Sample Holders / Stubs (15 & 25mm dia, 0/45/90 tilt)	
Carbon Tape	
Blower	
Storage Box	
Vacuum Grease	
Pincette	
Working Distance JIG	
Tools and Wrenches	
Operation Manual & CD	

Standard Items Included	
SEM Unit	
Pump Unit (Rotary+Turbo)	
PC (Desktop PC)	
Monitor	

### Example of Installation Layout

