Phenom ProX Desktop SEM

The high-performance desktop SEM

Thermo Fisher
S C I E N T I F I C
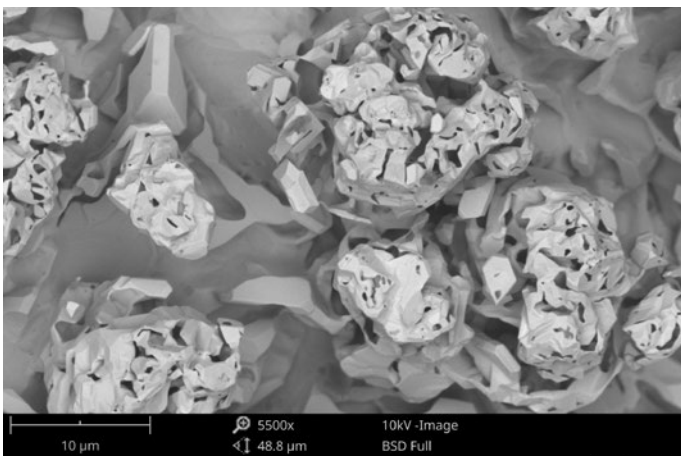
Platinum coated metal grid (BSD)
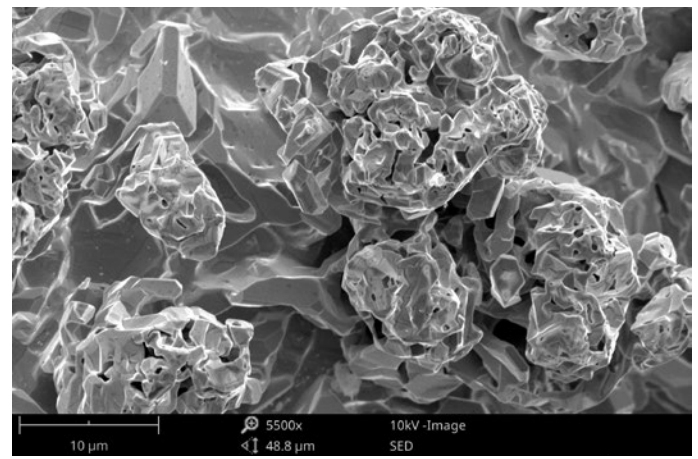
Platinum coated metal grid (SED)

The Thermo Scientific™ Phenom ProX scanning electron microscope (SEM) is based on the 5th generation Phenom desktop SEM platform and is a high-performance SEM for imaging and analysis. With the Phenom ProX desktop SEM, sample structures can be physically examined and their elemental composition determined. Besides point analysis, the optional Elemental Mapping and Line Scan software allows further analysis of the distribution of elements.
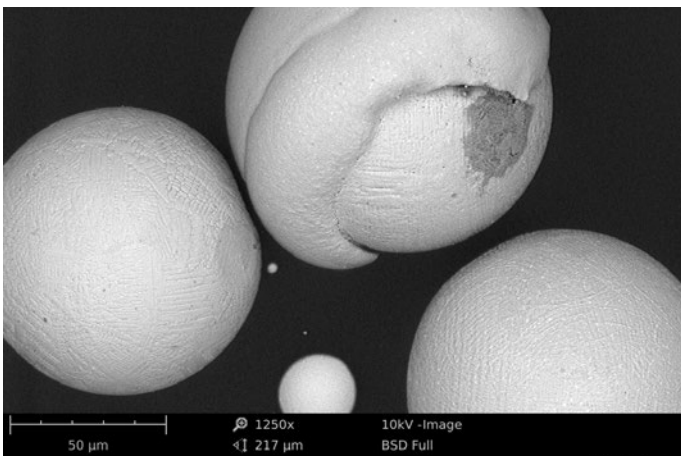
Phenom ProX Desktop SEM

The Phenom SEM microscopes are intuitive to use, fast to create results and built to high quality standards. These core principles have been used to develop and create the Phenom ProX spectroscopy system for best-in-class imaging and analysis. Compared to its predecessors, the Generation 5 Phenom ProX SEM has at least a 20% better resolution, and an even better user experience to address a wider range of applications, including samples that are very sensitive to beam damage. Alongside acquiring high-resolution images of microscopic structures, there is often a need to identify the different chemical elements in a specimen.
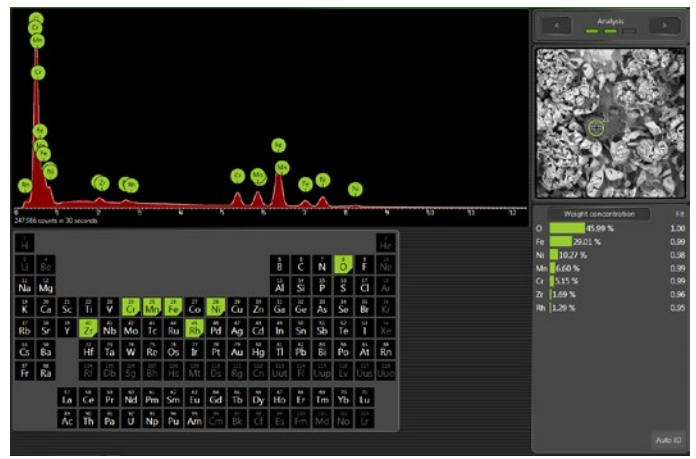
This is accomplished in the Phenom ProX with the Element Identification (EID) software package and a specially designed and fully integrated Energy Dispersive Spectrometer (EDS). The Phenom ProX is the most extended solution for fast and user friendly imaging and analysis. This is enhanced by additional sample holders that allow for example sample tilting and cooling for imaging an even greater diversity of samples.

Imaging Specifications	
Imaging modes	
Light optical	Magnification range: 20 - 135x
Electron optical	• Magnification range: 80 - 150.000x • Digital zoom max. 12x
Illumination	
Light optical	Bright field / dark field modes
Electron optical	• Long lifetime thermionic source (CeB_6) • Low, imaging, spot analysis and mapping mode, beam currents selection

Acceleration voltages	• Default: 5 kV, 10 kV and 15 kV • Advanced mode: adjustable range between 4.8 kV and 15 kV imaging and analysis mode
Resolution	< 10 nm (BSD) < 8 nm (SED)
Detector	
Standard	Backscattered electron detector
Optional	Secondary electron detector
Digital image detection	
Light optical	Color navigation camera
Electron optical	High-sensitivity backscattered electron detector (compositional and topographical modes)
Image formats	
JPEG, TIFF, BMP	
Image resolution options	
456 x 456, 684 x 684, 1024 x 1024 and 2048 x 2048 pixels	
Data storage	
USB flash drive, Network, ProSuite PC	
Sample stage	
Computer-controlled motorized X and Y	
Sample size	
• Up to 32 mm (Ø) • Up to 100 mm (h)	
Sample loading time	
Light optical	< 5 s
Electron optical	< 30 s

Cobalt chrome particles


EDS analysis of cobalt

Step-by-step data collection

A dedicated software package is included and installed on the ProSuite PC to control the fully integrated EDS detector. Elemental analysis has become as easy as imaging, since there is no need to switch between external software packages or computers. The EDS-technique analyzes X-rays generated by the electrons from the electron beam interacting with the sample. The Phenom CeB_6 electron source generates the highest number of X-rays in its market segment.

The EID software package allows the user to identify elements within the sample via the spot mode analysis. All results are verified using iterative peak stripping deconvolution. The step-by-step guided process within the software helps the user to collect all X-ray results in an organized and structured way. Optionally, this software can be expanded with the Elemental Mapping and Line Scan option.

EDS Specifications

Detector type

- Silicon Drift Detector (SDD)
- Thermoelectrically cooled (LN_2 free)

Detector active area	25 mm^2
X-ray window	Ultra-thin Silicon Nitride (Si_3N_4) window allowing detection of elements B to Am
Energy resolution	Mn Kα ≤ 132 eV
Processing capabilities	Multi-channel analyzer with 2048 channels at 10 eV/ch
Max. input count rate	300.000 cps
Hardware integration	Fully embedded

Software

- Integrated in Phenom ProSuite
- Integrated column and stage control
- Auto-peak ID
- Iterative strip peak deconvolution
- Confidence of analysis indicator
- Export functions: CSV, JPG, TIFF, ELID, EMSA

Report

Docx format

System Specifications

Dimensions & weight

Imaging module	286(w) x 566(d) x 495(h) mm, 50 kg
Diaphragm vacuum pump	145(w) x 220(d) x 213(h) mm, 4.5 kg
Power supply	156(w) x 300(d) x 74(h) mm, 3 kg
Monitor	375(w) x 203(d) x 395(h) mm, 7.9 kg
ProSuite	• Standard ProSuite System including: 19" monitor with PC and network router mounted • 375(w) x 250(d) x 395(h) mm, 9 kg

Requirements

Ambient conditions

Temperature	15°C ~ 30°C (59°F ~ 86°F)
Humidity	< 80% RH
Power	Single phase AC 110 - 240 Volt, 50/60 Hz, 300 W (max.)

Recommended table size

150 x 75 cm, load rating of 100 kg

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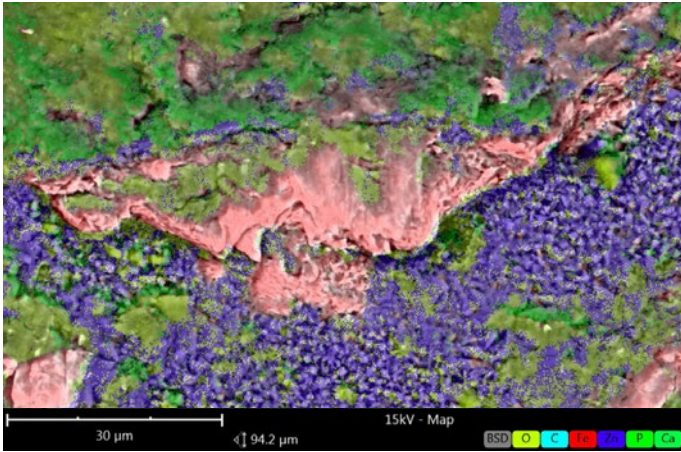
Elemental Mapping of zinc phosphate sample
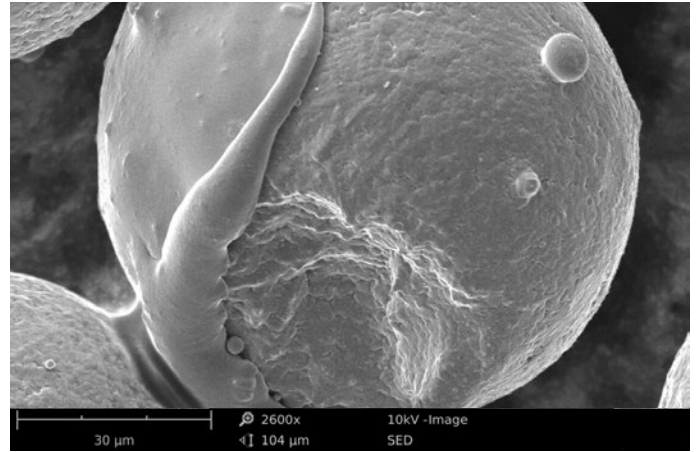
SED image of speed steel particle

Elemental Mapping and Line Scan

The Elemental Mapping functionality visualizes the distribution of elements throughout the sample. The selected elements can be mapped at a user specified pixel resolution and acquisition time. The real time mapping algorithm shows live build up of the selected elements. For a user, it is simply click and go to work with the Elemental Mapping and Line Scan functionality of the Phenom ProX desktop SEM.

The Line Scan functionality shows the quantified element distribution in a line plot. This is especially useful for coatings, paints and other applications with multiple layers. All results of both the Elemental Mapping and Line Scan functionality can be easily exported by using an automated report template.

Secondary Electron Detector

The standard detector in the Phenom ProX is a four-segment backscattered electron detector (BSD) that yields sharp images and provides chemical contrast information.

A secondary electron detector (SED) is optionally available on the Phenom ProX. The SED collects low energy electrons from the top surface layer of the sample. It is therefore the perfect choice to reveal detailed sample surface information. The SED can be of great use for applications where topography and morphology are important. This is often the case when studying microstructures, nanostructures or particles.

Element Mapping & Line Scan Specifications	
Element Mapping	
Element selection	10 individual user specified maps, plus backscatter image and mix-image
Backscatter image and mix-range	
Selected area	Any size, rectangular
Mapping resolution range	16 x 16 - 512 x 512 pixels
Pixel dwell time range	10 - 250 ms
Line scan	
Line Scan resolution range	16 - 512 pixels
Points dwell time range	50 - 250 ms
Total number of lines	12
Report	
Docx format	
SED Specifications	
Detector type	
Everhart-Thornley	

Find out more at **thermofisher.com/phenomworld**

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