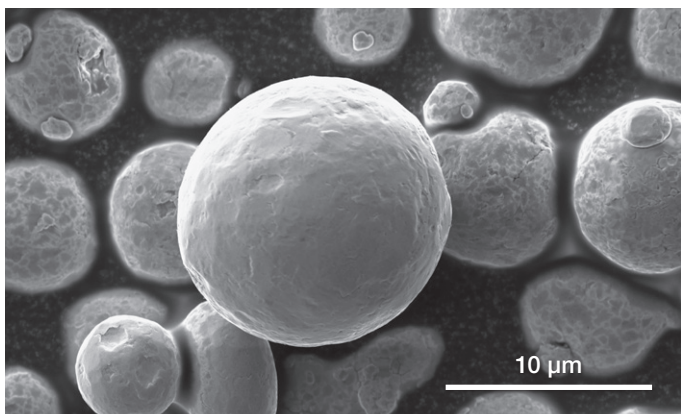


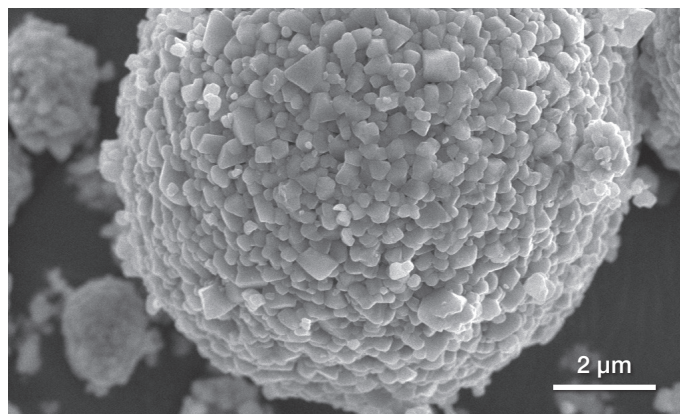
Phenom XL G2 Desktop SEM

The versatile desktop SEM that
automates quality control





Mixed back scattered electron and secondary electron image from metal particles.



SEM image of battery cathode particles.

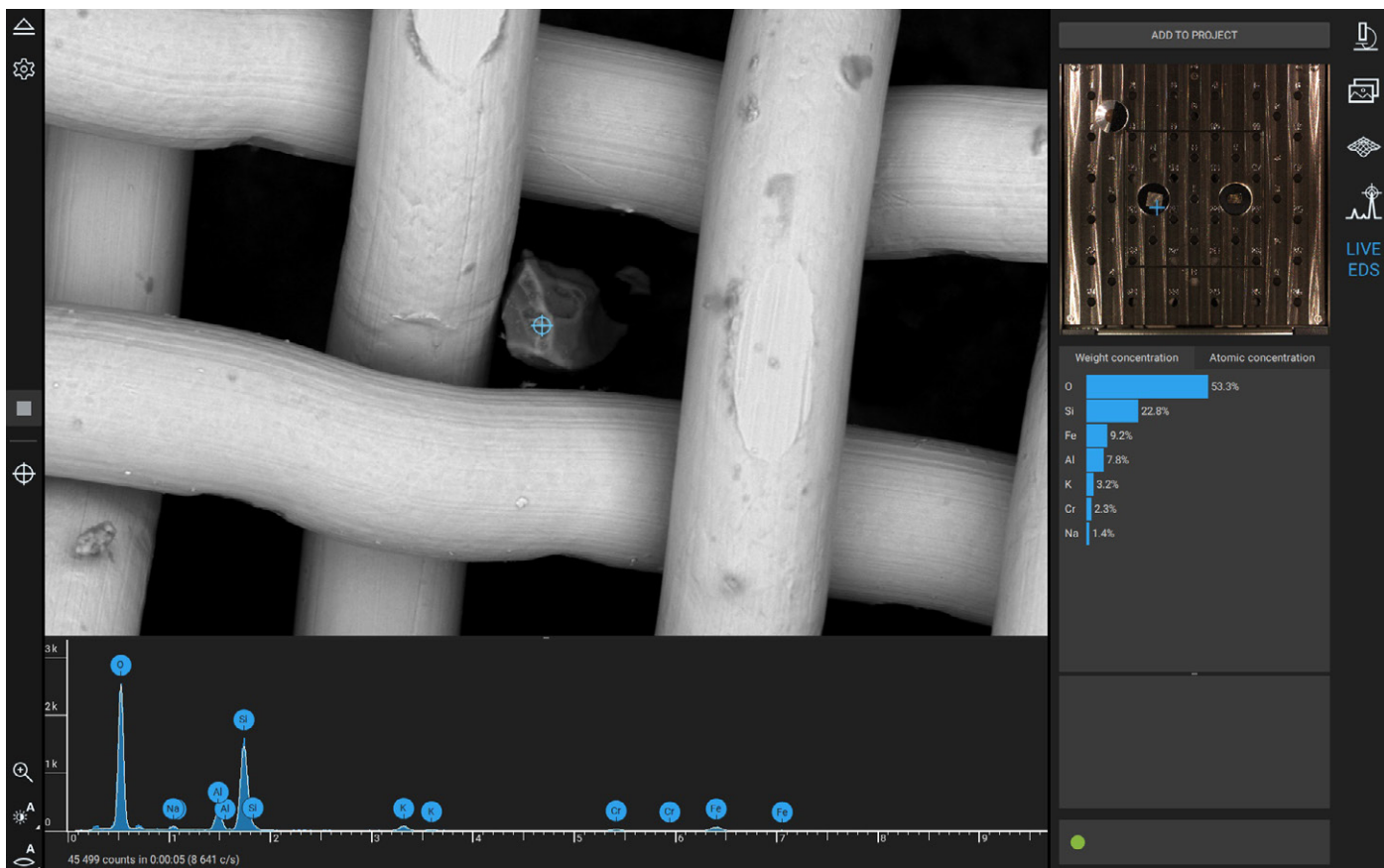
The Thermo Scientific Phenom XL G2 Desktop SEM automates the quality control process, providing accurate, reproducible results while freeing up time for value-added work.

The all-new, easy-to-learn interface helps you to quickly come up to speed and is ideal for a wide range of applications. The Phenom XL G2 features full-screen images and an average time-to image of just 40 seconds—three times faster than other desktop SEMs on the market. The system offers the ability to analyze large samples up to 100 x 100 mm at an improved resolution of 10 nanometers, allowing for even more details. A proprietary venting/loading mechanism ensures the fastest vent/load cycle in the world, providing the highest throughput.

The all-new user interface is based on the proven ease-of-use technology already applied in the successful Thermo Scientific Desktop SEMs. It is now even easier: the workflow for analysis software is now integrated and operating the SEM has been made easier via the interactive databar and overlay structure. The interface enables both existing and new users to quickly become familiar with the system with less training.

The standard detector in the Phenom XL G2 is a four-segment backscattered electron detector (BSD) that yields sharp images and provides chemical contrast information. The Phenom XL G2 can be equipped with two optional detector systems. The first one is a fully integrated Energy Dispersive Spectroscopy (EDS) system for elemental analysis. The second option is a Secondary Electron Detector (SED) that enables surface sensitive imaging. The ProSuite application platform is also available. With the ProSuite software and applications such as ParticleMetric, PoroMetric, FiberMetric and 3D Roughness Reconstruction, you can further analyze samples.

Imaging Specifications	
Imaging modes	
Light optical	Magnification range: 3–16x
Electron optical	Magnification range: 160–200,000x
Illumination	
Light optical	Bright field / dark field modes
Electron optical	- Long lifetime thermionic source (CeB₆) - Multiple beam currents
Acceleration voltages	- Default: 5 kV, 10 kV and 15 kV - Advanced mode: adjustable range between 4.8 kV and 20.5 kV imaging and analysis mode
Vacuum levels	Low - medium - high
Resolution	<10 nm
Detector	
Standard	Backscattered electron detector
Optional	Secondary electron detector
Digital image detection	
Light optical	Proprietary high-resolution color navigation camera, single-shot
Electron optical	High-sensitivity backscattered electron detector (compositional and topographical modes)
Image formats	
JPEG, TIFF, BMP	
Image resolution options	
960 x 600, 1920 x 1200, 3840 x 2400 and 7680 x 4800 pixels	
Data storage	
USB flash drive, Network, workstation with SSD	
Sample stage	
Computer-controlled motorized X and Y	



EDS analysis of a particle inside a metal mesh.

Element Identification (EID)

The Phenom XL G2 can be equipped with an optional EDS detector to obtain more material insights with element identification via x-ray analysis. Thanks to the design of the SEM column, high-resolution imaging is done at the same working distance as EDS analysis, resulting in an even faster workflow.

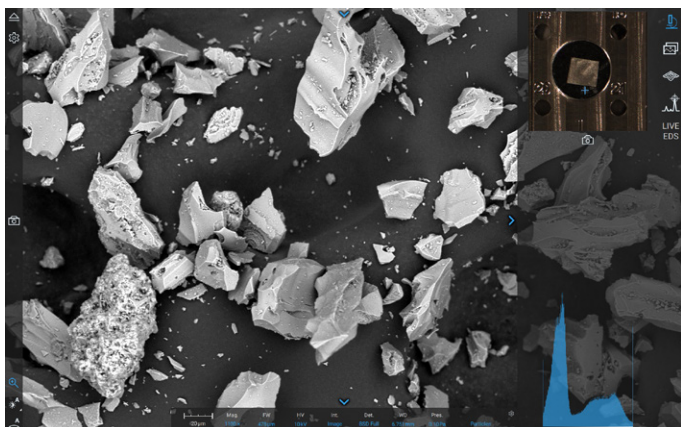
Live EDS gives you immediate element identification via point & click in imaging mode while more advanced analysis, including the optional EDS line scan & EDS fast mapping, can be done via the integrated EID application.

Step-by-step data collection

The dedicated software package Element Identification (EID) is used to control the fully integrated EDS detector. Analysis has become as easy as imaging, since there is no need to switch between external software packages or computers. The CeB_6 electron source is used to generate the highest X-ray count rate in its market segment, allowing fast results.

The EID software package allows you to identify nearly all materials in the periodic table, starting from Boron (5) and ranging up to Americium (95). It is a perfect analysis tool for a wide range of samples and applications. Projects can be stored locally or on the network, where they can be analyzed at a later stage or offline.

The EID software package runs smart algorithms with advanced peak analysis to optimize the auto-identification functionality, while still allowing for manual adjustments at any time in the analysis process. The intuitive step-by-step process within the software helps you to collect all X-ray results in an organized and structured way.



Intuitive user interface.

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 ₃ N ₄) window allowing detection of elements B to Am
Energy resolution	Mn K α $\leq$ 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

- Max. 100 mm x 100 mm
- Integrated in Phenom ProSuite Software
- 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	316(w) x 587(d) x 625(h) mm, 75 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 (24")	531,5 (w) x 250 (d) x 515,4 (h) mm; 6,7 kg
Workstation	• Powerful workstation, including SSD storage and four USB slots
	• 92.5 (w) x 305.6 (d) x 343.5 (h) mm, 8 kg

Sample size

- Max. 100 mm x 100 mm (up to 36 x 12 mm pin stubs)
- Max. 40 mm (h)

Scan area

- 50 mm x 50 mm
- 100 mm x 100 mm (optional)

Sample loading time

Light optical	<5 s
Electron optical	<60 s

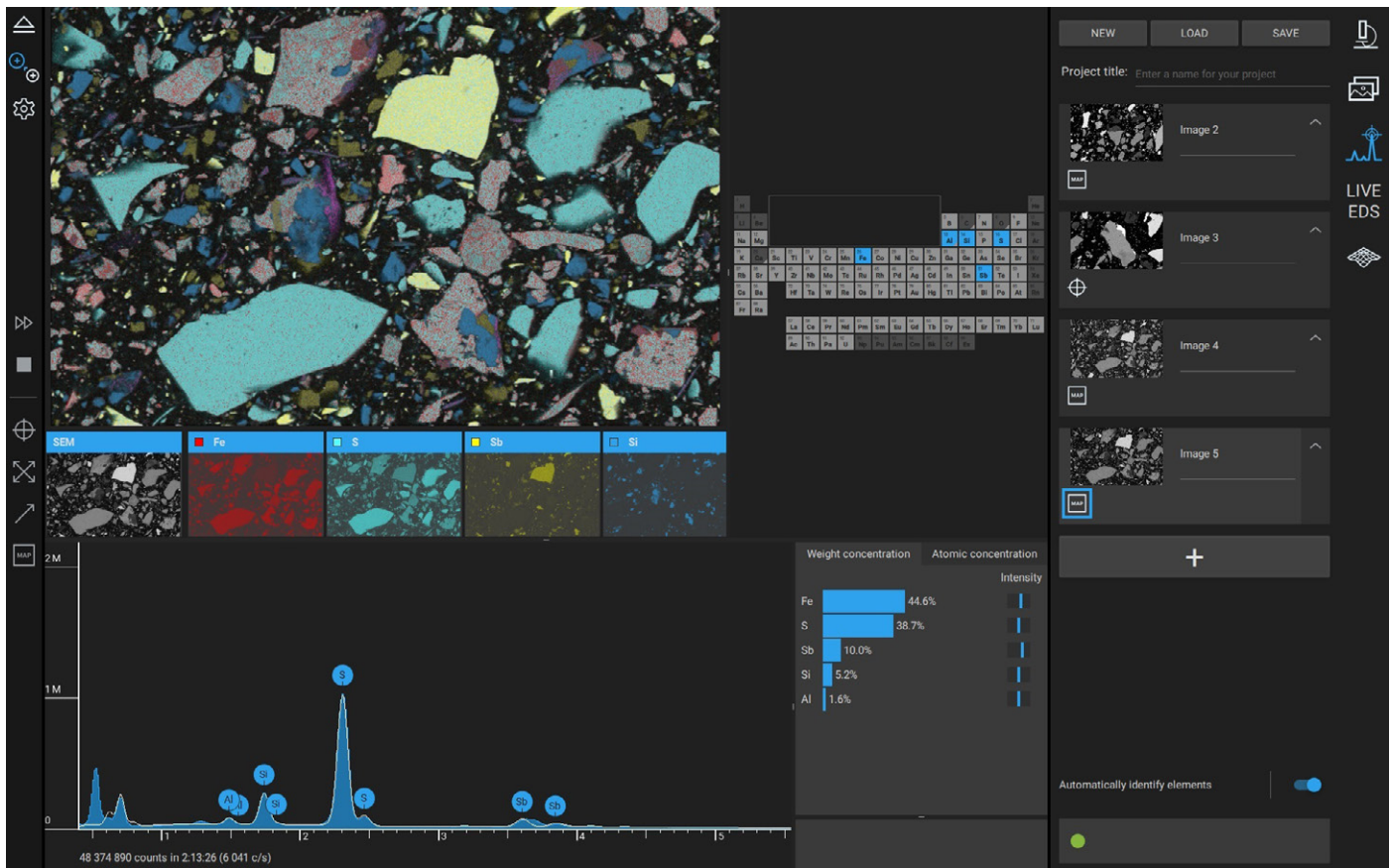
Requirements

Ambient conditions

Temperature	15°C ~ 30°C (59°F ~ 86°F)
Humidity	Between 20% and 80% RH
Power	Single phase AC 100–240 Volt, 50/60 Hz, 163 W average, 348 W max

Recommended table size

150 x 75 cm, load rating of 150 kg



EDS mapping of geological sample.

Automation

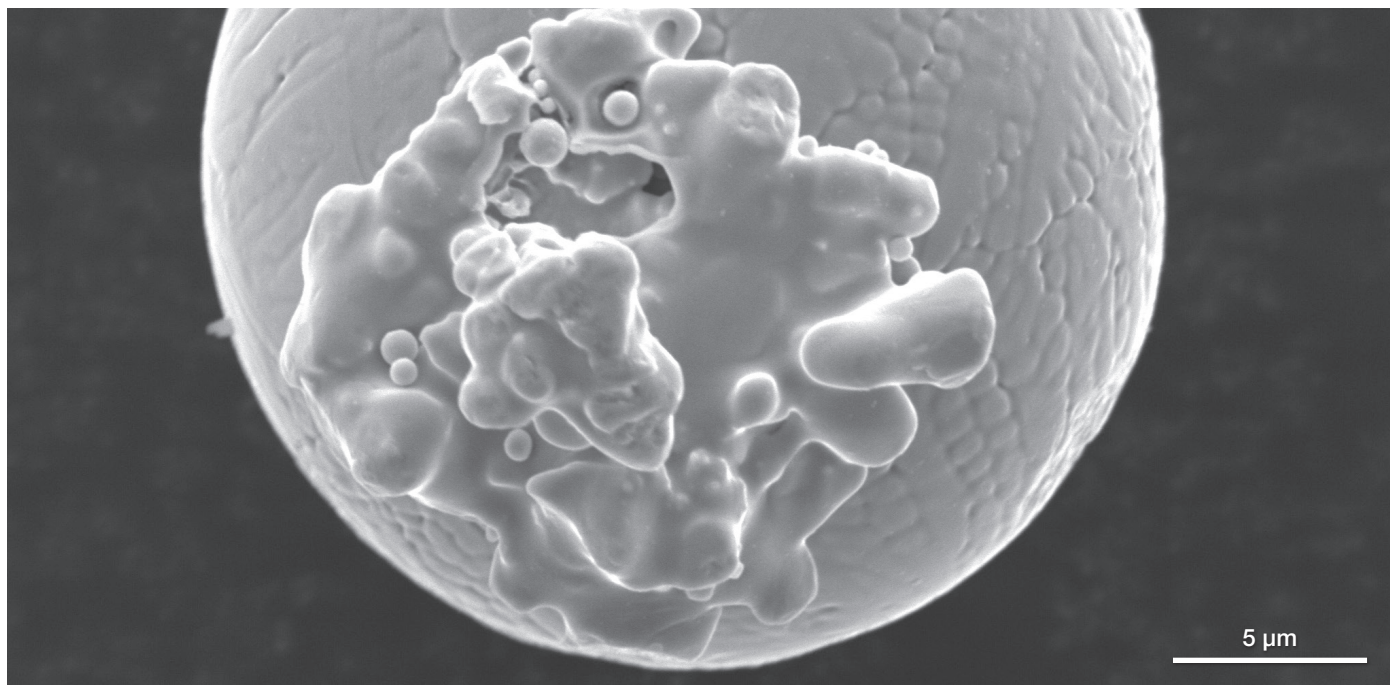
The Phenom XL G2 is standardly accesible via PPI (Phenom Programming Interface), a powerful method to command the Phenom XL G2 via Python scripting. If you have an SEM workflow with repetitive work to analyze particles, pores, fibers or large SEM images, let the Phenom XL G2 do this for you automatically. If required, Thermo Fisher Scientific can offer support on your specific use case.

CeB₆ long-life source

The CeB₆ (Cerium-hexaboride) long-life source has several advantages. First is the high brightness it provides compared to tungsten, making it much easier for many users to obtain high quality images with many details. Secondly, the lifetime of the source is very long and maintenance can be scheduled. This enables you to obtain the results you are looking for, even after a long automated run. The lifetime is extended as much as possible via our intelligent software: the source is hibernated in case the Phenom XL G2 is not used. In case the source needs to be replaced, this can be done on-site.

Eucentric Sample Holder

In many SEM applications, you can gain more insight into sample properties if the sample can be tilted and rotated. The Eucentric Sample Holder has been specifically developed with that in mind. The holder contains a sub-stage that allows you to easily and safely look at a sample from all sides.



SED image of particles.

Elemental Mapping & Line Scan Specifications

Elemental Mapping

Element selection	Individual user-specified maps, plus backscatter image and mix-image
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Backscatter image and mix-range

Selected area	Any size, rectangular
Mapping resolution range	32 x 20 - 960 x 600 pixels
Pixel dwell time range	1–500 ms

Line Scan

Line Scan resolution range	16–512 pixels
Line scan dwell time range	10–500 ms

Report

Docx format

SED Specifications

Detector type	Everhart Thornley
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Eucentric Sample Holder Specifications

Automated movements

In 4 directions: Z (height), R (rotation), T (tilt) and x' (x-prime)

Maximum sample size

90° tilt	Ø ≤30 mm; height ≤32 mm
< 45° tilt	Ø ≤70 mm; height ≤32 mm

Tilt angle

Between -15° and +90°

Rotation

360° continuous

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