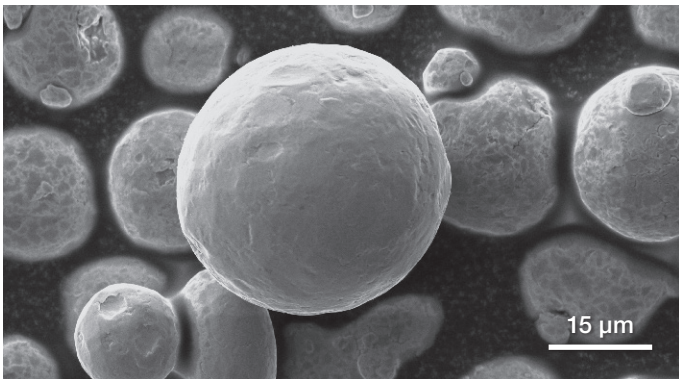


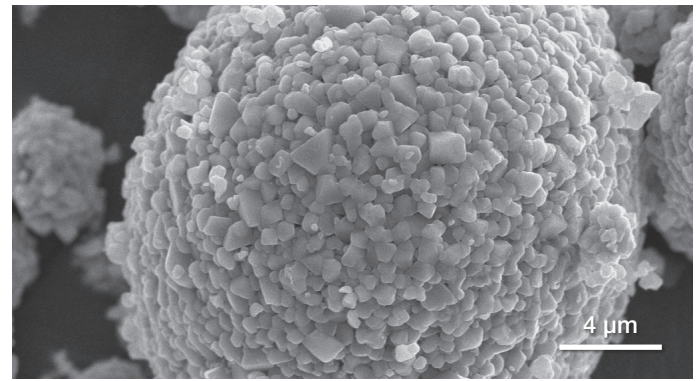
Phenom XL G2 Desktop SEM

The versatile desktop SEM that automates quality control





Metal particles imaged via mixed signals of the backscatter detector and secondary electron detector.



SEM image of battery cathode particles.

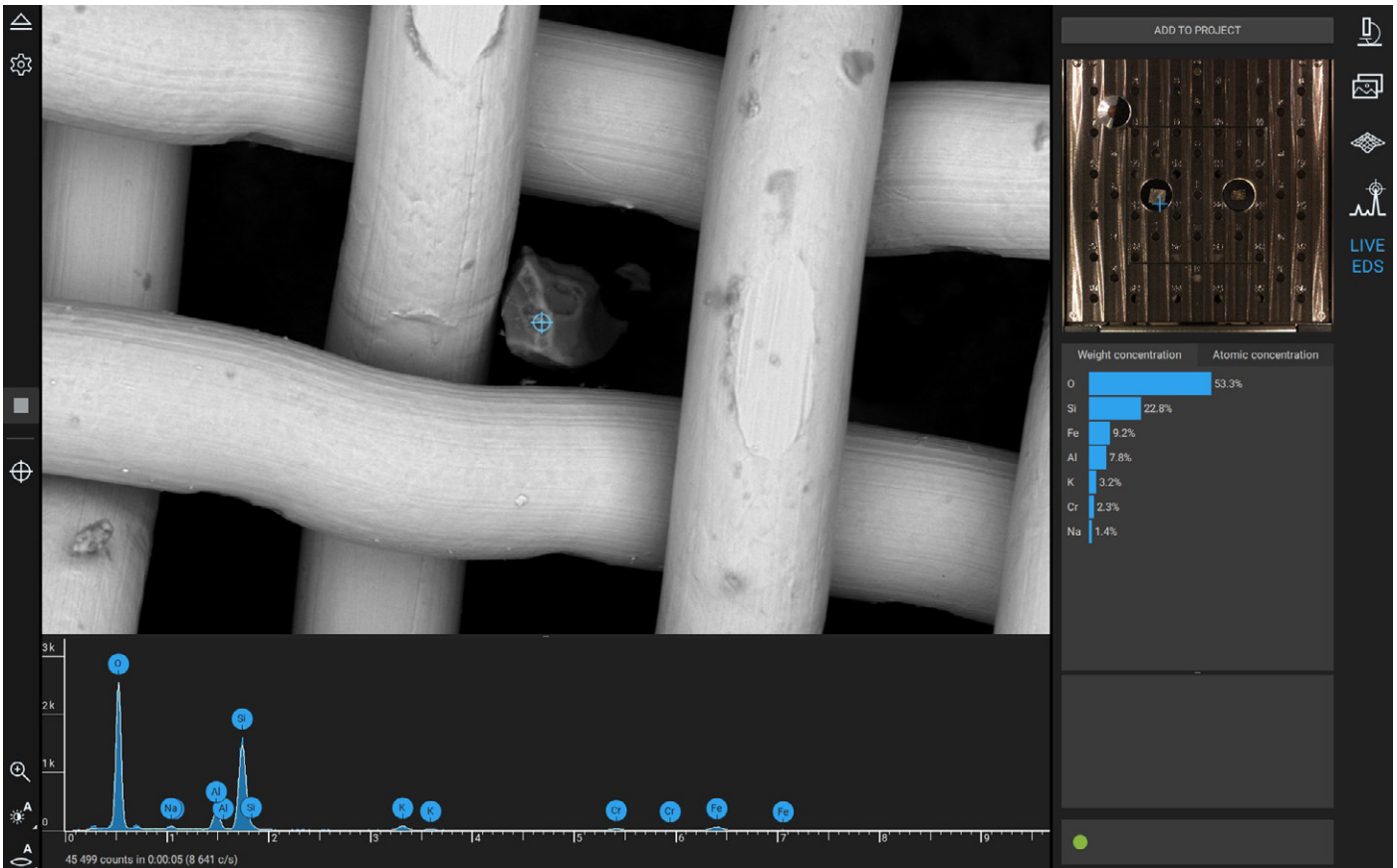
The Thermo Scientific™ Phenom™ XL G2 Desktop SEM automates the quality control process, providing accurate, reproducible results while freeing up time for valuable work.

The 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 Desktop SEM 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 can analyze large samples up to 100 x 100 mm at a resolution of 10 nanometers, showing all the details. A proprietary venting/loading mechanism ensures a fast vent/load cycle providing high throughput.

The user interface is based on the proven ease of use already applied in successful Thermo Scientific Desktop SEMs. The interactive databar and overlay structure make operating the SEM very easy, and the interface enables both experienced and new users to quickly become familiar with the system with less training.

The standard detector in the Phenom XL G2 Desktop SEM is a four-segment backscattered electron detector (BSD) that yields sharp images and provides chemical contrast information. The system can be equipped with two optional detectors: a fully integrated energy-dispersive spectroscopy (EDS) system for elemental analysis and 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	
Detection modes	
Light	Magnification range: 3–16x
Electron	Magnification range: 160–200,000x
Illumination	
Light	Bright field / dark field modes
Electron	<ul style="list-style-type: none"> Long lifetime thermionic source (CeB₆) Multiple beam currents
Acceleration voltages	<ul style="list-style-type: none"> 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, energy dispersive spectroscopy 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, PNG	
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 makes it possible to study the chemical composition.

Element identification (EID)

The Phenom XL Desktop SEM 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.

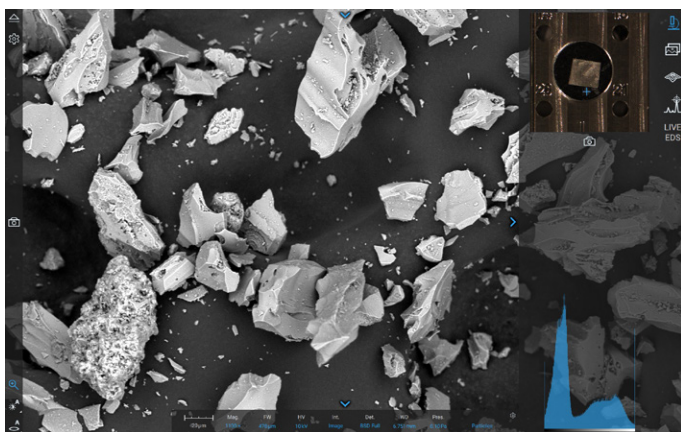
Live EDS gives you immediate element identification via point and click in imaging mode while more advanced analysis, including the optional EDS line scan and EDS mapping, can be done via the integrated EID application.

Step-by-step data collection

The dedicated element identification software package 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 CeB6 electron source is used to generate the a high X-ray count rate that provides 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.



Screenshot of the user interface highlighting the interactive databar and the large coverage of the SEM image.

EDS

Detector type	<ul style="list-style-type: none"> Silicon Drift Detector (SDD) Thermoelectrically cooled (LN₂ 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 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 user interface
- Integrated column and stage control
- Auto-peak ID
- Iterative strip peak deconvolution
- Confidence of analysis indicator
- Export functions: CSV, JPG, TIFF, ELID, EMSA

Report

.doc format

System

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	260(w) x 260(d) x 85(h) mm, 2.3 kg
Monitor (24")	531(w) x 180(d) x 511(h) mm, 5.6 kg

Workstation	<ul style="list-style-type: none"> • Powerful workstation including SSD storage
	<ul style="list-style-type: none"> • 93(w) x 293(d) x 290(h) mm, 5.6 kg

Sample size

- Max. 100 mm x 100 mm (up to 36 x 12 mm pin stubs)
- Max. 40 mm height (optional up to 65 mm)

Scan area

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

Sample loading time

Light optical	<5 s
Electron optical	<60 s

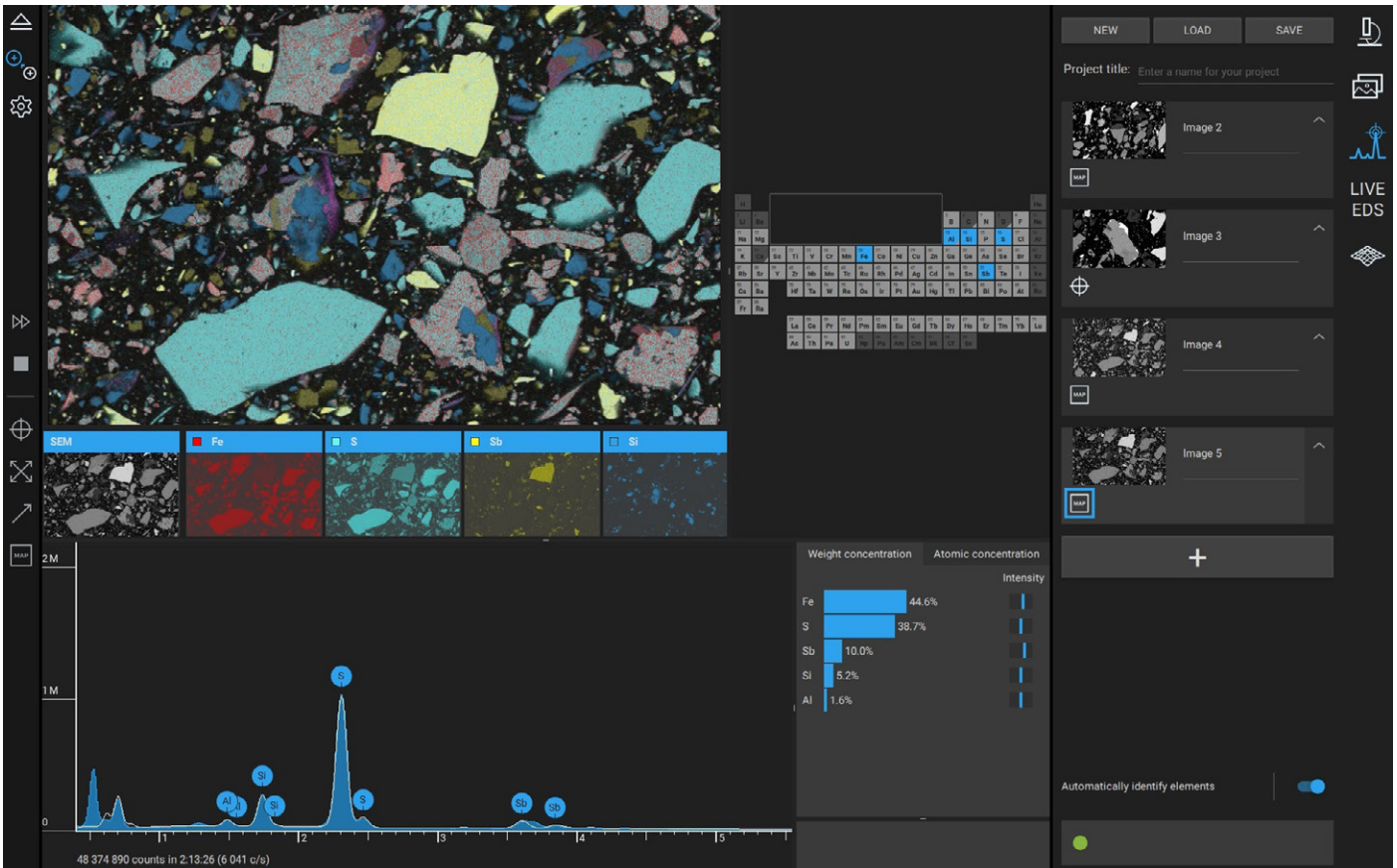
Site requirements

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 map of a geological sample with colors indicating the different elements present in the sample.

Automation

The Phenom XL G2 Desktop SEM is standardly accessible via PPI (PhenomProgramming Interface), a powerful method to command the system 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 Desktop SEM 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 system is not used. If 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 additive manufacturing powder.

Elemental Mapping & Line Scan

Elemental mapping

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

Selected area	Any size, rectangular
Mapping resolution range	32 x 20 to 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

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

Learn more at thermofisher.com/phenom-xl

thermo scientific