semplor

NANOS

the next generation tabletop SEM

- High Performance SE & 4 Quad BSE Detectors
- EDS – Point Analysis, Line Scan & Element Mapping
- Low Vacuum Capability
- Motorized XY Stage
- Eucentric Tilt
- 1000+ hrs Lifetime Filament Performance
- 1-20 kV Acceleration Voltage
- < 8 nm resolution
- Low Service Costs

The NANOS tabletop SEM offers high-resolution SEM imaging with low cost of ownership, along with integrated energy dispersive spectroscopy (EDS) for fast, accurate elemental analysis.

Compact, Robust & Versatile Tabletop SEM

The NANOS is a robust tabletop SEM designed using the latest technology to deliver fast, high-quality imaging and elemental analysis. Its compact, modern design makes it ideal for R&D, educational, and industrial applications. The NANOS provides immediate access to SEM capabilities, making it perfect for labs looking to reduce reliance on external SEM services or to offload routine work from larger floor-model instruments. With a small footprint, excellent system stability, and no need for dedicated infrastructure, the NANOS fits seamlessly into any lab environment.

High-Performance Detectors

The NANOS tabletop SEM is equipped with both a Secondary Electron Detector (SED) and a Backscattered Electron Detector (BSD) as standard. The SED collects electrons emitted from the surface of the sample, producing crisp, high-resolution images that reveal fine surface topography. The BSD, a high-quality 4-quadrant detector, provides excellent compositional contrast by detecting backscattered electrons sensitive to atomic number differences. Its quadrant design also enables advanced imaging modes, such as topographical shading. For elemental analysis, the NANOS includes an integrated Silicon Drift Detector (SDD) for Energy Dispersive Spectroscopy (EDS), offering fast, accurate identification of elemental composition across a wide range of samples.

Designed for Low Maintenance

The NANOS is designed with serviceability in mind. Its plug-and-play setup ensures fast, straightforward installation, while removable panels and modular components make maintenance easy. Uniquely, the NANOS has no moving parts inside the vacuum chamber—a design feature not found in other systems—which eliminates the risk of contamination and mechanical failure. With minimal moving parts overall, many maintenance tasks can be performed by the user, reducing downtime and lowering service costs.

Intuitive Operation with Discover Platform

Semplor's Discover Platform simplifies operation with an intuitive interface, requiring minimal training. Its user-friendly controls allow even novice users to achieve high-quality results quickly, making it ideal for labs with varying levels of experience.

Eucentric Stage – Standard Feature

The NANOS includes a unique eucentric stage that ensures samples stay in focus while tilting, eliminating the need for adjustments in SEM settings. The motorized XY movement is controlled via software, while tilt angles are manually adjusted with real-time feedback on the screen. With a maximum tilt of 55°, users can explore samples from various angles without compromising focus or image quality. (See figure 2)

Mixed Mode SE & BSE Imaging

The NANOS enables simultaneous viewing of secondary electron (SE) and backscattered electron (BSE) images, which can be overlaid or displayed side-by-side for a comprehensive view of the sample's surface and composition. (See figure 1)

Figure 1 – Mixed mode, easy overlay of SE and BSE images

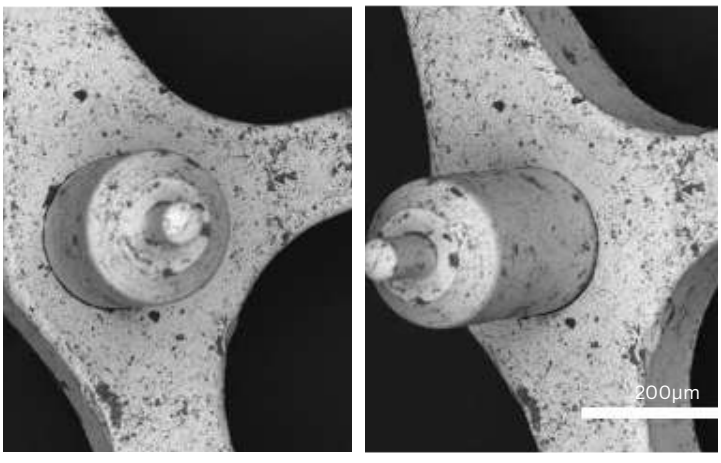


Figure 2 – NANOS images with +15 and -38,5 degrees tilt

Low-Vacuum to Reduce Charging

The NANOS offers the flexibility to observe samples in both high- and low-vacuum modes. In high-vacuum mode, non-conductive samples may experience charging effects, where electrons accumulate on the surface, causing image distortion. To mitigate this, the NANOS is equipped with a low-vacuum mode that reduces or eliminates the effects of charging. Switching between high and low vacuum is simple, requiring just a single click of the mouse, allowing users to efficiently manage different sample types and conditions.

Topographical Mode

The NANOS's advanced BSE detector, with its fully controllable 4-quadrant design, allows for the creation of high-quality topographical images. In standard BSE mode, users capture compositional data, while the topographical mode utilizes various segment combinations to highlight surface features through shading effects. This technique provides valuable insights into surface roughness, enhancing the understanding of material properties. (See figure 3)

Easily Replaceable Electron Source

The thermionic electron source in the NANOS is a tungsten filament controlled by electro-magnetic coil lenses & electrostatic deflectors. In ECO-mode, the filament offers an extended lifespan of several hundred hours while still delivering high-resolution imaging. Users can easily replace the source themselves using a simple alignment tool, minimizing downtime and avoiding costly replacement parts or service visits.

Flexible Accelerating Voltages

The NANOS offers adjustable accelerating voltages ranging from 1 kV to 20 kV, providing flexibility for a wide range of applications. Lower voltages are ideal for protecting beam-sensitive samples, while higher voltages enable faster and more efficient EDS analysis and mapping. This flexibility ensures optimal performance for both imaging and elemental analysis.

Full-Color Navigation Camera

The NANOS features an optical navigation camera that provides a full-field image of the sample upon insertion. This enables quick identification of areas of interest, even at high magnifications, ensuring users always know exactly where they're working.

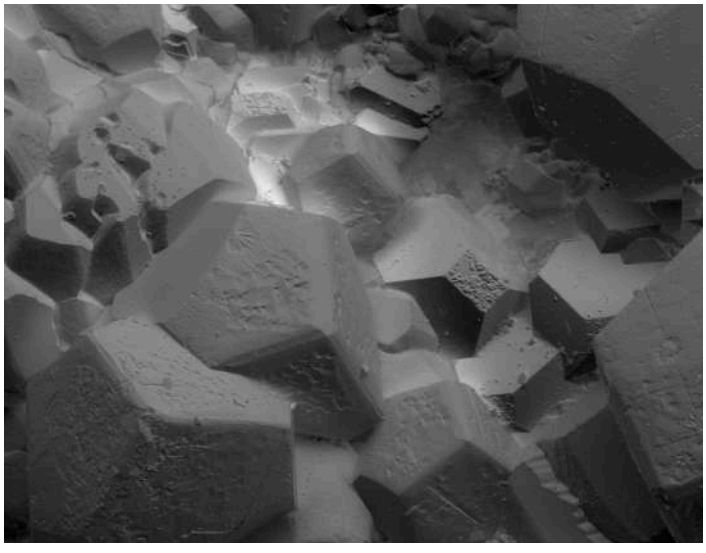


Figure 3 – NANOS Topographical image of a crystalline rock

Unlock the full potential of your NANOS tabletop SEM with our intuitive, fully embedded Semplor Discover EDS software. From quick elemental mapping to precise peak identification and reliable quantification, Discover EDS streamlines every step of your analytical workflow. Its intuitive interface and seamless integration deliver fast, reliable results without interruption. Whether you're working with routine samples or tackling complex material characterization, Discover EDS ensures precision without compromise.

Live Mapping for Instant Visual Feedback
Build real-time, progressive maps of your sample as data is acquired. Immediate feedback enables faster decisions and more efficient analysis.

Instant Element Identification & Quantification
Quickly identify and quantify elements with minimal input. Reliable results are delivered in seconds, giving you the insights you need—fast.

Advanced Map Blending
Combine elemental maps with detector images for clearer, more detailed spatial interpretation. Achieve superior results with this high-end feature.

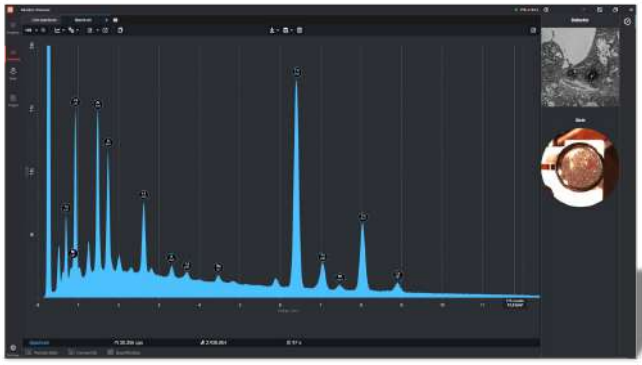
Map Spectrum Selection
Select and analyze spectra from specific regions of the map for precise material classification and comparison.

Line Scan Analysis
Generate high-resolution compositional profiles to explore material gradients and boundaries, perfect for materials with complex structures.

All-in-One Project Structure
Keep everything organized in one file. All your imaging, analytical data, and results are stored in a single, easy-to-manage project, ready for analysis or reporting.

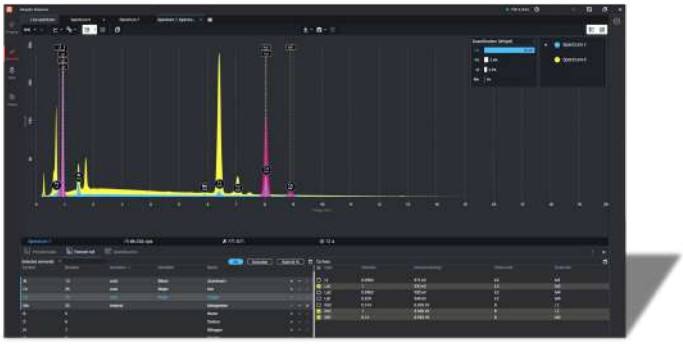
One-Click Reporting
Generate professional, publication-ready reports with a single click. Streamline your workflow and avoid the hassle of outdated, complicated reporting formats.

High Count-Rate
The tungsten electron source delivers high beam currents and exceptional X-ray count rates – ideal for capturing fast, low-noise, high-resolution elemental maps.



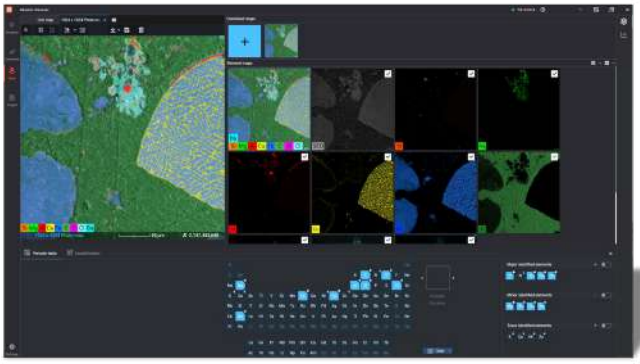
Live Spectrum

Discover EDS delivers spectra live on your SEM image or selected spot, with peaks updating continuously in real time. High count rates ensure sharp, low-noise results from the very first second, making live optimization effortless. Every acquisition is reliable, stable, and immediately ready for analysis.



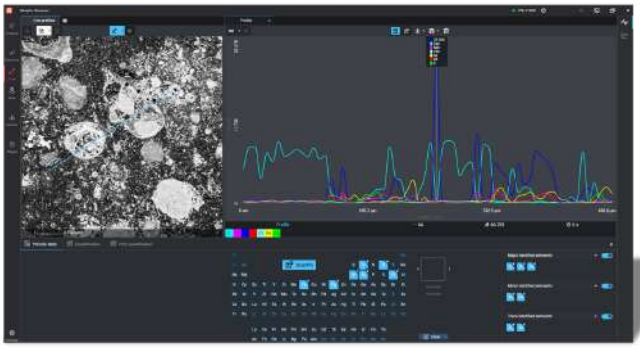
Quantification and Element Identification

Spectra are processed into quantified results with minimal input. Advanced algorithms handle background subtraction and peak deconvolution, producing accurate concentrations instantly. Every spectrum becomes a fully labeled, publication-ready dataset without extra steps.



Live Mapping for Instant Visual Feedback

Elemental maps are built progressively during acquisition, revealing spatial distributions as the map runs. Maps blend seamlessly with SE and BSE images for immediate compositional context. Fast, continuous updates expose material contrasts early, delivering clarity and efficiency in every analysis.



Line Scan

Line profiles are generated along any selected path, plotting element concentrations with high precision. Transitions, gradients, and interfaces are resolved clearly, providing powerful insights into complex structures. The process is fast, intuitive, and seamlessly integrated into the workflow.

The Semplor Explore App transforms standard SEM imaging into advanced material characterization—particle, fiber, and 3D analysis—all embedded into your NANOS tabletop SEM.

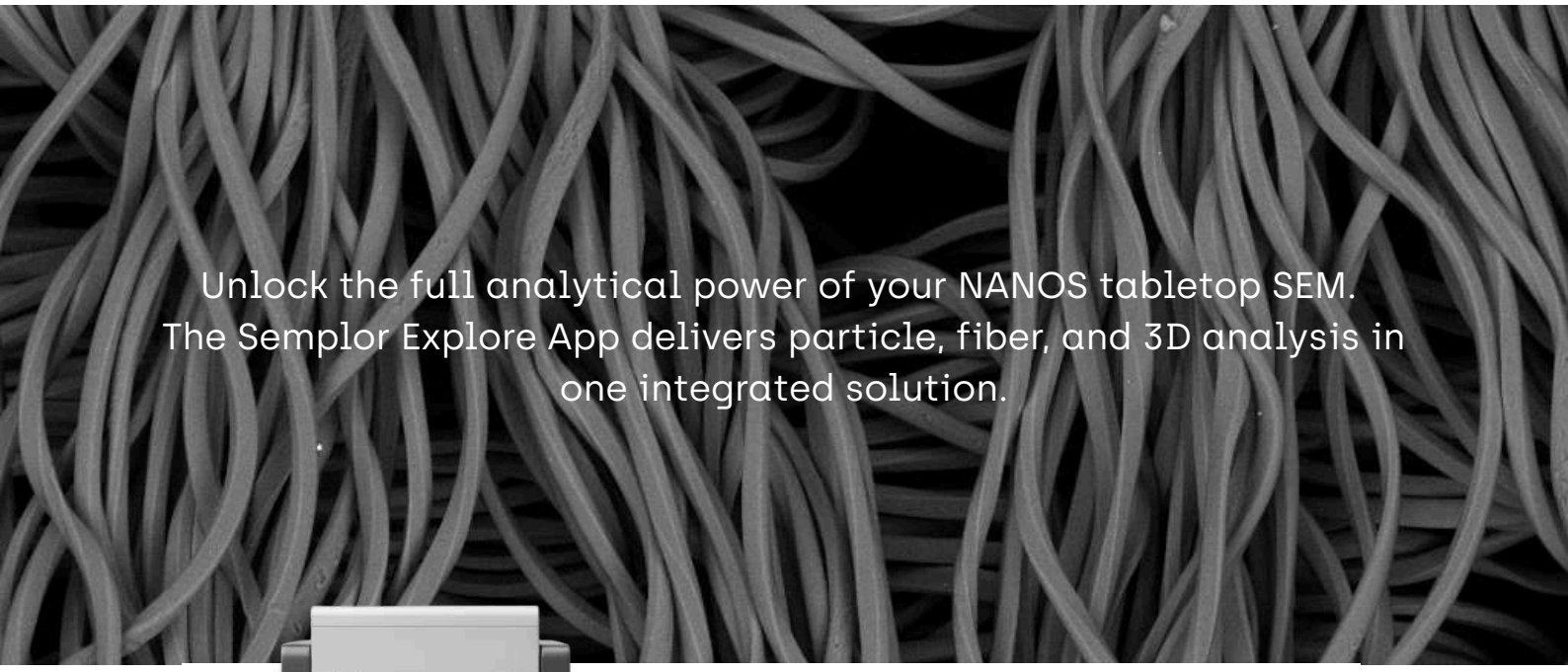
Advanced Image Analysis At Your Fingertips

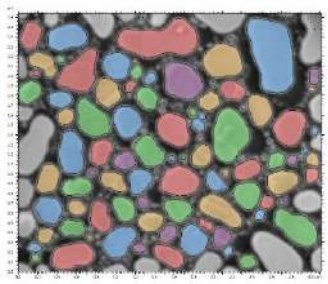
The Semplor Explore App expands the analytical power of the NANOS tabletop SEM with a suite of advanced characterization tools. Seamlessly integrated in the NANOS interface, these optional modules are only a click away, ensuring a smooth, efficient workflow without leaving your SEM environment.

Tailored Analysis for Every Application

Three specialized optional modules are available, tailored to different applications:

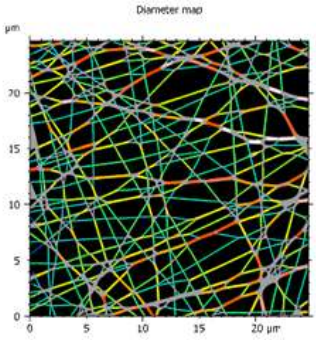
- Explore Particles
- Explore Fibers
- Explore 3D





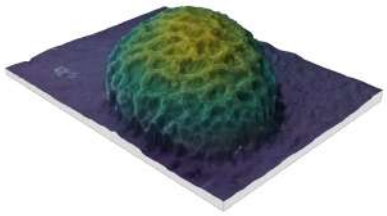
Explore Particles

Detect, quantify, and measure particles, pores, or grains with precision. The Explore app offers multiple segmentation methods—including thresholding and watershed—to overcome challenges in particle dispersion or sample preparation. Even touching particles can be separated and analyzed individually. Results include size, area, perimeter, shape descriptors, and count distributions, with visual overlays that clearly display particle boundaries. Users can save multiple analysis layers within a project, compare segmentation approaches, and export distributions, morphology data, and customizable statistical reports—ideal for both material science and biological samples.



Explore Fibers

Specifically designed for fiber analysis, this module measures diameter, orientation, and curvature, and can accurately trace overlapping or touching fibers. Orientation distributions and pore characteristics are automatically generated, providing valuable statistics for textiles, nonwovens, electrospun materials, and more. Results are exportable and ready to integrate into your research or reporting workflow.



Explore 3D

Create realistic 3D reconstructions and quantitative height maps directly from SEM images. The module supports several approaches:

- Stereo pair reconstruction using images acquired at different tilt angles.
- Four-quadrant BSE detector topography, producing calibrated height maps from a single scan.
- Single-image rendering for fast, convincing 3D visualization of morphology.

Together, these methods provide both qualitative insights and metrologically reliable measurements when properly calibrated.

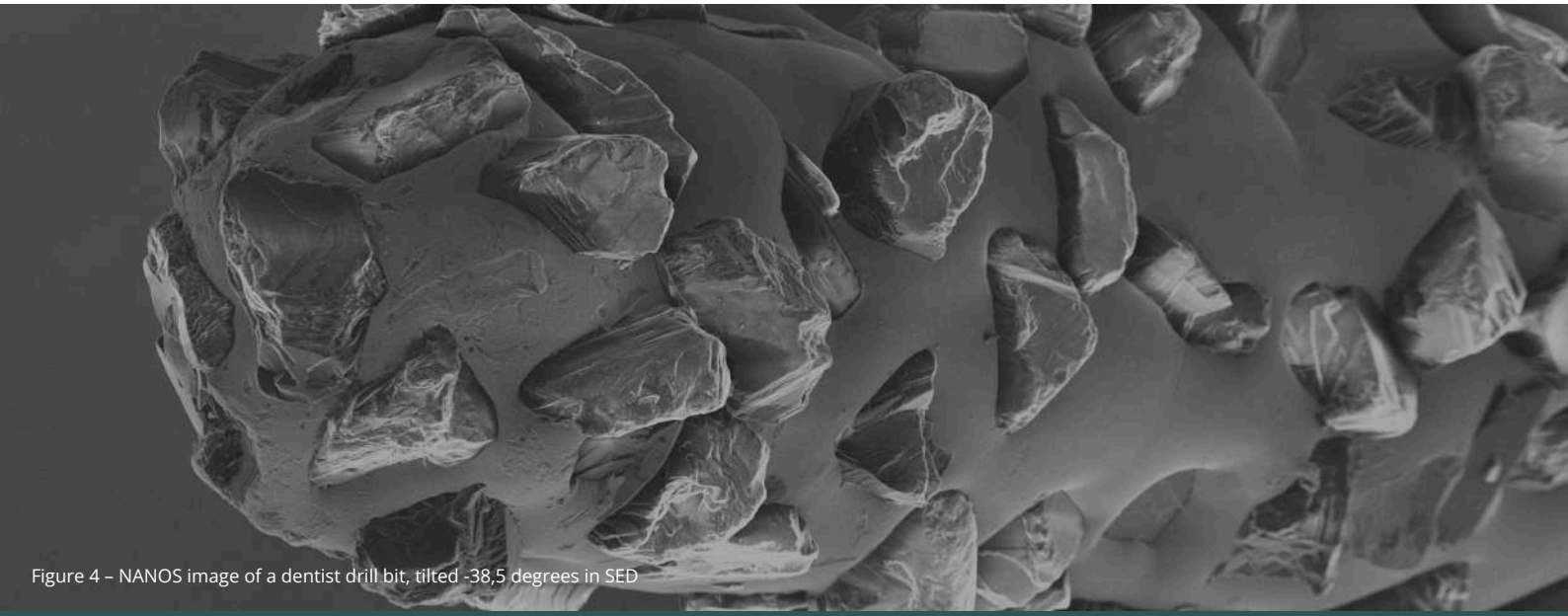


Figure 4 – NANOS image of a dentist drill bit, tilted -38,5 degrees in SED

Specifications

IMAGING MODE	Optical	2 & 12x optical with up to 60x digital zoom
	SEM	Magnification range: 100 - 200.000x
	Resolution	< 8 nm
	Capture resolution	Up to 4096 x 4096 pixels (4K)
ILLUMINATION	Light optical	Bright field
	Electron optical	Optimized thermionic source (tungsten)
		Lifetime: 1000+ operating hours in ECO-mode
	Acceleration voltages	Default: 1, 2, 5, 7, 10, 15 & 20 kV
DETECTOR		Secondary electron detector (SED)
		Backscattered electron detector (BSD) – 4 quadrant Energy
		Dispersive Spectroscopydetector (EDS) – embedded
LIGHT OPTICAL NAVIGATION CAMERA		Color
IMAGE FORMATS		JPEG, TIFF, PNG, BMP
USER INTERFACE		Communication, imaging and analysis use a single monitor with control via a wireless mouse & keyboard.
		Remote control and diagnostic enabled.
		Network, USB, workstation
SAMPLE STAGE		Eucentric tilt stage (+15° up to -40°) manual
		Computer-controlled motorized X, Y: 25 x 25 mm
SAMPLE SIZE		Up to 45 mm diameter (max +15° to -15° tilt)
		Up to 19 mm height (optional 40 mm)
EDS SPECIFICATIONS	Detector type	Silicon Drift Detector (SDD), thermo-electrically cooled
	Detector active area	30 mm^2
	Energy resolution	@ Mn Kα < 132 eV
	Max. input count rate	300,000 cps
SOFTWARE	Hardware integration	Fully embedded SDD, pulse processor and scan generator.
		Installed on Windows PC and controlled via user interface.
		EDS point analysis, line analysis and mapping.
		Export functions.
SYSTEMS SPECIFICATIONS	Footprint	280 (w) x 470 (d) x 550 (h) mm
	Weight	62kg
	Pumps	Pfeiffer Turbo molecular pump and an oil free membrane pre-vacuum pump.
		High vacuum SEM mode (standard).
		Low vacuum mode (standard): vacuum of 40 Pascal for reduced charging.
		Motor controlled vacuum levels via the user interface.
	Workstation	Pre-configured All-in-One PC with a 27" monitor.
		SEM imaging and EDS Analysis software installed.
AMBIENT CONDITIONS	Temperature	15°C – 25°C (59°F - 77°F)
	Humidity	20 - 80% RH
	Power	System in typically power imaging mode: 110 W (max. 140 W)

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