NANOS

the next generation tabletop SEM

- High performance SE & 4 quad BSE Detectors
- EDS – Point Analysis, Line Scan & Element Mapping
- Low Vacuum Capability
- Motorised XY Stage & Eucentric Tilt
- Filament Performance Optimisation
- 1-20 kV Acceleration Voltage
- <8 nm resolution
- Low Service Costs

Distribution in the UK & Ireland

Lambda

www.lambdaphoto.co.uk

semplor

The NANOS offers SEM imaging at a low cost of ownership for high-resolution imaging and integrated energy dispersive spectroscopy (EDS) for rapid elemental analysis

NANOS, an affordable SEM

The NANOS is a comprehensive and affordable tabletop scanning electron microscope (SEM). It is engineered using the latest technology, giving fast and high-quality SEM images and elemental analysis. Its design is robust and modern, which makes it perfect for research & development, educational and industrial usage. The NANOS offers direct access to SEM imaging and analysis, eliminating the need for outsourcing. It also suits well for offloading routine analysis of common samples from floor-model SEM instruments. With its excellent stability, robust design, and small footprint, it can be used in any laboratory environment without specific infrastructure.

High performance detectors

The NANOS comes with both a Secondary Electron Detector (SED) and a Back Scattered Electron Detector (BSD) as standard. The high-quality BSD is a 4-quadrant detector providing high resolution images that convey elemental contrast information.
The SED collects electrons emitted from the sample surface and thus provides crisp and high-resolution surface-sensitive imaging. Images generated with the SED convey surface topographical information and generally have higher resolution as a result of the smaller beam sample interaction volume.
An Energy Dispersive Spectroscopy (EDS) Silicon Drift Detector (SDD) is installed for Elemental Analysis.

Eucentric stage standard included

The Eucentric Stage of the NANOS is truly the only one of its kind. It comes standard with the NANOS. The motorized XY movements can easily be controlled by a click of the mouse. Tilting the specimen while in SEM mode can be done by manually turning the stage. Thanks to the eucentric design, the sample stays in focus without the need for intermediate changes in SEM settings. On the monitor the exact tilt angle is indicated. Samples can be tilted up to angles of 55 degrees. (See Figure 4)

Full color navigation camera

At sample entry an optical image of the complete sample is made to easily navigate over the sample. It gives the user full control and even in high magnification they always know where they are looking at. (See Figure 5)

Intuitive to use

The ‘Discover App’ makes the NANOS simple and intuitive to operate and requires minimal training. The ease of use makes it perfect for facility users of any experience level. The NANOS will quickly produce excellent results in a short period of time.

Low-vacuum reduces vacuum charging

Specimens can be observed in high-vacuum or in low-vacuum. The low-vacuum is used to reduce or eliminate the effects of sample charging (See Figure 1). When a non-conductive sample is observed under a high-vacuum state, electrons accumulate on the sample surface causing a charging phenomenon. The NANOS is equipped with low-vacuum mode to overcome this. Switching from high to low-vacuum can be done by just a click of the mouse.

Mixed mode BSE & SE images

BSE and SE images can be simultaneously viewed in a single composite image. Images can either be overlaid or compared side by side. (See Figure 2)

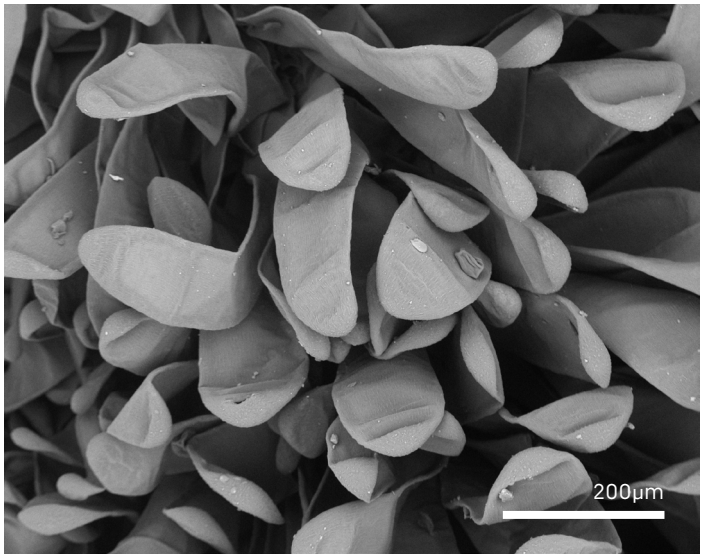

Figure 1 - NANOS image of an uncoated cornuta bud in low vacuum, air dried

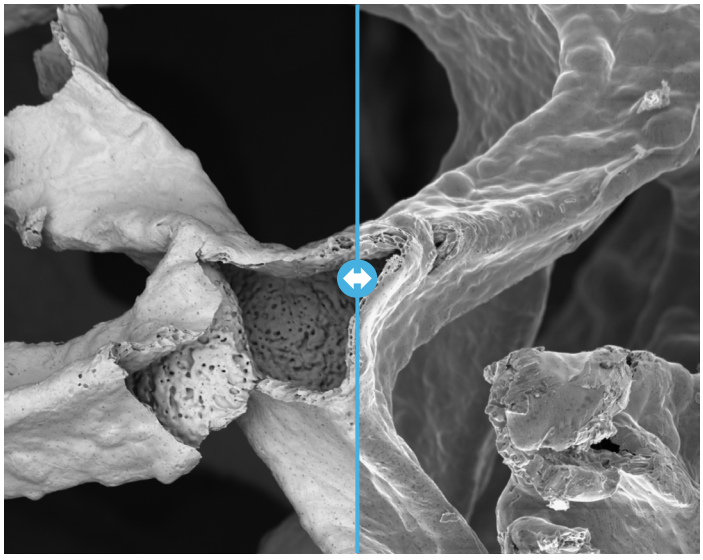

Figure 2 – Mixed mode, easy comparison between SE and BSE images

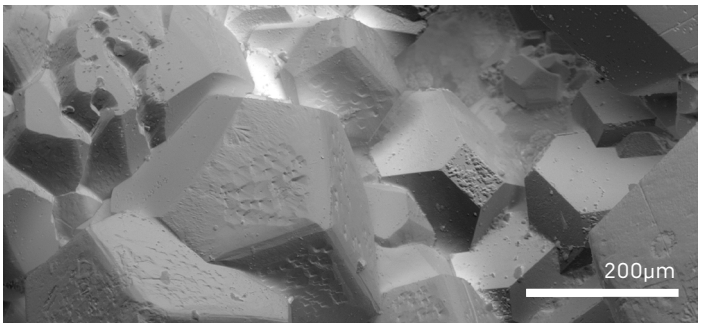

Figure 3 – NANOS Topographical image of a crystalline rock

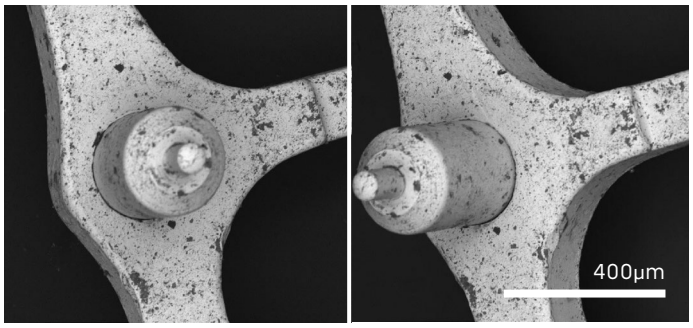

Figure 4 – NANOS images with +15 and -38,5 degrees tilt

Topographical mode

The NANOS high-quality BSE detector is a 4-quadrant detector with fully controllable independent segments. The standard BSE mode provides compositional details from the sample. By utilizing the segments in different combinations, topographical images with a 'shading effect' are generated, highlighting the surface from multiple directions. This provides a qualitative visualization of surface roughness. (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. Using the optional 'eco'-setting, the filament lifetime can be extended up to hundreds of hours and still generate high-resolution images. Any user can replace the electron source with a simple alignment tool, ensuring minimum downtime. No need to wait for a service engineer to replace an expensive source.

Accelerating voltages

Adjustable accelerating voltages between 1kV to 20kV ensures high speed EDS analysis and mapping for identifying elements in your samples. Selecting a low voltage helps to protect any beam sensitive specimen.

Low maintenance

The NANOS has been developed with service at the core of its design. Easily removable panels, modular components, a single control board and few moving parts keep service requirements to a minimum. Much can be undertaken by the user. Unique for the NANOS is that there are no moving parts within the vacuum chamber. Due to this smart design the risk of contamination has been eliminated.

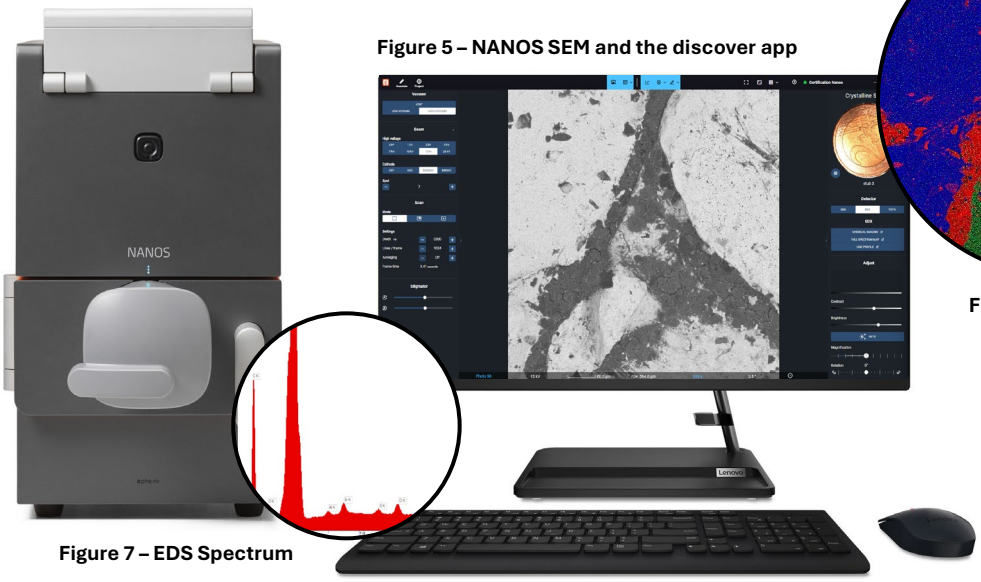

Figure 5 – NANOS SEM and the discover app

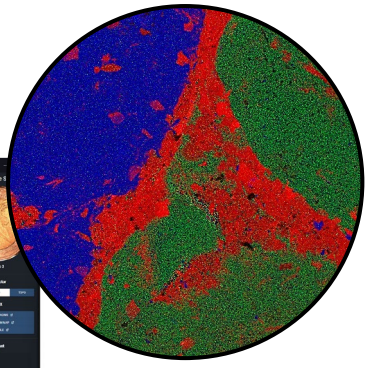

Figure 6 – EDS Map

Figure 7 – EDS Spectrum

Embedded elemental analysis

The NANOS is equipped with an integrated EDS detector. The SEM column was designed to have the same optimal working distance for both EDS analysis and high-resolution imaging. This makes the workflow efficient and fast. The operator can select EDS Point Analysis, Line Scan or activate Elemental Mapping. The embedded EDS makes it independent from any third-party equipment and runs on the same PC. The NANOS is also available without EDS.

EDS mapping

Elemental mapping visualizes all elements present in a sample and allows researchers to see their samples in color. Regions of interest that were previously invisible can become clear, contamination can be spotted, or information can be retrieved that can help develop an understanding of the sample. (See Figure 6)

Specifications

IMAGING MODE	**Optical**	2 & 12x optical
		Up to 60x digital zoom
	SEM	Magnification range: 100 - 200.000x
	Resolution	< 8 nm
ILLUMINATION	**Light optical**	Bright field
	Electron optical	Optimized thermionic source (tungsten)
		Lifetime: 400+ 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 Spectroscopy detector (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
DATA STORAGE		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 14 mm height (optional 22 and 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
	Hardware integration	Fully embedded SDD, pulse processor and scan generator
SOFTWARE		Installed on Windows PC and controlled via user interface
		EDS point analysis, line analysis and mapping
		Export functions
SYSTEM SPECIFICATIONS	**Footprint**	280 (w) x 470 (d) x 550 (h) mm
	Weight	62 kg
	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	Preconfigured 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)

Distribution in the UK & Ireland

Lambda

Characterisation, Measurement & Analysis

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