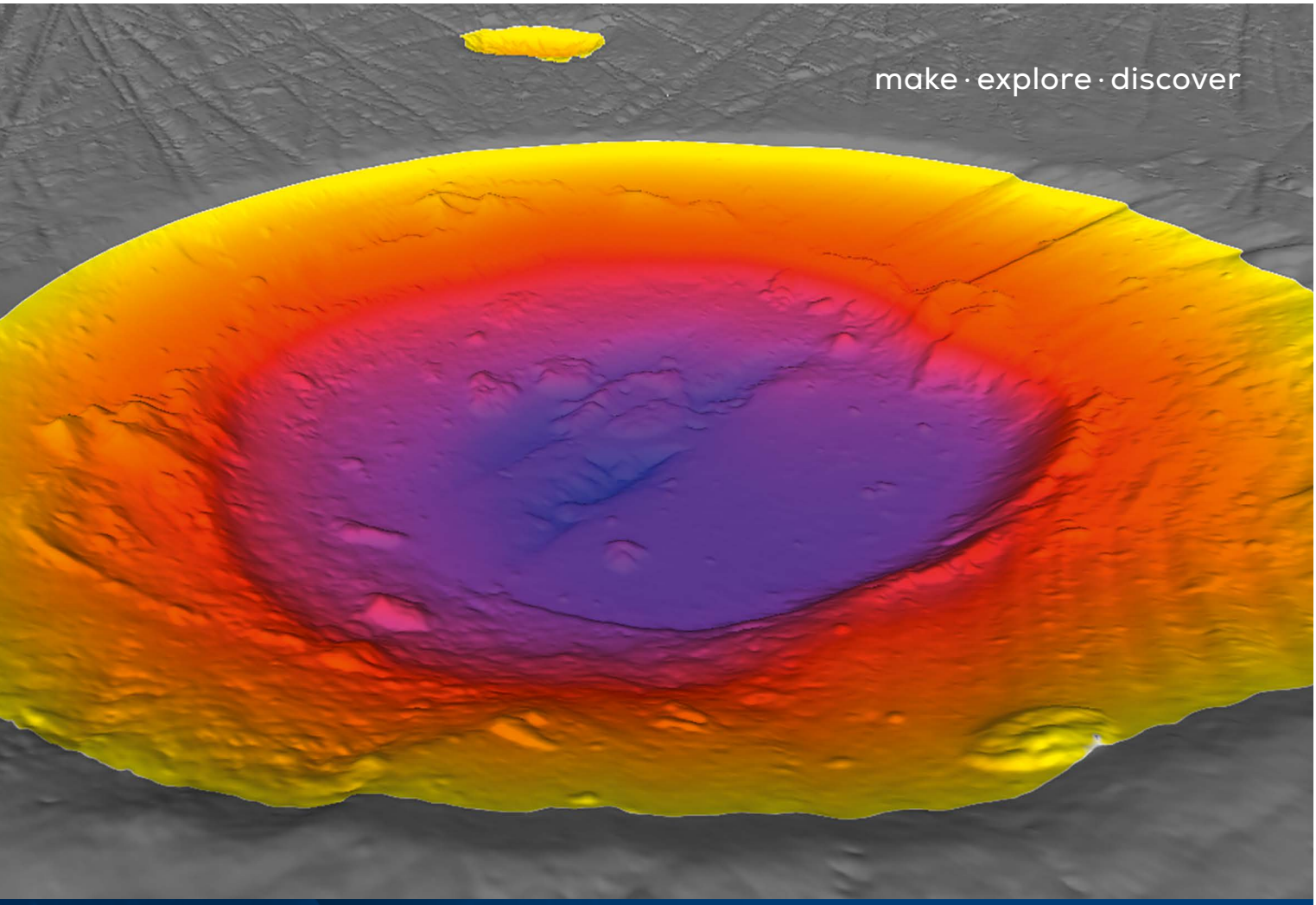
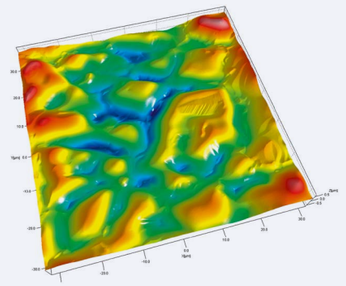


BSE Topography

Live and calibrated height measurements with SEM or FIB-SEM

point electronic

Add the third dimension to your SEM

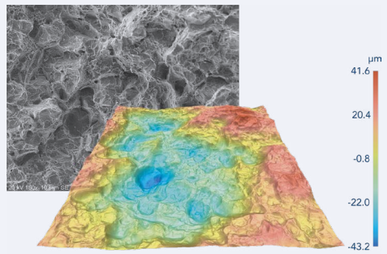


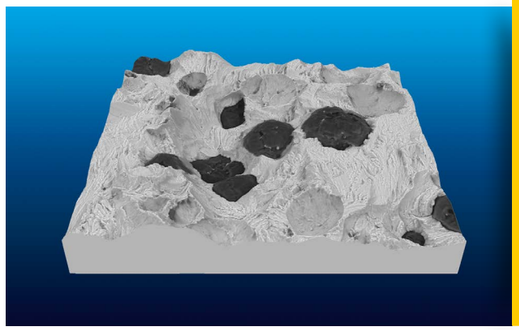
3D DYNAMICS

Record, measure and animate changes of surface topography - now including high-temperature in-situ experiments.

3D MEASUREMENTS

Measure height differences, profiles and other geometric features, or verified by integrated 3D calibration.





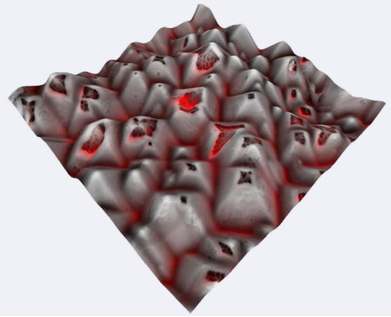
3D NAVIGATION

Explore surface topography in real time and understand your samples better with a dynamic 3D view - live while moving the sample or adjusting magnification.

point electronic

The BSE Topography system is the only solution that provides live quantitative and calibrated measurement of surface height, with live 3D visualization in Scanning Electron Microscopy.

It's designed for multivendor environments and interfaces seamlessly with standard topography software, including offline analysis and 3D printing file formats.

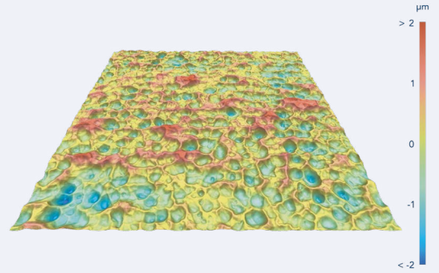


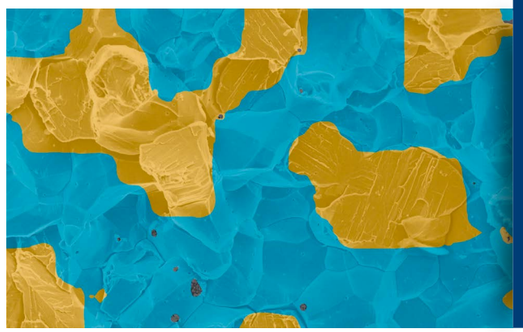
CORRELATIVE 3D MICROSCOPY

Acquire and visualize any SEM analog and digital signal as texture on sample height maps - now including EBIC for correlative electrical analysis.

STANDARD 3D ANALYSIS

Leverage captured 3D data with off-line external analysis software tools, such as particle distribution and surface roughness.





AUTOMATED 3D WORKFLOWS

Remotely acquire surface topography and multichannel SEM signals for live analysis and feedback, such as AI-based fracture analysis.

Live and calibrated height measurements

CUSTOMIZABLE WORKFLOW

Fully configurable scan profiles, including live scan or high resolution acquisition

PROJECT SETUP

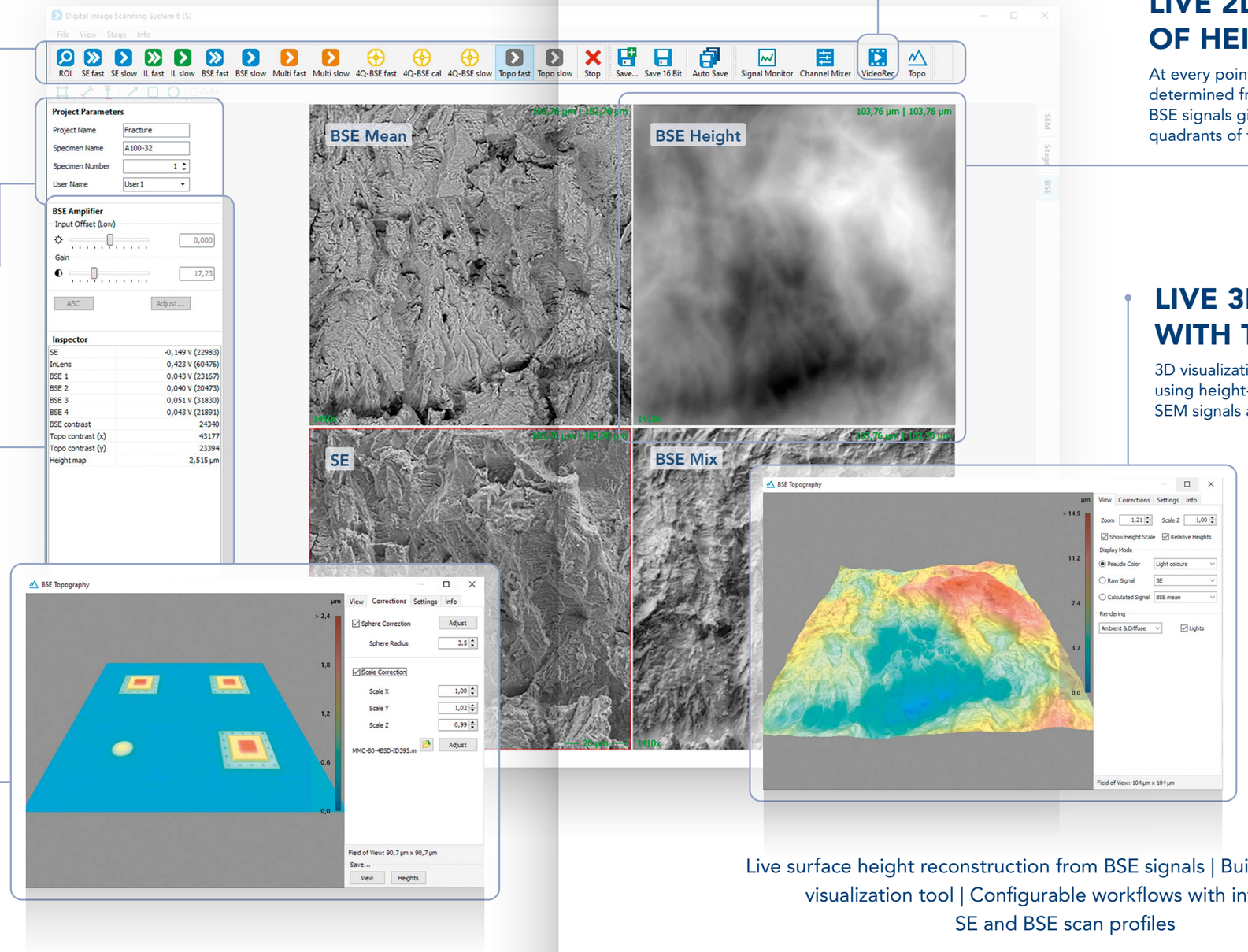
Project parameters for save and auto-save, routine workflows and remote control

DETECTOR CONTROL

Brightness and contrast with automated signal adjustment, detector insertion and retraction

AUTOMATED CALIBRATION

Automated determination and correction of lateral and height scales with 3D calibration sample



AUTOMATED 3D TIME SERIES

Automated acquisition of time-series for 3D in-situ microscopy, including live height

LIVE 2D VIEW OF HEIGHT

At every point on the sample, height is determined from the four simultaneous BSE signals given by the four quadrants of the detector

LIVE 3D VIEW WITH TEXTURE

3D visualization of measured topography using height-coded colors or raw SEM signals as texture

Live surface height reconstruction from BSE signals | Built-in 3D surface visualization tool | Configurable workflows with integrated SE and BSE scan profiles

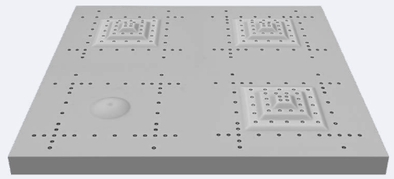
Turn-key quantitative BSE for any SEM or FIB-SEM

As a complete detector and scan controller system, the BSE Topography solution can be retrofitted into any microscope with a suitable BSE port.

Calibrated electronics and software

3D calibration sample | BSE detector
Scan generator | Data acquisition

point electronic



3D CALIBRATION STANDARD

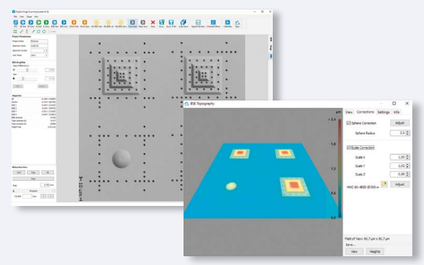
Spatial calibration sample with reference marks for automated geometrical calibration, ensures correct height scale

BSE DETECTOR

4Q segmented BSE detector with calibrated amplifier, including automated signal adjustments and insertion/retraction mechanism

DISS6 SCAN CONTROLLER

Calibrated multi-channel imaging system for simultaneous acquisition of BSE and SEM signals



DISS6 APP WITH TOPOGRAPHY PLUGIN

Reconstruction and live visualization of quantitative surface maps and SEM signals, with integrated 3D calibration

3D calibration standard

Calibration structures	3× multi-level pyramidal elements
	1× spherical element
	Circular reference marks
	Unique ID
Pyramidal elements	3 levels with reference marks
	Each level with sloping flanks
	Nominal size 20 x 20 x 3 µm
Spherical element	Rotational symmetric spherical cap
	Nominal diameter 10 µm
	Nominal height 1 µm
Reference marks	Coded bit pattern for auto-recognition
	Nominal diameter 800 nm
Calibration area	40 × 40 × 3 µm (single pyramid)
	80 × 80 µm × 3 µm (complete structure)
Holder	15 x 15 mm Al plate
	400 x 400 µm finder structure
Material	Pt composite
	Conductive mounted on Si substrate
Reference data	3D coordinates of reference marks
	SI-traceable measured
	Binary file format with reader app

Premium BSE detector

Sensor	Detector-grade Si chip
	Four-quadrant (4Q) geometry
	Chip on ceramic board mount
	2 mm inner diameter
	16 mm outer diameter
	0.5 kV minimum acceleration voltage
Mechanics	Port mounted, motorized
	10 µm step size
	-4…4 mm height and lateral alignment
	Automated touch alarm
	Passive cooling
Pre-amplifier	4x in-situ mount
	10^5 V/A gain
	200 ns minimum dwell time (gain dependent)
Amplification	-1…1 V input offset (calibrated brightness 1…4)
	1…1,800× gain (calibrated contrast 1….4)
	-0.5 ... 0.5 V output offsets (calibrated reference 1…4)
	BSE average (hardware mix of 1…4)
	3.4 MHz … 34 Hz low-pass filter

point electronic

High-Temperature BSE detector

Sensor	Carbon coated electrodes
	Four-quadrant (4Q) geometry
	5 mm inner diameter
	25 mm outer diameter
	-10...10 V voltage bias
Mechanics	Port mounted, motorized
	-4…4 mm height and lateral alignment
	Automated touch alarm
	Temperature sensor
	Passive cooling
Pre-Amplifier	4x in-situ mount
	Galvanic isolation
	5x107 V/A gain
	50 kHz bandwidth (gain dependent)
Amplification	-1…1 V input offset (calibrated brightness 1…4)
	1…1,800× gain (calibrated contrast 1….4)
	-0.5 ... 0.5 V output offsets (calibrated reference 1…4)
	BSE average (hardware mix of 1…4)
	3.4 MHz … 34 Hz low-pass filter

BSE DISS6 imaging

Signal inputs	BSE 1…4
	AUX 1…4
Digitization	12-bit (calibrated BSE1…4)
	8× simultaneous signals (BSE1…4 and AUX1…4)
	200 ns minimum dwell time (gain dependent)
	32,000× max. oversampling (pixel averaging)
Scan generator	X and Y scan outputs (calibrated)
	Beam blank output (optional)
	64k × 64k pixels maximum resolution
	0.5 GPixels maximum frame size (software limit)
	200 ns minimum pixel dwell time (detector limited)
	6 milliseconds maximum pixel dwell time
	256× max. frame average
	50x max. line average
	Frame, line, pixel synchronization (optional)

PC/Laptop, display (optional)

PC/Laptop	Intel Core i3 minimum
	2× USB 2.0 minimum
	Windows 11…7
	Network is recommended for remote support
Display	1,280 × 1,024 resolution minimum

BSE DISS6 app

Data acquisition	Live quantitative BSE
	Live height map
	Multi-channel SEM signals
	Configurable scan profiles
	Annotations and measurements
	Remote control
BSE detector control	Automated insertion/retraction
	Contrast and brightness
	Input offset and gain normalization corrections
	Automated 4Q global brightness
	Automated 4Q global contrast
	Automated input offsets (dark correction)
	Automated gain normalization (bright correction)
	Automated time filter (matching pixel dwell time)
Topography tool	Live 3D view with calibrated height scale
	Free configurable views and pseudo-colors
	Live overlay of all available SEM signals
	Automated spherical correction
	Automated X, Y and Z scale corrections
File formats	16-bit multi-page TIF with XMP metadata (raw image and height data)
	TIF, JPG, BMP for image data or 3D views with annotations and overlays
	Additional height data formats (AL3D, SDF)
Operating system	Windows 11…7

microShape app

Topography viewer	3D view with color-coded heights
	3D texture overlay with SEM signal
	2D view of height map and selected SEM signal
	Configurable views, also for saving to files
Topography processing	Crop, rotate, resize
	Scale and shear 3D corrections
	Texture layer replacement
	Histogram calculation
Measurements functions	3D points, distances and angles
	Spherical and polynomial surface fit
	Free configurable height profiles
Export functions	Height profiles (Image, CSV, PDF report)
	3D printing (PLY)
	Surfer grid data (DAT)
File formats	TIF, AI3D, BCR/F, ASCII
Operating system	Windows 11…7

Parts and cables

3D calibration sample	Standard 1×
BSE detector	Standard 1×
BSE detector PSU	Standard 1×
BSE detector flange adaptor	Standard 1×
DISS6 scan	Standard 1×
DISS6 scan cable	Standard 1×
DISS6 detector cable	Standard 1×
DISS6 mains power	Standard 1×
USB cable	Standard 2×
USB flash drive	Standard 1×
PC, keyboard, mouse	Optional 1×
Displays	Optional 1×

Software packages

Drivers	PE USB driver
Libraries	DISS6Control
	DISS6Topography
Software	DISS6 app
	EM Gateway server
	microShape app
	microDIP app
	microCal app (optional)

Weight and dimensions

Shipping	Typ. 36 × 32 × 150 cm
	Typ. 12.5 kg

Site requirements

Power	2x mains 110/220 VAC single phase 50/60 Hz
	On the same earth as the microscope
Mount	1× port for BSE detector
Scanning	1× external scan interface on the SEM electronics
Space	DISS6 scan controller may be placed on the SEM table

point electronic

Our design principles

We look back on 30 years of experience in development and manufacture of high-performance instruments and technologies for microscopy.

We are driven by an ambition to expand abilities and to improve performance of electron microscopes.

Our aspiration is to make the best quality tools and to join our customers on their journeys of scientific exploration and discovery.

Performance
Microscopy must be a reliable and enjoyable experience
- Design for highest speed and resolution at the lowest noise
- Develop smart independent controllers for live optimization
- Support new users with simple and automated controls
- Assist advanced users with access to all parameters

Efficiency
Microscopes must provide an uninterrupted focus
- Use standard microscope controls and data formats
- Give instant feedback with live image mixing and processing
- Add bespoke software tools and algorithms for repetitive tasks
- Enable more developers with libraries and documentation

Environment
Products and technologies must be sustainable
- Reduce power consumption through smart design
- Minimize material use, embrace reuse where possible
- Save weight and volume for shipping and maintenance
- Enable everyone to develop sustainable innovations

Quantification
Data and control must be in physical units
- Calibrate, in production, for measured inputs and outputs
- Provide samples, procedures and software for calibration
- Give all control parameters in device independent values
- Ensure safe operation according to IEC61010-1 and IEC 61326-1

point electronic GmbH
Erich-Neuß-Weg 15 | 06120 Halle (Saale) | Germany
Tel.: +49 345 1201190 | info@pointelectronic.de
www.pointelectronic.de

point electronic

Edition 07/2025 | Images: point electronic, Adobe Stock | Design: kraus@atelier-krauskopf.de