Product Information
Version 1.2

ZEISS EVO

Your High Definition SEM with Workflow Automation

We make it visible.

Increased Resolution and Surface Detail for All Samples

Put EVO to work on a wide range of applications in materials and life sciences.

Capture outstanding topographical details at low voltages with beam deceleration and high definition backscattered electron imaging. Now you can observe materials interacting in real time under changing environmental conditions. Take control of the chamber environment and carry out detailed analyses of biological samples in their natural hydrated state.

High productivity is a given, thanks to automated workflows. EVO's unique X-ray geometry gives you the highest resolution performance at analytical working conditions.

Simpler. More Intelligent. More Integrated.

Unrivalled Surface Imaging

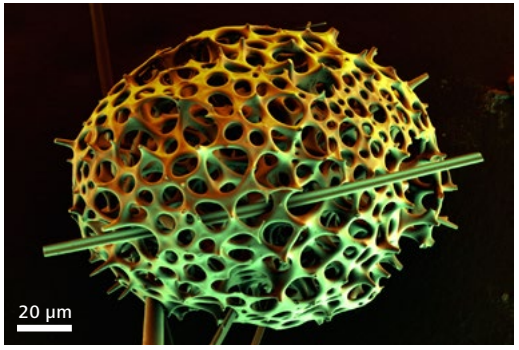
Now you can visualize exceptionally fine surface details with crisp contrast using EVO's low-kV high definition backscattered electron detector (HD BSD). For beam sensitive samples or samples with surface topographies, beam deceleration technology achieves higher resolution and enhanced surface detail. Drift correction during imaging further improves edge resolution. The EVO series offers a choice of three source technologies including a powerful HD source. Combine all three and realize new standards in image quality.

Intelligent Imaging – High Throughput

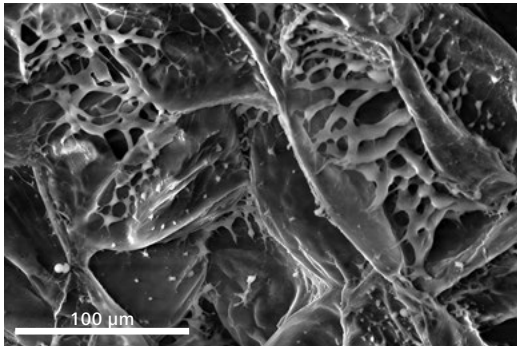
Count on your EVO to deliver high productivity in manufacturing and quality control. Just consider the impact on your throughput of reducing over 400 manual steps to only 15, imaging four points of interest on nine specimens at three different magnifications. Its intelligent system automation handles the column alignment as well as magnification, focus and stage movement settings – all that in addition to the final image acquisition. The system will recommend imaging conditions based on your sample selection. Expect reliable and reproducible results with the mid-column aperture controlled by a user-friendly click-stop mechanism.

Environmental Electron Microscopy

EVO LS is your instrument of choice for observing nano scale interactions of life science and materials samples at different temperatures, pressures and humidities. Use it to gain insights into cells, plants and organisms in their natural state of hydration. Analyze material properties such as corrosion, temperature resistance and coating performance. EVO LS is your all-round environmental SEM; capture high quality images at extended pressures of up to 3000 Pa; image wet samples with ease; maintain computer-controlled environmental conditions to avoid dehydration artifacts.



Pseudo-color image of uncoated Radiolaria at 1 keV landing energy using beam deceleration technology. Sample courtesy of the University of Cambridge.

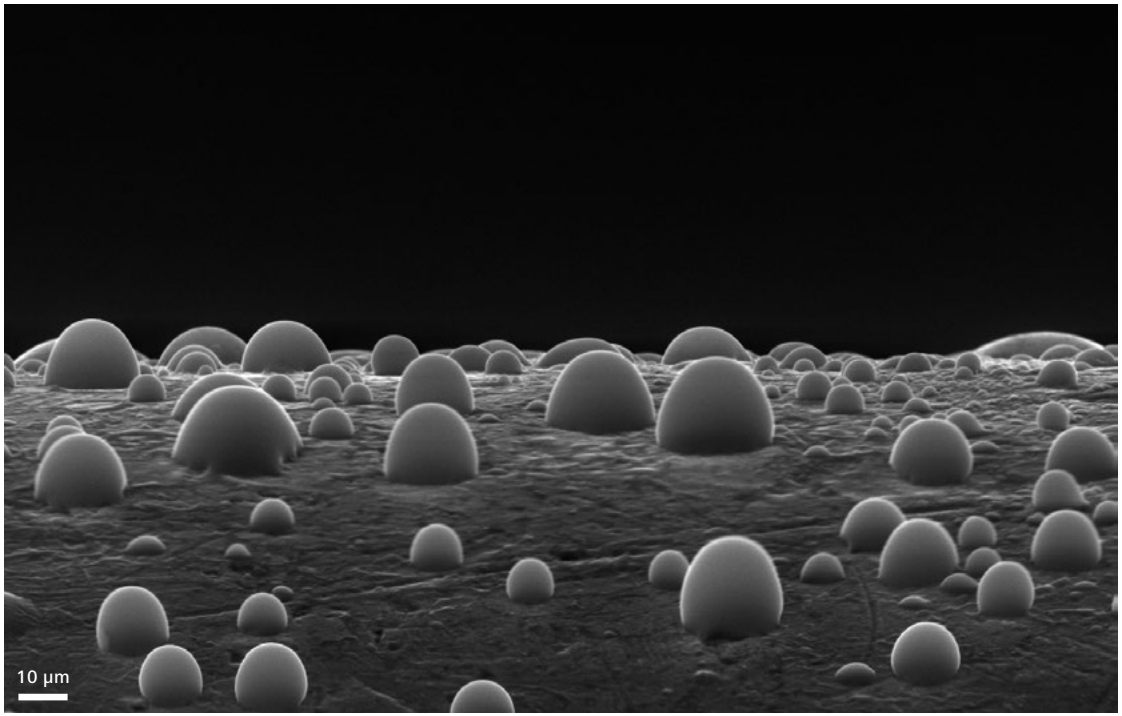


Thin slice of apple imaged on EVO LS with the EPSE detector at 20 kV and 100 Pa water vapor at -15 °C.

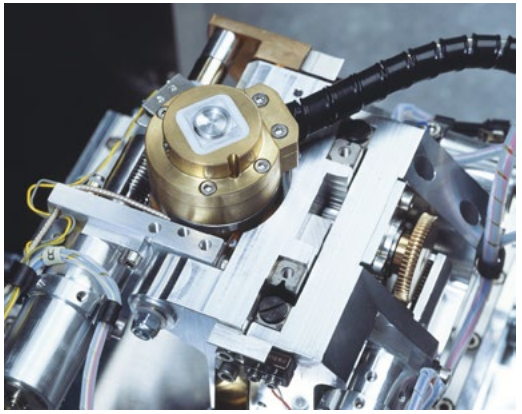
Your Insight into the Technology Behind It

Environmental Electron Microscopy

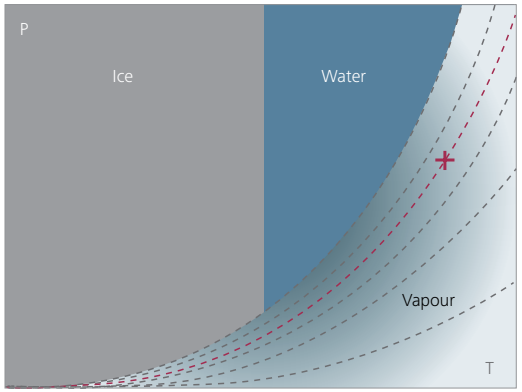
By preventing dehydration, EVO LS maintains the structure of fauna and flora as you study the interaction of water with materials. When imaging liquid water, EVO LS keeps the specimen temperature above freezing while increasing the water vapor pressure in the microscope to facilitate condensation on the sample. Combine Coolstage with the highly sensitive vacuum and humidity control of EVO LS and you will achieve stunning life science images. It's easy to move between vapor, liquid or ice, using the active phase diagram of water (as shown on right) to control imaging conditions. You can perform both freezing and heating processes in the SEM vacuum with the dovetail mounted stage that can be controlled thermally within the range of -30 to 50 °C.



Water droplets imaged on wire using the EPSE detector at 25 kV and 690 Pa water vapor at 0.1 °C on EVO LS.



EVO Coolstage



Phase diagram to control imaging conditions

Your Insight into the Technology Behind It

ZEISS EVO HD Electron Source

Introduce high definition beam technology to your SEM to increase image contrast and resolution at low acceleration voltages. Additional electrodes shape the emission from the filament to form a virtual source, exhibiting a reduced source diameter and producing significantly higher resolution. The EVO HD source also delivers a major increase in brightness. Plot the factor of improvement in source brightness with the EVO HD against conventional tungsten technology and you will see an increase by a factor of 100 at low-kV. What's more, you can enhance the performance of the EVO HD source even further by using the HD BSE detector and stage biasing technology.

Filament Type	Relative Brightness at 1 kV	Emitter Diameter (µm)	Source Diameter at 1 kV (µm)
Tungsten	1	120	150
Conventional LaB_6	x13	20	60
HD	x100	20	5
Schottky FE	x3330	0.5	0.02

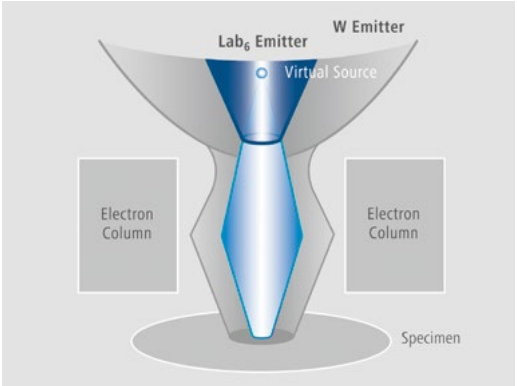


Figure 1: The LaB_6 filament in the HD source (red outline) superimposed on the conventional W filament (grey outline) illustrates that the HD technology results in a reduced spot size.

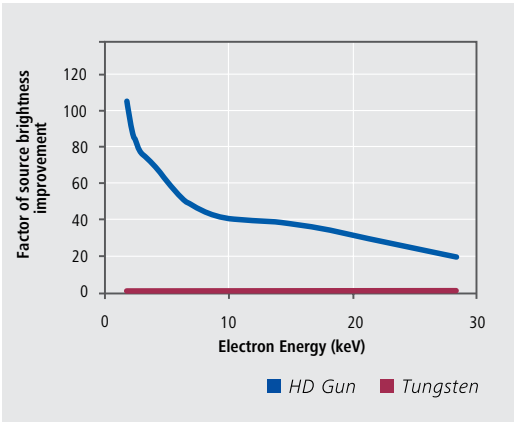


Figure 2: The brightness improvement achieved with the HD source is particularly strong at low-kV. A factor of 100 is achieved at 1 keV.

Your Insight into the Technology Behind It

Class Leading X-ray Geometry for Analytical Imaging

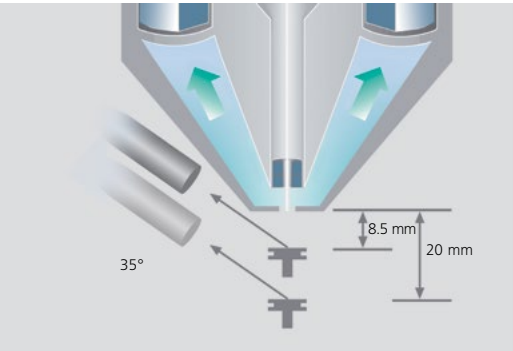
By making access to the specimen a design priority, ZEISS has ensured you will also achieve an optimum geometry for EDS, WDS and EBSD. The objective lens features a sharp profile that gives you a working distance of 8.5 mm while retaining a 35° take-off angle. You can maximize signal levels for simultaneous imaging and analysis, and also vary the EDX working distance to provide flexibility and perfect working conditions.

Coplanar Geometry for EBSD

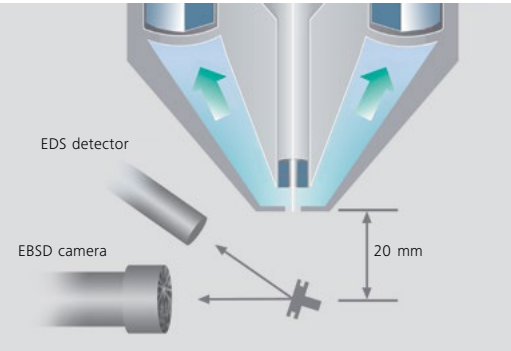
The EVO column and chamber geometry create an optimized environment for an EBSD detector. The EDS detector is positioned directly above and in the same plane as the EBSD detector. It is ideally positioned at a 35° take-off angle to enable simultaneous data collection from both systems. You can tilt the stage at 70° to face the EBSD camera or fit it with a pre-tilted specimen holder.

EasyVP

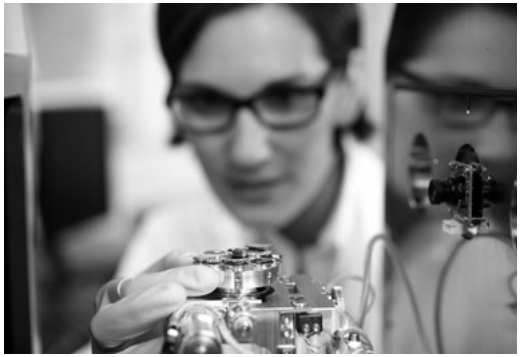
EasyVP enhances both ease of use and imaging capabilities. It lets you switch seamlessly between high vacuum and variable pressure modes without ever needing to change apertures. OptiBeam, the column control software, optimizes all imaging conditions across high vacuum and variable pressure modes so high resolution images will be easily captured, even in VP mode. EasyVP also introduces automatic aperture alignment to your daily working environment.



The chamber geometry of the EVO features the lowest analytical working distance of 8.5 mm.



The coplanar chamber was designed with analytical accessories in mind and provides the flexibility required for combination of analytical techniques such as EDS, EBSD or WDS.



Tailored Precisely to Your Applications

Typical Applications, Typical Samples	Task	The ZEISS EVO Series Offers
Automotive	Routine analysis to ensure manufactured components meet quality and durability requirements.	■ Choose between three chamber size options with EVO MA (10, 15 & 25). Easily handle samples weighing up to 5 kg with a height of 210 mm and width of 300 mm with the EVO MA 25. ■ With EVO MA you benefit from intelligent imaging and automated workflows, perfectly suited to process control environments. EVO MA will take care of the optimal settings for your sample type and run around the clock with minimal user interaction. ■ Variable pressure technology as standard, eliminating the need for sample coatings. This enhances throughput, especially for non-conductive applications focused on samples such as polymers or textiles. ■ EVO LS provides full environmental capabilities to analyze water interaction on textiles, polymer films and plastic components.
Manufacturing Cleanliness	Automated analysis of particles and identification of morphology and chemical analysis to meet ISO 16232 standard.	■ Upgrade EVO 15 with SmartPI software and EDS and WDS detectors.
	Characterization of wear particles in lubricated systems and foreign particles in foodstuffs and pharmaceuticals.	
Natural Resources	Mineralogy: Visualize the microstructure of rocks.	■ High definition backscattered electron detector (HD BSD) in combination with ZEISS cathodoluminescence (CL) detector. ■ Correlative microscopy with ZEISS light microscopes with polarized light.
	Morphology: Visualize the form of crystallites to identify minerals.	■ SE imaging in both high vacuum and variable pressure modes.
	Analyze the chemical composition of minerals and rocks.	■ Energy dispersive spectroscopy (EDS) and wavelength dispersive spectroscopy (WDS).

Tailored Precisely to Your Applications

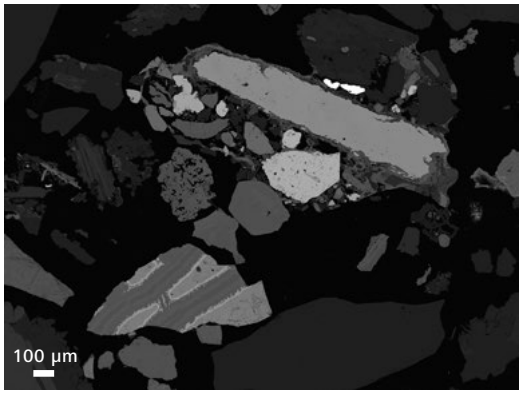
Typical Applications, Typical Samples	Task	The ZEISS EVO Series Offers
Material Science	Investigate and develop materials: Analyze of both conducting and non-conducting material samples.	■ Choose from a wide range of additional imaging detectors including EDS and WDS systems for analytical analysis of your materials. ■ Benefit from in-situ analysis of fracture mechanics using the large range of compatible third party tensile stages. ■ Use variable pressure operation as standard. ■ Combine EVO with the HD BSE detector, stage biasing technology and coplanar EDS and EBSD geometry to perform materials analysis. With EVO HD you capture outstanding topographical images at particularly low voltages providing image quality approaching field emission technology. ■ With EasyVP on EVO, switching between high vacuum and variable pressure modes of operation is quick and easy for both conductive and non-conductive samples. ■ EVO LS provides full environmental capabilities to analyze water interaction on textiles, polymer films and plastic components.
Forensics	Investigate criminal evidence: ■ Firing pin marks on cartridges ■ Rifling marks on bullets ■ Determination of shooting distance ■ Gunshot residue analysis ■ Paint and glass analysis ■ Analysis of printed and written documents, including bank note forgery ■ Coin forgery ■ Fabric analysis ■ Hair and other human sample comparison and analysis ■ Forensic toxicology	■ Choose between three chamber size options with EVO MA – 10, 15 & 25. Easily handle samples weighing up to 5 kg with a height of 210 mm and width of 300 mm with the EVO MA 25. ■ With EVO LS you benefit from environmental electron microscopy and image samples in their original condition. ■ Acquire high resolution images of a specimen at 10 nm or less while retaining a very large depth of field. ■ Optional SmartPI software for non-destructive analysis of the elemental make-up of individual particles or sub-regions of the specimen. ■ Correlative microscopy with ZEISS optical florescence technology. ■ ZEISS bullet comparison sub-stage for bullet or cartridge case analysis.
Plant Sciences	Phytopathology: Study plant diseases caused by environmental conditions or pathogens, such as fungi, bacteria, nematodes and parasitic plants. Image both plant and disease vector in environmental SEM conditions in their natural state. Morphology: Study form and structure of plants. Micromorphological Analysis: Combine the study of structure with microanalysis of content; understand the distribution of molecules and compounds within the plant and plant seed. Textile studies: Use of crops for textile production to be a driver for efforts to maximize yield and manipulate microstructure for mechanical benefit.	■ Environmental electron microscopy allowing specimens to be examined in their natural state under a range of conditions; the detail provided by the environmental capabilities of EVO is unparalleled.

Tailored Precisely to Your Applications

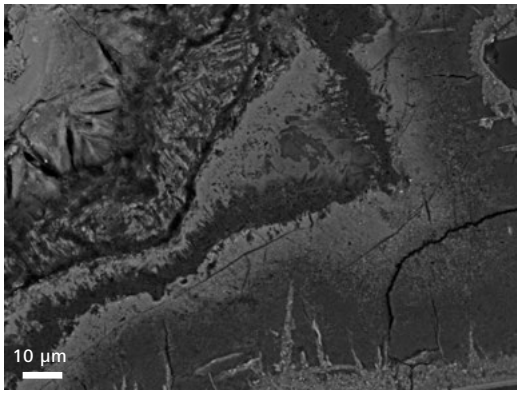
Typical Applications, Typical Samples	Task	The ZEISS EVO Series Offers
Zoology	Describe new species and understand the evolutionary history of organisms. Examine unprepared soft tissue in full environmental mode, hexamethyldisilazane (HMDS) dehydrated or critically-point dried (CPD) soft tissue specimens. Image hard specimens, such as the shells of molluscs, crustaceans, insects and turtle shells and animal bones. Examine museum reference collections.	■ True environmental SEM, allowing specimens to be examined in their natural state under a range of conditions. ■ If uncoated, the suite of variable pressure detectors available on EVO LS, such as the VPSE, EPSE and BSE detectors, offer outstanding imaging while the SE and BSE detectors are ideal for coated specimens under high vacuum conditions. The HD BSE detector is ideally suited to beam sensitive samples due to low noise and low probe currents. ■ The capability to image without coating is now an essential requirement for museum applications. EVO LS offers an unequalled range of electron detectors to provide a solution for any specimen.
Microbiology	Reveal and visualize structures in life sciences by a range of techniques; from simple morphological studies on critical point dried and coated materials, examinations of fully hydrated biological tissues in Cryo or Environmental mode, to scanning transmission electron microscopy (STEM).	■ Cryo techniques – Cryo SEM is a standard method of examining solid and liquid specimens by imaging them at near liquid nitrogen temperatures. ■ Environmental imaging – Specimens can be examined in their natural state of hydration. The use of environmental techniques to precisely control the water vapour pressure in the specimen chamber and the sample temperature allows samples, such as fungi and bacteria, to be examined in various states of humidity. ■ Scanning transmission electron microscopy (STEM) – EVO is an effective alternative to the use of a dedicated transmission electron microscope (TEM) for simple visualization. Mounting a STEM detector on to EVO is a fast and convenient method for the examination of a large range of specimens appropriate for imaging in the TEM.

ZEISS EVO at Work

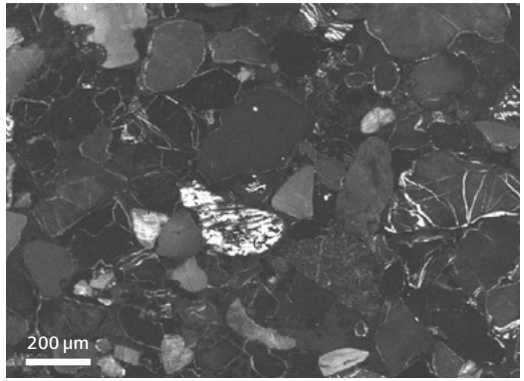
Natural Resources



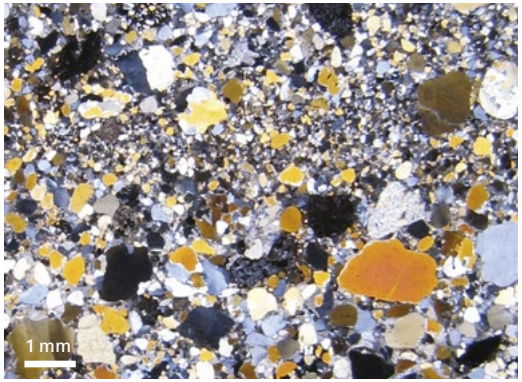
BSD image of African copper-gold ore at 15 kV. Minerals of interest include monazite, electrum and native copper.



BSD image of African copper-gold ore at 15 kV. Grey levels show the crystal growth and atomic number contrast across the sample.



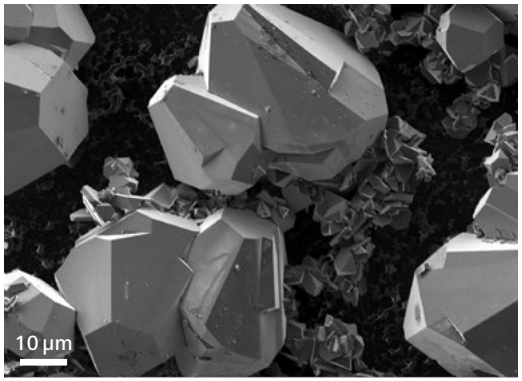
Given their persistent luminescence, CL imaging in the presence of carbonates is usually challenging. This sandstone thin section image was taken at 15 kV with the ZEISS IndigoCL detector, which is designed to deliver artifact-free CL imaging under such circumstances.



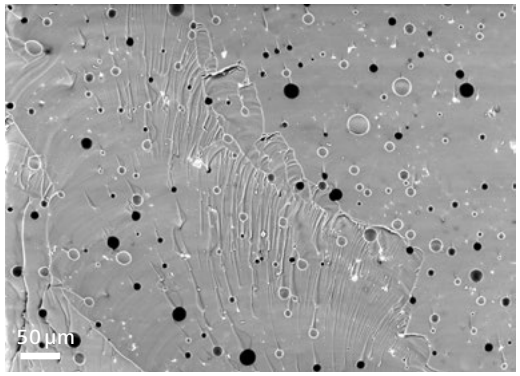
Sandstone geological slide imaged with the crossed polar accessory on the camera stand. Crossed polar imaging highlights grains of interest for ease of navigation.

ZEISS EVO at Work

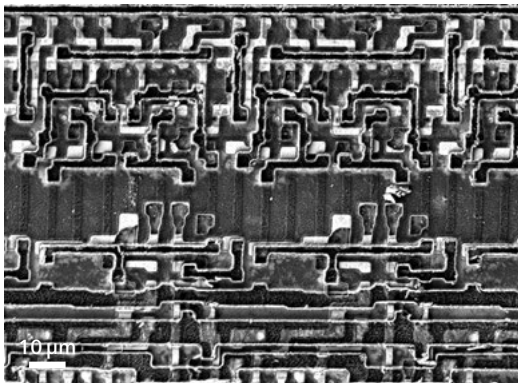
Materials Research



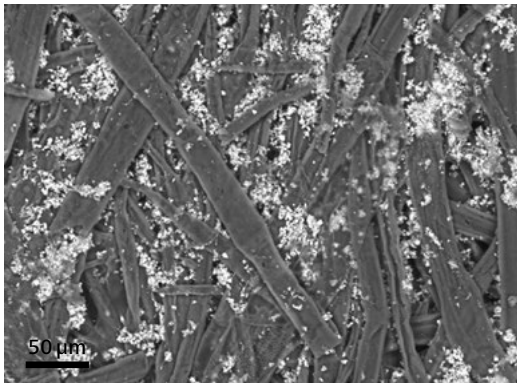
Ferrous oxide imaged using EVO HD with the SE detector at 3 kV. The growth and morphology of crystals and surface features is best imaged at low kV.



A compositional image of a ceramic fracture at 20 kV and 40 Pa air with the HD BSE detector.



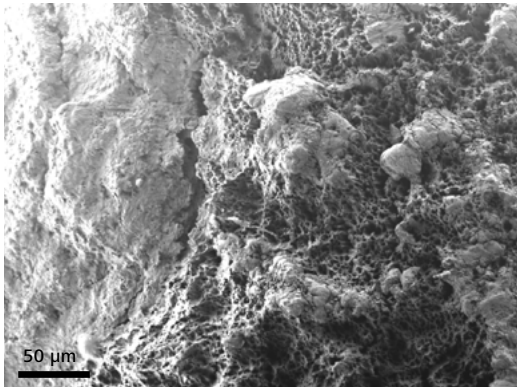
A semiconductor integrated circuit (IC) imaged with the HD BSE detector at 3 kV with beam deceleration (landing energy 1 keV). Inspection of an IC at different points during the manufacturing process is an important aspect of quality and process development.



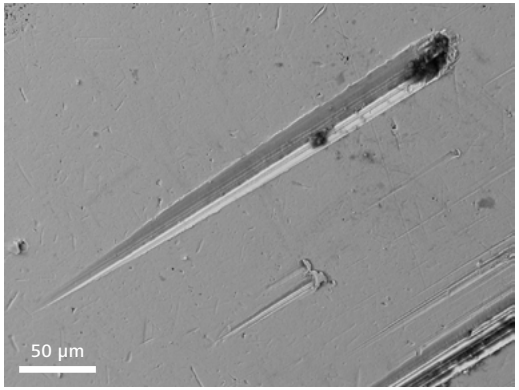
Printer paper imaged at 20 kV and 40 Pa air with the HD BSE detector. Analysis of paper is carried out in industry to control the quality of these products.

ZEISS EVO at Work

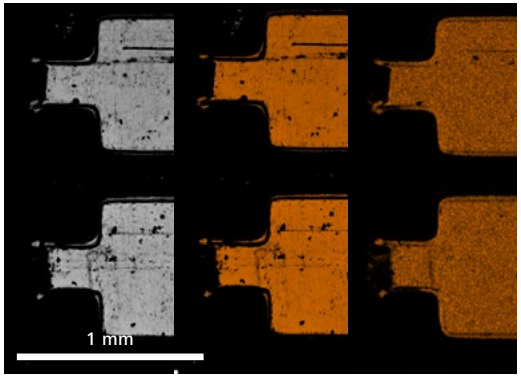
Automotive and Manufacturing Cleanliness



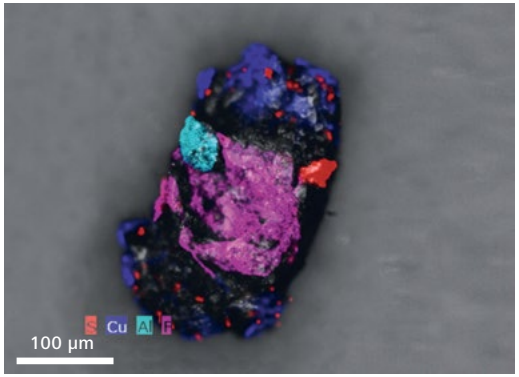
Metallic fractured sample imaged with the HD BSE detector at 5 kV with beam deceleration (landing energy 600 eV) demonstrating topographical capabilities.



Mixed image of secondary and backscattered electrons using EVO HD at 20 kV showing the wear on the surface of a ball bearing.



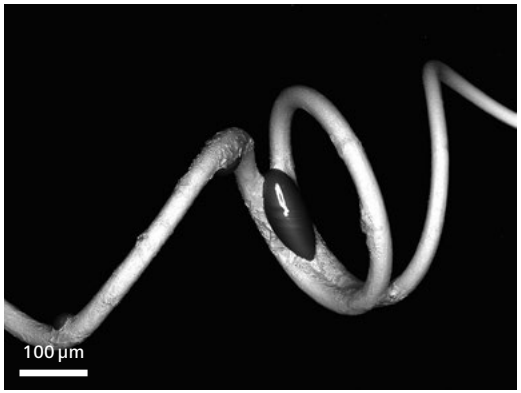
BSE image (left), EDX map (centre), and overlaid images (right) of a PCB edge connector/gold contact imaged at 20 kV with a field of view of 2.5 mm.



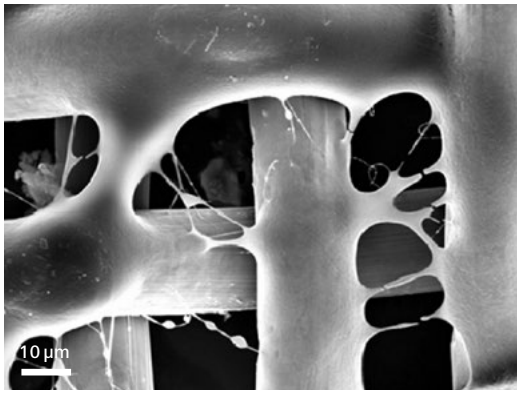
Images from a light and electron microscope can be overlaid using CAPA (correlative particle analysis) and information about the elemental composition can be collected using an EDS system.

ZEISS EVO at Work

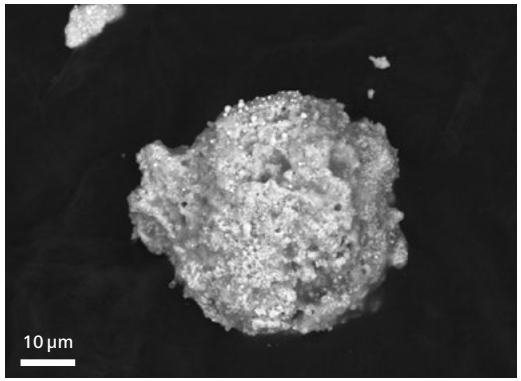
Forensics



BSD image of a broken light bulb filament at 20 kV.



SE image of lipstick remnants on fabric at 20 kV.

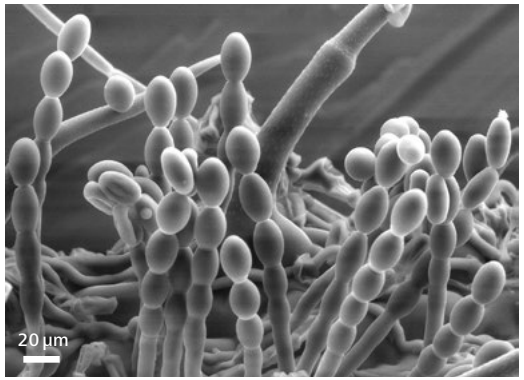


BSD image of a gunshot residue (GSR) particle at 20 kV. Courtesy of I. Tough, Robert Gordon University, Aberdeen, UK.

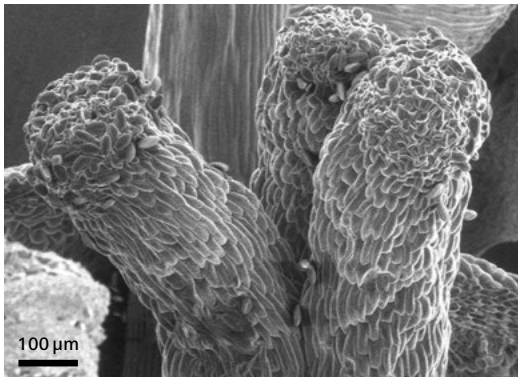
BSD image of pollen caught on fabric at a pressure of 58 Pa in water vapor at 20 kV.

ZEISS EVO at Work

Plant Sciences

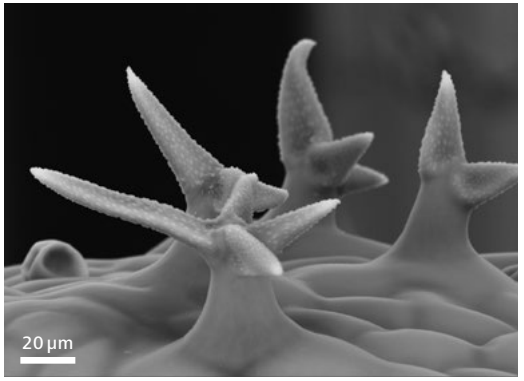


EPSE image illustrating environmental imaging during phytopathological investigations of chains of mildew on the surface of a leaf, captured at 568 Pa of water vapor and using the Coolstage.



Pollen grains adhering to the stigma during pollination of the hebe, an evergreen plant. Imaged using EVO HD with the VPSE G3 detector in variable pressure mode using OptiBeam depth mode.

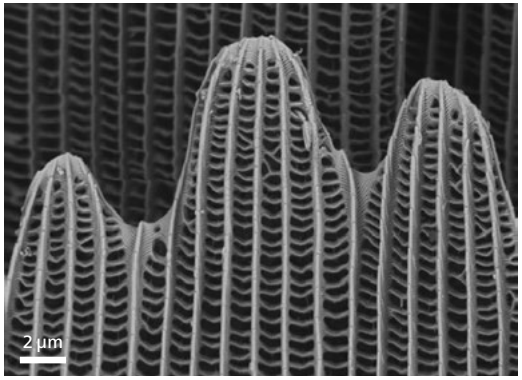
BSD image of hairs on a nettle leaf imaged in variable pressure mode using the Coolstage option to maintain hydration.



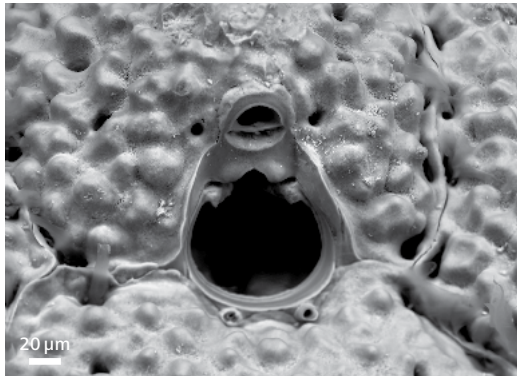
The intricate structure of the surface of a rosemary leaf visualized by the VPSE G3 detector at 20 kV in full environmental mode with water vapor introduction and Coolstage.

ZEISS EVO at Work

Zoology



Scale of butterfly wing (Pieris brassicae) imaged using EVO HD at 5 kV.



BSD image of a bryozoan (or 'moss animal') at 20 kV and variable pressure of 20 Pa.

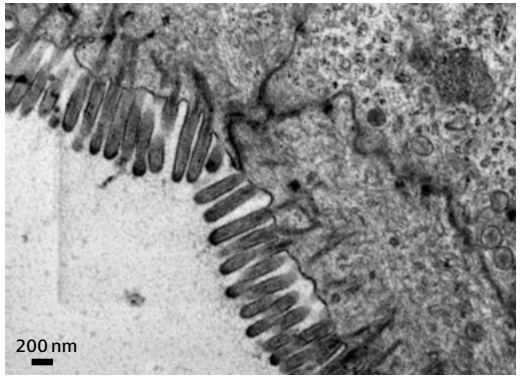
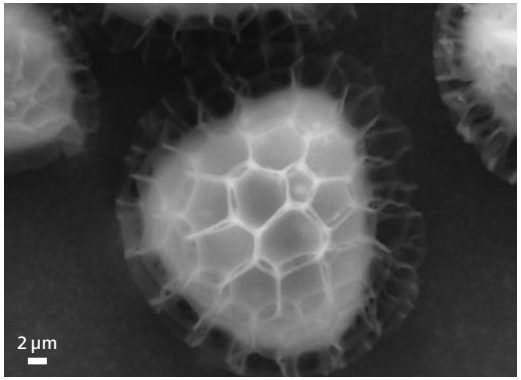


Image of a section of intestine with the microvilli border clearly visible, with the EVO STEM detector at 20 kV.

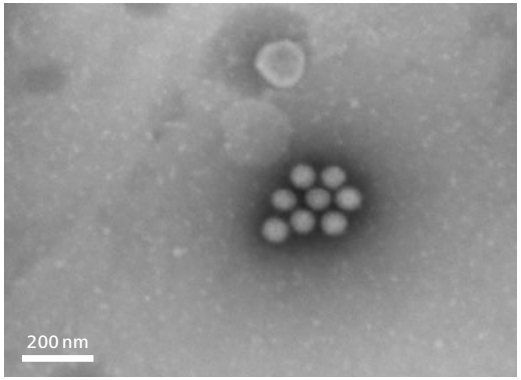
BSD image of equine bone structure at 20 kV in variable pressure mode. Copyright A. Boyde, Queen Mary University of London, UK.

ZEISS EVO at Work

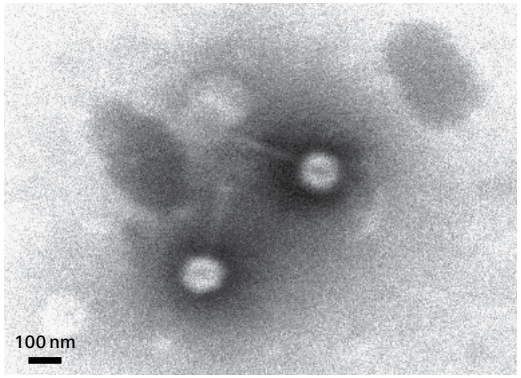
Microbiology



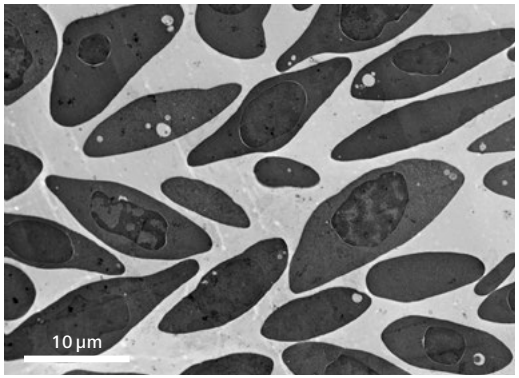
BSD image of lycopodium spores imaged at 30 kV in variable pressure mode. Courtesy of I. Tough, Robert Gordon University, Aberdeen, UK.



High magnification image of rotavirus cells captured with the STEM detector at 30 kV.



High magnification image of two bacteriophages showing their characteristic makeup of the hexagonal head and tail. Captured with the STEM detector at 20 kV with a 1.5 µm field of view.



Python blood cells imaged with the EVO STEM detector at 20 kV.

ZEISS EVO: Your Flexible Choice of Components

Upgrade EVO with sample holders, detectors and additional software options:

Electron Source Options	Benefits Offered
EVO HD	The bright electron source delivers high contrast and resolution images at low landing energies
LaB_6	Extended filament lifetime and stable probe currents. Ideal for analytics
Tungsten	Economic source technology, easy to change over, provides high probe currents

Detector Options Include	Benefits Offered
Chamberscope & Downscope	View your sample in the chamber with a CCD camera. Available with picture-in-picture capability
EDS & WDS	Carry out elemental X-ray analysis of your sample
CL	Produce high resolution images of luminescent materials. Choose the ZEISS IndigoCL detector for artifact-free cathodoluminescent images at fast scan speeds in the presence of carbonates
STEM	Observe thin section samples in transmission mode
EBSD	Analyze the crystallographic properties of your sample
SE	Visualize surface detail in high vacuum modes of operation
VPSE	Visualize true surface detail in variable pressure modes of operation
EPSE	Obtain outstanding images at extended water vapor pressures
HD BSD	Image to perfection at both high and low voltages with great surface detail. Further enhance topographical detail using the shadow mode, thanks to the fifth segment design

ZEISS EVO: Your Flexible Choice of Components

Software and Hardware Options Include	Benefits Offered
Crossed Polarized Accessory	Image thin sections of geological samples
SmartBrowse	Contextualized image browsing with multiple detector overlays
Shuttle & Find	Correlative microscopy for light and electron microscopes
CAPA	Correlate particle analysis data between your ZEISS light microscope and EVO scanning electron microscope
	Compliant with ISO 16232 standard
SmartStitch	Automatically stitch acquired images together to form one micrograph of your entire sample
ATLAS	Acquire incredibly large images (32k x 32k pixels)
Image Navigation	Quickly navigate to areas of interest in your sample using an image from a separate device, e.g. a digital camera
Intelligent Imaging	Acquire images for routine applications automatically
SmartPI (Particle Investigator)	Automatically detect, investigate and characterize particles of interest in your sample. Particularly useful for industrial cleanliness
BeamSleeve	Enhance imaging in variable pressure modes of operation and improve accuracy of EDS analysis by reducing beamscattering caused by charge compensation gas in the chamber
Bullet Comparison Stage	Compare bullets or cartridge cases easily with the ZEISS specialist forensic stage
Beam Deceleration	Use beam deceleration technology for topographical images of beam sensitive samples
Drift Correction	Correction for systematic drift of the image whilst increasing resolution

Expand Your Possibilities

Flexible Chamber Design

A choice of three chamber sizes lets you select the optimal solution for your application needs:

ZEISS EVO 10

Although equipped with a compact chamber, EVO 10 defies expectations to offer the largest X-Y stage travel and best repeatability in its class. It's ideal for high throughput applications such as particle and gunshot residue (GSR) analysis.

ZEISS EVO 15

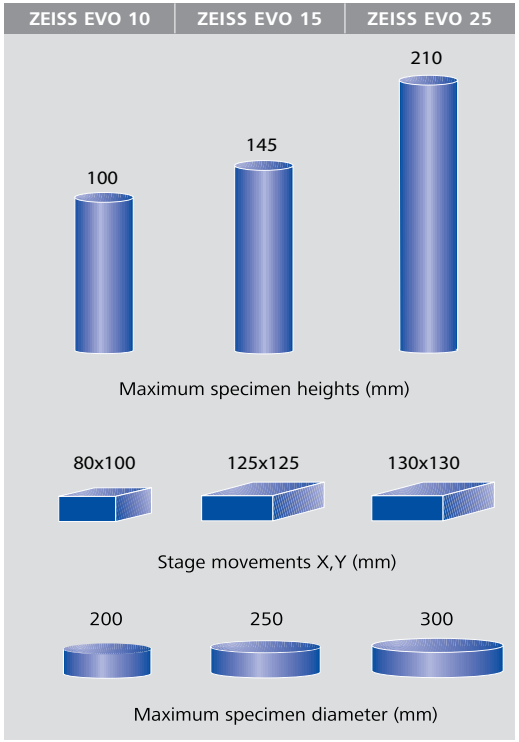
With EDS and WDS ports as standard, EVO 15 demonstrates perfectly the total flexibility concept of the EVO range. The EVO 15 chamber excels in analytical applications. Achieve optimum results with a single chamber configuration, using the coplanar geometry of the electron beam, EDS detector, EBSD camera and sample tilt direction.

ZEISS EVO 25

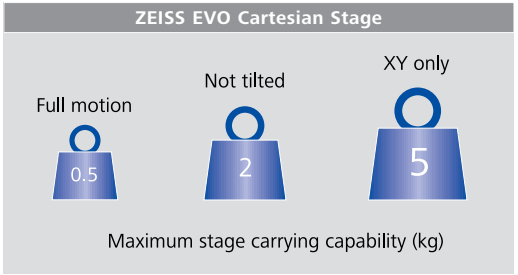
Largest in the series, the EVO 25 chamber is tailor-made for applications using the largest specimens. Indeed, EVO 25 can accommodate samples up to a maximum specimen diameter of 300 mm and a maximum height of 210 mm.

Flexible Stage Design

The flexible stage design allows you to add or remove spacers, and even remove the z tilt and rotate module, to offer full x, y movement of the complete base platform.



The EVO chamber concept is based on maximum flexibility and offers tall chambers to allow for large specimens up to 210 mm.



The EVO stage offers large weight bearing capabilities independent of the chamber type.

Expand Your Possibilities

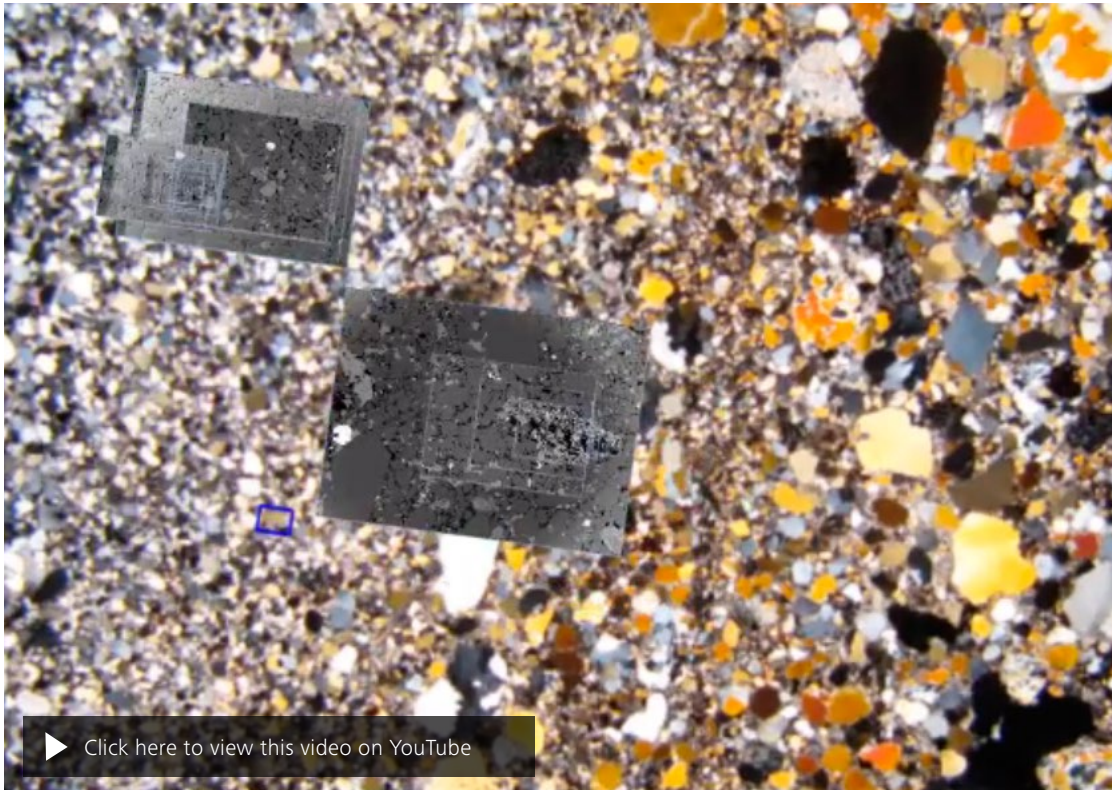
Intelligent Imaging

For routine applications where images are acquired on a daily basis using repetitive settings, Intelligent Imaging dramatically increases productivity. Use a simple wizard to select imaging regions, magnifications and detectors to automatically acquire images from your sample. Replicate imaging conditions from one stub to the next for reproducible results at the click of a button. Count on high quality unattended imaging acquisition equivalent to an experienced user manually obtaining the images. Intelligent Imaging is compatible with all ZEISS standard sample holders and is integrated with SmartBrowse and Image Navigation for offline contextual viewing.

Expand Your Possibilities

SmartBrowse

Use SmartBrowse, your contextual imaging tool for post image acquisition, to present images taken with multiple detectors at different magnifications in one single, interactive image. With this patented software from ZEISS, you completely understand your images in context to one another, both in terms of space and imaging parameters. With SmartBrowse you can use a photograph or optical image of your sample for navigation of your captured micrographs. SmartBrowse indicates when additional image information from multiple detector types is available for a selected field. The complementary information produced by multiple detectors in the same field build up a unique and comprehensive set of data layers. SmartBrowse is particularly useful for applications requiring contextual information to be included in investigations. In geosciences, the association of minerals and the location and texture of rocks is important in understanding the geological landscape. SmartBrowse facilitates the observation of nano structures in their macro environment with ease of navigation between the micro and nano worlds. In failure inspection applications, the origin, size and propagation mechanism of fractures provides vital information to understand failure processes. SmartBrowse enables the piecing together of data over several length scales to enable the correct identification of failure mechanisms.



Expand Your Possibilities

Particle Analysis

From manufacturing cleanliness to steel production, particle analysis solutions from ZEISS automate your workflow for increased reproducibility.

SmartPI

SmartPI (Smart Particle Investigator) is a powerful particle analysis tool for your scanning electron microscope from ZEISS. Automatically detect, investigate and characterize particles of interest in your sample. Application specific plug-ins provide pre-built recipes and report templates tailored specifically to the industry you are working in.

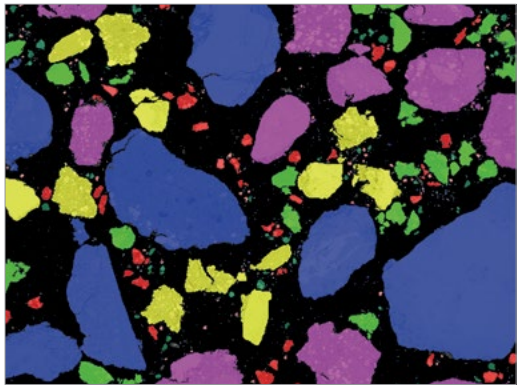
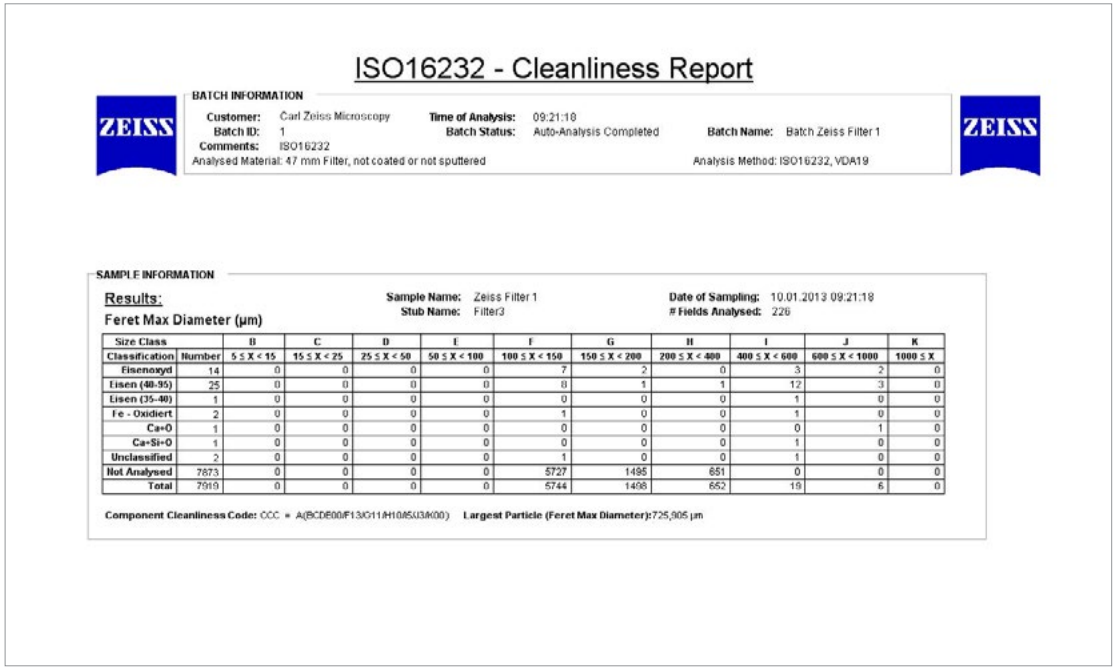


Image from SmartPI Image Analysis, displaying particles of different size ranges; in which the size range is defined by a unique colour



ISO16232 - Cleanliness Report

BATCH INFORMATION

Customer: Carl Zeiss Microscopy
Batch ID: 1
Comments: ISO16232
Time of Analysis: 09:21:18
Batch Status: Auto-Analysis Completed
Batch Name: Batch Zeiss Filter 1
Analysed Material: 47 mm Filter, not coated or not sputtered
Analysis Method: ISO16232, VDA19

SAMPLE INFORMATION

Results:
Feret Max Diameter (µm)

Sample Name: Zeiss Filter 1
Stub Name: Filter3
Date of Sampling: 10.01.2013 09:21:18
Fields Analysed: 226

Size Class		B	C	D	E	F	G	H	I	J	K
Classification	Number	5 ≤ X < 15	15 ≤ X < 25	25 ≤ X < 50	50 ≤ X < 100	100 ≤ X < 150	150 ≤ X < 200	200 ≤ X < 400	400 ≤ X < 600	600 ≤ X < 1000	1000 ≤ X
Eisenoxyd	14	0	0	0	0	7	2	0	3	2	0
Eisen (40-95)	25	0	0	0	0	8	1	1	12	3	0
Eisen (35-40)	1	0	0	0	0	0	0	0	1	0	0
Fe - Oxidiert	2	0	0	0	0	1	0	0	1	0	0
Ca+O	1	0	0	0	0	0	0	0	0	1	0
Ca+Si+O	1	0	0	0	0	0	0	0	1	0	0
Unclassified	2	0	0	0	0	1	0	0	1	0	0
Not Analysed	7873	0	0	0	0	5727	1495	651	0	0	0
Total	7919	0	0	0	0	5744	1498	652	19	6	0

Component Cleanliness Code: CCC = A(BCDE00/F13/G11/H10/I5/J3/K00) Largest Particle (Feret Max Diameter): 725,905 µm

SmartPI reports conform to ISO 16232 standard.

Expand Your Possibilities

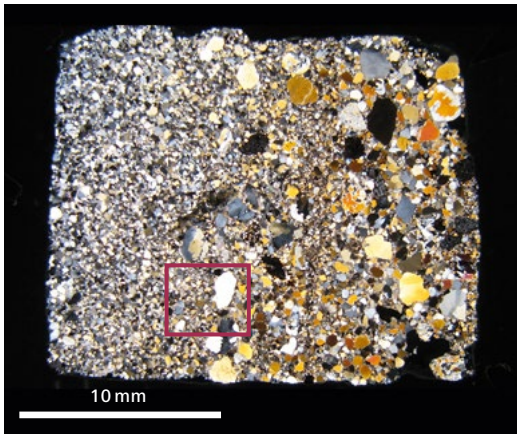
Image Navigation

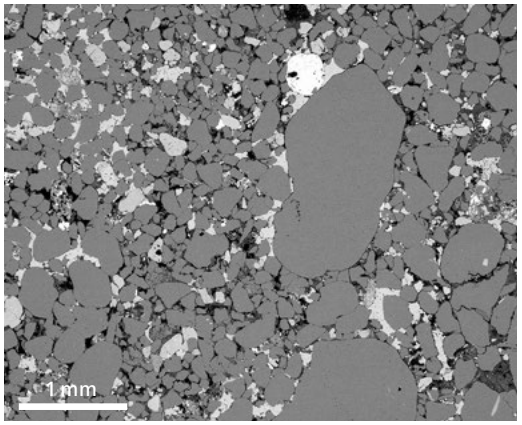
It's easy to find your way around large samples with Image Navigation. Import color images from digital cameras, optical microscopes and many other sources to image areas of interest previously observed outside the SEM. SmartSEM, your SEM's user interface, integrates an intelligent tool for image navigation, allowing you to upload, display and use a macro view of the sample for large area navigation. Simply click on a feature on the navigation image and this area of interest on the specimen will be placed at the center of the SEM's field of view.

Import images from a variety of sources:

- Live or stored SEM images
- Digital camera, webcam or mobile phone with camera
- Light microscope
- CAD packages

The camera stand for image navigation (top) can be equipped with the crossed polar accessory (bottom). An application example is shown on the right.





Crossed polar image of a Corrie sandstone from Scotland, UK mounted on a geological slide. The crossed polar image (top) is used to navigate the SEM beam to the area of interest. The area can then be imaged in the SEM using the BSE detector (bottom). Specimen courtesy of the Natural History Museum, London.

Expand Your Possibilities

Correlative Microscopy with Shuttle & Find
The Shuttle & Find software module allows an easy-to-use, productive workflow between your light microscope and electron microscope. Combine the optical contrasting techniques of your light microscope with the analytical methods of your electron microscope. Discover information about the structure, function and chemical composition of your sample.

How it Works
Using a special specimen holder with three fiducial markers, a coordinate system is calibrated semi-automatically within seconds using Shuttle & Find software. Use the light microscope to capture interesting regions of your sample. Then relocate a region of interest in the electron microscope with significantly increased resolution and also perform chemical analysis using optional X-ray microanalysis systems. Examine your sample more extensively. Achieve reproducible results.

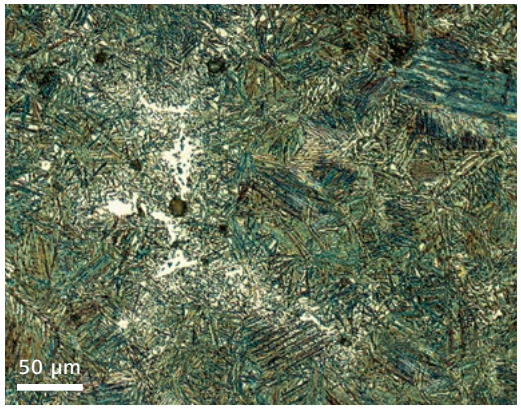
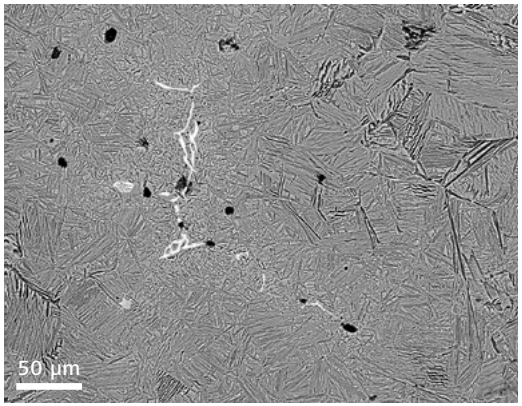


Image of an ADI sample made using a light microscope; Magnification: 400:1

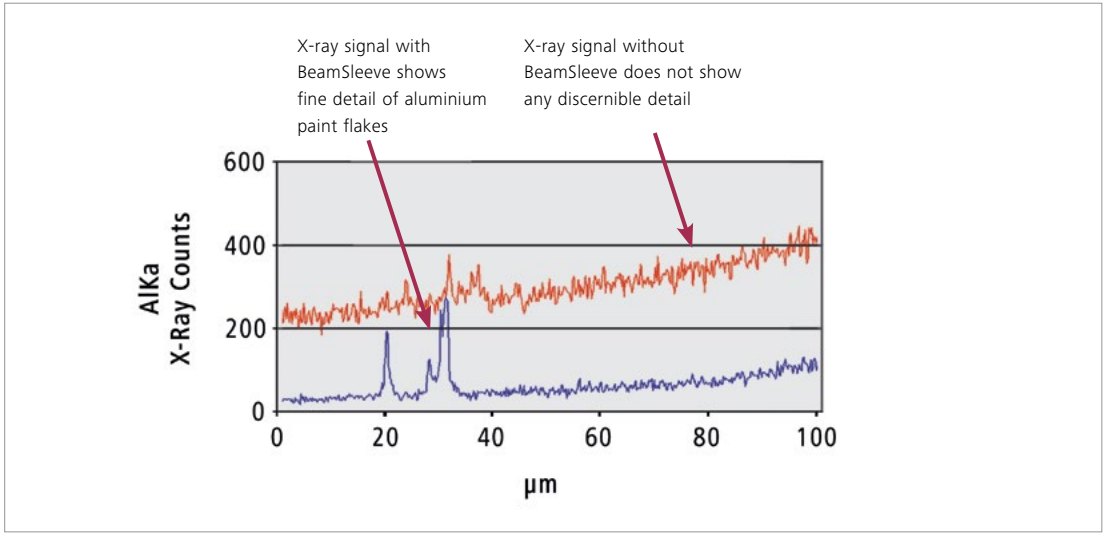


BSE image of the same region of interest: the microstructure is clearly visible

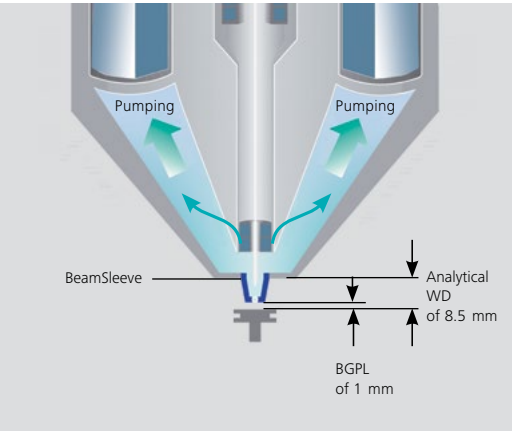
Expand Your Possibilities

BeamSleeve

Optional BeamSleeve technology lets you extend the through-the-lens (TTL) pumping advantage to maximize isolation of the electron probe from the charge compensating gas in the specimen chamber. Beam gas path length (BGPL) is the distance over which the electron beam and chamber gas interact. BeamSleeve minimizes the BGPL to produce the highest quality imaging and X-ray analysis. All microscopes in the EVO series offer a BGPL of 1 mm. Combine BeamSleeve with any EVO detector and it will reward you with both enhanced accuracy under EDS conditions and brilliant images at low voltages. In variable pressure mode, beamscattering is caused by the collision of electrons with gas molecules in the chamber. Scattered electrons contribute to the background EDS signal and thus obscure features of interest. In this example the aluminum line of an X-ray spectrum (taken from a cross-section of the paint layer of a car body part) is shown with BeamSleeve (blue line) and without BeamSleeve (red line). The aluminum flakes in the top part of the paint layer can only be detected once the background signal caused by beamscattering is reduced by the BeamSleeve.



Line scan across cross-section of paint layer of a car bodypart with and without BeamSleeve.



The "through the lens pumping (TTL)" design on EVO microscopes shown in conjunction with the BeamSleeve.

Expand Your Possibilities

Correlative Particle Analysis: More Knowledge. Higher Quality.
Systematically identify and characterize process-critical particles. Correlative Particle Analyzer combines your data from light and electron microscopy.

Completely characterize residual particles. With correlative particle analysis from ZEISS, you can relocate and analyze preselected, reflective particles using electron microscopy and EDS in a fully automated process. Correlative Particle Analyzer automatically documents the results from both the light microscopic and electron microscopic analysis; you receive a combined, informative report at the touch of a button.

As an experienced user, you can inspect the results of the combined light microscopic and electron microscopic analysis on an interactive overview screen. Relocate particles at the touch of a button, automatically start new EDX analyses, and automatically generate a report. With Correlative Particle Analyzer, your results will be available up to ten times faster than first conducting an analysis with a light microscope and then subsequently with an electron microscope. You can systematically focus on potentially process-critical particles. The complementary material characterization from both microscopic worlds gives you added security.

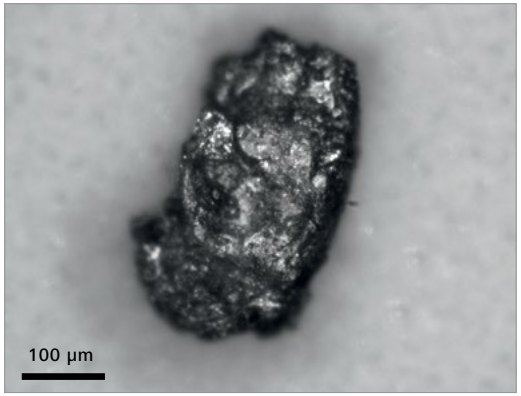


Image of a metallic particle from a light microscope

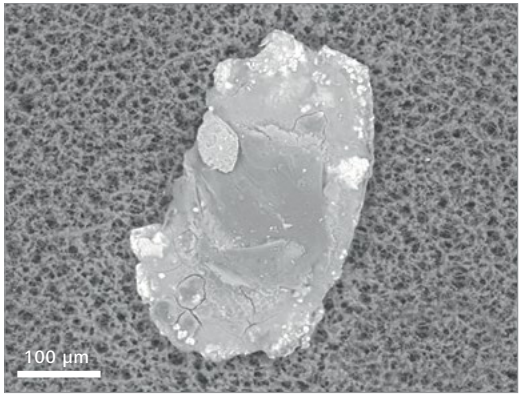
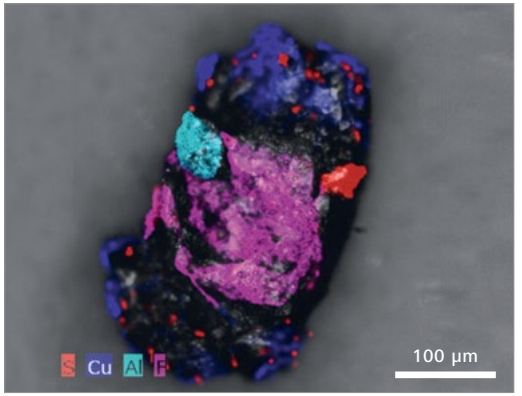


Image of the same metallic particle from an electron microscope



Overlay of the images from both systems; chemical element composition via EDX analysis; graphical EDX overlay prepared with Bruker Esprit software

Technical Specifications

			ZEISS EVO MA10 ZEISS EVO LS10	ZEISS EVO MA15 ZEISS EVO LS15	ZEISS EVO MA25 ZEISS EVO LS25
Resolution	1.9 nm, 2 nm, 3 nm	@ 30 kV SE with HD, LaB_6, W			
	3 nm, 3.49 nm	@ 30 kV SE VP mode HD, W			
	10 nm, 15 nm	@ 30 kV 1 nA with HD, LaB_6			
	5 nm, 10 nm	@ 3 kV SE with HD, W			
	8 nm, 15 nm, 20 nm	@ 1 kV SE with HD, LaB_6, W			
	6 nm	@ 3 kV with beam deceleration			
Acceleration Voltage	0.2 to 30 kV				
Probe Current	0.5 pA to 5 µA				
Magnification			< 7 – 1,000,000x	< 5 – 1,000,000x	< 5 – 1,000,000x
Field of View	6 mm at Analytical Working Distance (AWD)				
X-ray Analysis	8.5 mm AWD and 35° take-off angle				
OptiBeam[1] Modes	Resolution[3], Depth[3], Analysis[3], Field, Fisheye[2]				
Pressure Range	10 – 400 Pa (MA configuration)[4]				
	10 – 3000 Pa (LS configuration)				
Available Detectors	ETSE – Everhart-Thornley Secondary Electron Detector (supplied as standard)			CCD - Charge Coupled Device for Raman spectroscopy	
	HD BSD – High Definition Backscattered Electron Detector (5 segment diode)				
	VPSE – Variable Pressure Secondary Electron Detector				
	EPSE – Extended Pressure Secondary Electron Detector				
	SCD – Specimen Current Detector				
	STEM – Scanning Transmission Electron Microscopy Detector				
	CL – Cathodoluminescence Detector				
	EDS – Energy Dispersive Spectrometer				
	WDS – Wavelength Dispersive Spectrometer				
	EBSD – Electron Backscatter Diffraction Detector				

Technical Specifications

Chamber Dimensions		310 mm (Ø) x 220 mm (h)	365 mm (Ø) x 275 mm (h)	420 mm (Ø) x 330 mm (h)
5-Axes Motorized Specimen Stage	Stage control by mouse or optional joystick and control panel	X = 80 mm, Y = 100 mm, Z = 35 mm, T = -10° to 90°, R = 360° (continuous)	X = 125 mm, Y = 125 mm, Z = 60 mm, T = -10° to 90°, R = 360° (continuous)	X = 130 mm, Y = 130 mm, Z = 60 mm, T = -10° to 90°, R = 360° (continuous)
Maximum Specimen Height		100 mm	145 mm	210 mm
Future Assured Upgraded Paths[2]	BeamSleeve, Extended Pressure, Water vapour VP gas			
Image Framestore	3072 x 2304 pixels, signal acquisition by integration and averaging			
System Control	SmartSEM[5] GUI operated by mouse and keyboard			
	Hardware control panel with rotary controls for improved manual feedback and more intuitive control during imaging			
	Ease of use features - auto saturation, auto align, sample selection & automated imaging			
	Windows® 7 multilingual operating system			
Utility Requirements	100 – 240 V, 50 or 60 Hz single phase, no water cooling requirement			

[1] Optibeam – active column control for best resolution, best depth of field or best field of view
[2] optional upgrade
[3] available in HV and VP (up to 133 Pa) for EVO HD models
[4] with optional TTL upgrade
[5] SmartSEM – Fifth generation SEM control Graphical User Interface

Count on Service in the True Sense of the Word

Because the ZEISS microscope system is one of your most important tools, we make sure it is always ready to perform. What's more, we'll see to it that you are employing all the options that get the best from your microscope. You can choose from a range of service products, each delivered by highly qualified ZEISS specialists who will support you long beyond the purchase of your system. Our aim is to enable you to experience those special moments that inspire your work.

Repair. Maintain. Optimize.
Attain maximum uptime with your microscope. A ZEISS Protect Service Agreement lets you budget for operating costs, all the while reducing costly downtime and achieving the best results through the improved performance of your system. Choose from service agreements designed to give you a range of options and control levels. We'll work with you to select the service program that addresses your system needs and usage requirements, in line with your organization's standard practices.

Our service on-demand also brings you distinct advantages. ZEISS service staff will analyze issues at hand and resolve it – whether using remote maintenance software or working on site.

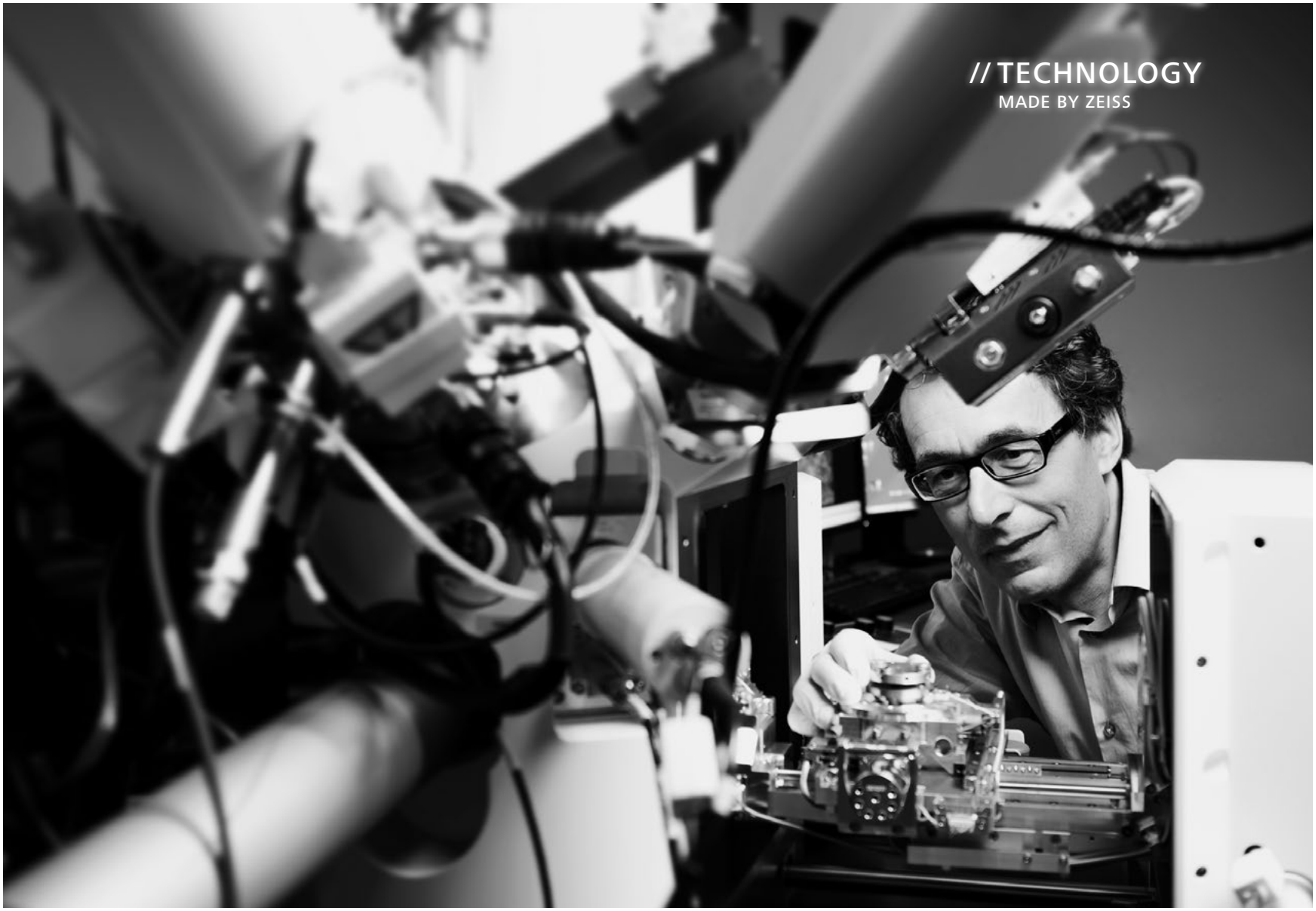
Enhance Your Microscope System.
Your ZEISS microscope system is designed for a variety of updates; open interfaces allow you to maintain a high technological level at all times. As a result you'll work more efficiently now, while extending the productive lifetime of your microscope as new update possibilities come on stream.

Please note that our service products are always being adjusted to meet market needs and maybe be subject to change.

Profit from the optimized performance of your microscope system with services from ZEISS – now and for years to come.

>> www.zeiss.com/microservice

The moment "I think" becomes "I know".
This is the moment we work for.



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