Product Information
Version 4.0

ZEISS EVO

Your Interactive SEM for Multi-User Environments

Your Interactive SEM for Multi-User Environments

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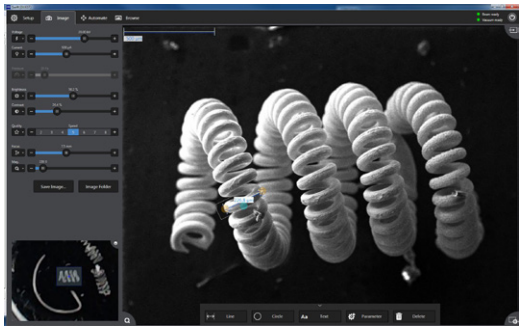
The EVO series combines high performance scanning electron microscopy with an intuitive user-friendly experience.

Discover substantial improvements in productivity and dramatically reduced training costs with SmartSEM touch user interface. Empower all users to generate excellent images and achieve highest throughput for visual inspection workflows. SmartSEM touch is a welcome addition in the multi-user environment.

Experience excellence in high vacuum (HV), variable pressure (VP) and extended pressure (EP) imaging, thanks to the latest detector technology. Significant improvements in signal yield and contrast ratio herald a step change in imaging efficiency.

EVO is a highly flexible, easy-to-use, high definition imaging and analysis tool delivering fast, accurate, repeatable results across all samples.



ZEISS SmartSEM touch provides an easy-to-use environment for all users. Its intuitive workflow simplifies set up, manual and automated acquisition and immersive browsing of results.

Simpler. More Intelligent. More Integrated.

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Control at Your Fingertips

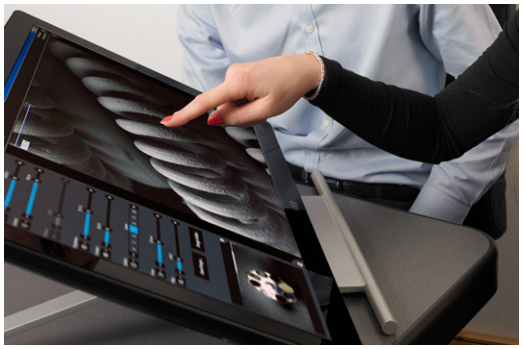
SmartSEM touch puts easy-to-use, interactive workflow control directly at your fingertips. SmartSEM touch is fast to learn, drastically reducing training costs. Within minutes you will begin capturing stunning images. SmartSEM touch is designed for industrial operators who require automated workflows for visual inspection tasks and academic users in mixed-ability environments. Automatically acquire images across large areas with the swipe of a finger and free your time for post-acquisition analysis.

Intelligent Imaging – High Throughput

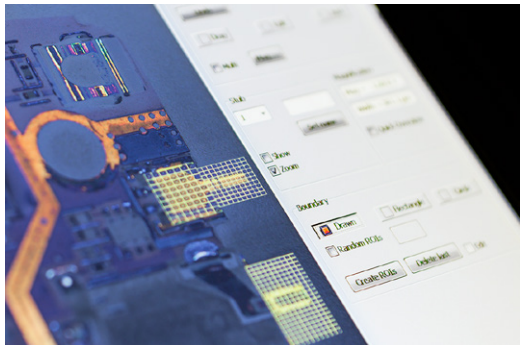
Count on your EVO to deliver high productivity in manufacturing and quality control. Consider the impact on your throughput of reducing over 400 manual steps to just 15, imaging four points of interest on nine specimens at three different magnifications. Automated Intelligent Imaging allows you to define random and free-form regions of interest (ROIs) across multiple samples for unattended automated image acquisition. The system will recommend imaging conditions based on your sample type selection and SmartBrowse collects and presents your data as an interactive map to help you completely understand your sample.

As Flexible As It Is Easy To Use

Flexibility comes as standard with EVO. With a future-assured upgrade path, EVO can meet the challenge of your growing application requirements. A choice of chamber size and electron source ensures EVO can be perfectly configured for your imaging, EDS, WDS and EBSD applications. Robust stage options provide the perfect platform for imaging large, heavy automotive and aerospace components. Upgrade your variable pressure system to a full environmental SEM to enable complete control over your sample for dynamic high pressure or water vapor experiments.



ZEISS SmartSEM touch user interface. Working in industry, you profit from high throughput automated workflow. In an academic environment you will benefit from ease-of-use in mixed-ability user groups.



Unlock the potential of automated unattended image acquisition with Automated Intelligent Imaging.

From the smallest biological specimens to large automotive and aerospace components, your ZEISS EVO handles all samples with ease.

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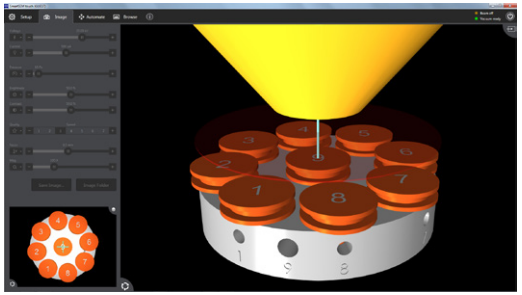
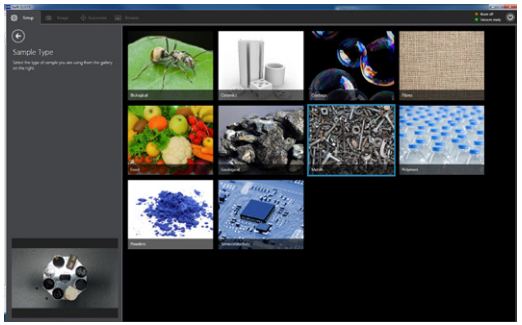
ZEISS SmartSEM touch

SmartSEM touch gives you the benefit of fast time-to-result and a reduction in training overhead. Industrial and academic users alike benefit from a short learning curve and automated unattended operation. Its uncluttered workflow-oriented layout places tasks in easy-to-understand groups. Quickly load, navigate, acquire and browse images using familiar touch gestures.

Set-up requires minimal effort and imaging uses carefully chosen pre-sets and auto-functions to generate outstanding images. In Automate mode simply draw directly on the screen to automatically acquire images across large regions of interest. In Browse mode, the touch screen monitor included with the software provides a “lay-flat” configuration to enhance image sharing and exploration when working in small collaborative groups.



ZEISS SmartSEM touch Set-up provides an easy-to-use model of the sample holder allowing the user to quickly position their sample under the electron beam.



Simply select your sample type from the list of commonly used types to automatically configure the system to generate the best images.

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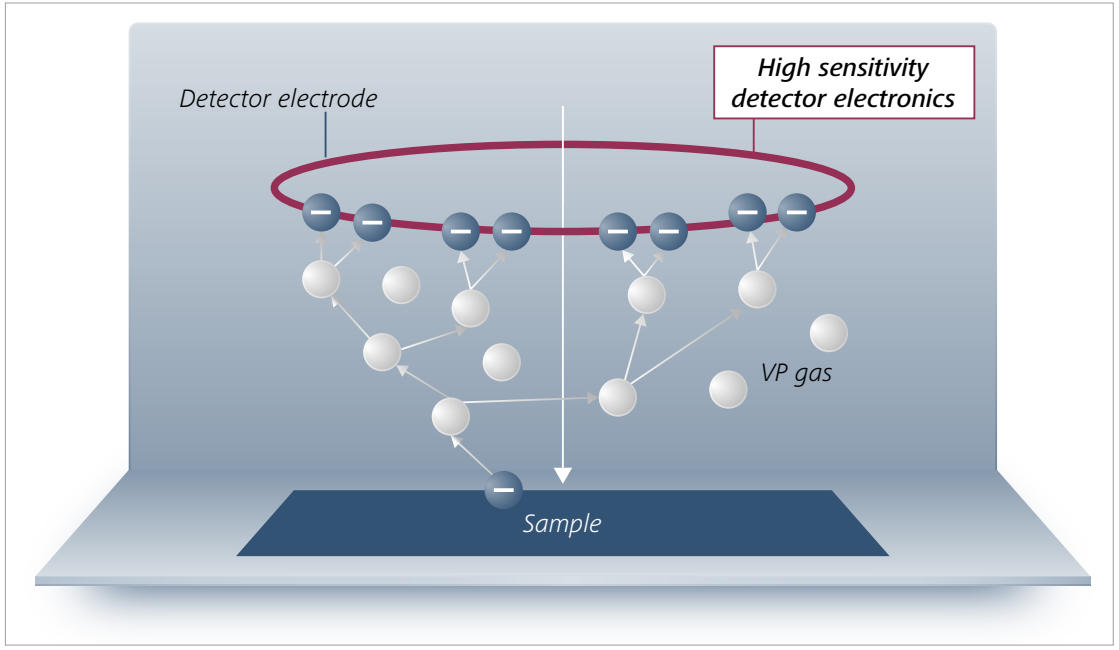
Cascade Current Detectors

You can achieve the best imaging performance in variable pressure mode with advanced detector technology. EVO's Cascade Current Detector (C2D) produces a bias voltage to efficiently attract electrons away from the sample surface towards the detector. The electrons collide with the VP gas molecules causing ionization that in turn causes more collisions, generating a cascade current toward the detector. The high amplification generated by the C2D, combined with its high sensitivity detector electronics ensures you acquire outstanding, low-noise images even in the most demanding VP applications. In addition, the Extended Range Cascade Current Detector (C2DX) is a detector unique to the EVO series and is designed to provide superb imaging performance at the highest pressures up to 3000 Pa. Together this new detector technology sets the standard for Variable Pressure and Environmental Scanning Electron Microscopy.



The Cascade Current Detector (C2D) and Extended Range Cascade Current Detector (C2DX) bias voltage causes an ionization cascade current. The high amplification provides excellent signal yield for high contrast, low-noise imaging in variable pressure and extended pressure modes.

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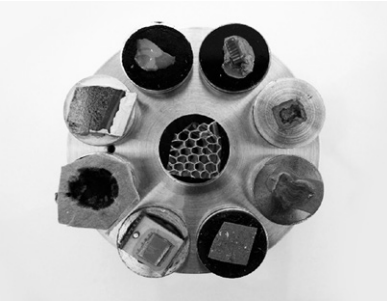
Automate and Speed Up Your Workflow

A 4-step workflow lets you control all the functionality of EVO, giving you the benefit of fast time-to-image and saves time on training, too – especially in a multi-user environment.

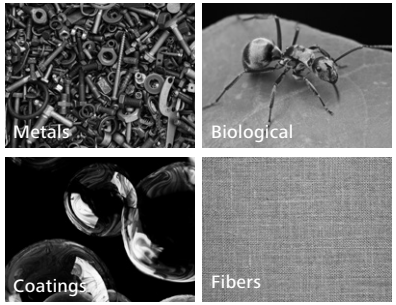
Navigate your sample quickly and easily with "real-world" digital camera images.

1. Image Navigation



One click sets the optimal imaging conditions for your sample, opening up access to novice users.

2. Sample Type Selection

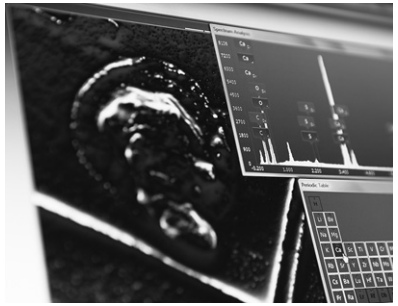


Identify and select regions of interest (ROI) – automatically generate image datasets across batches of samples.

3. Automated Intelligent Imaging

Review your data sets in context – collect and present your data as an interactive zoomable map.

4. SmartBrowse



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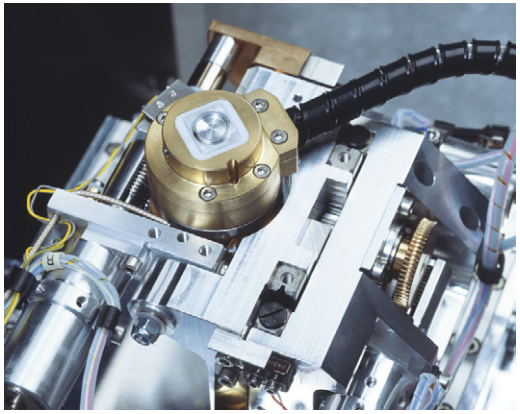
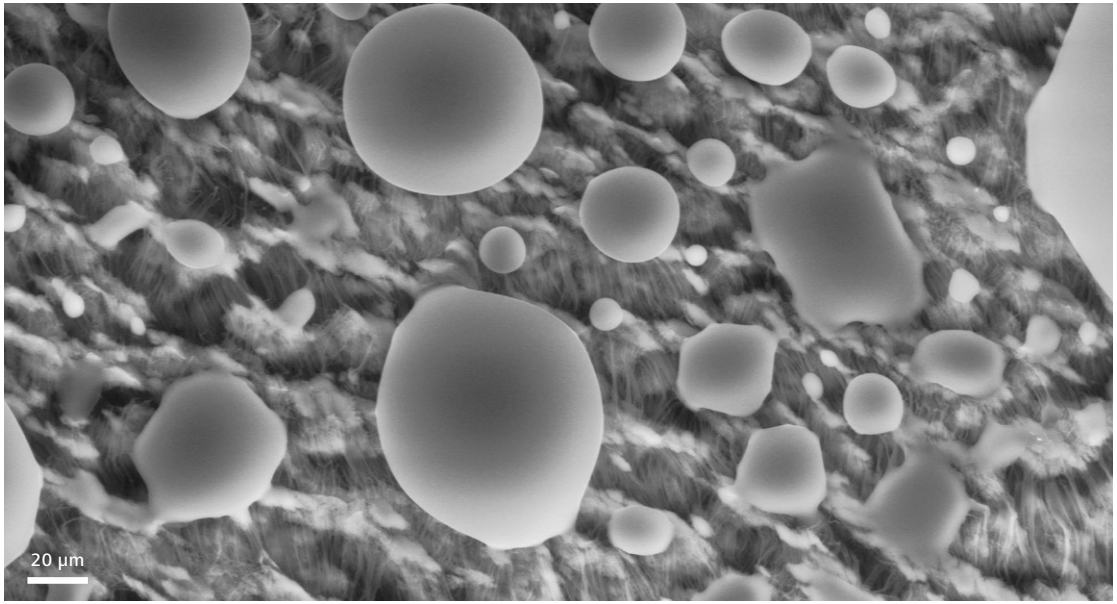
Environmental Electron Microscopy

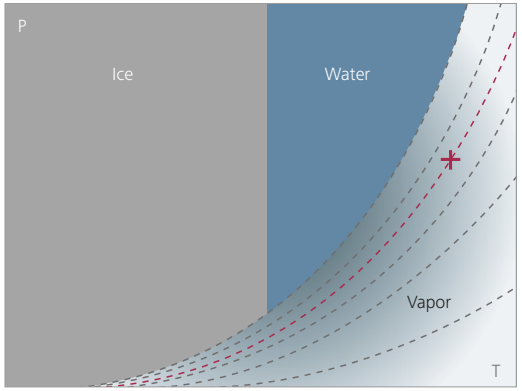
By preventing dehydration, EVO LS maintains the structure of fauna and flora as you study the interaction of water with your sample. When imaging liquid water, EVO LS keeps the specimen temperature above freezing while increasing the water vapor pressure in the microscope to facilitate condensation on 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.



ZEISS EVO Coolstage



Water droplets imaged on a Teflon® sample using the C2DX detector at 20 kV and 630 Pa water vapor at 0.9° C on ZEISS EVO LS.



Phase diagram to control imaging conditions

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Class Leading X-ray Geometry for Analytical Imaging

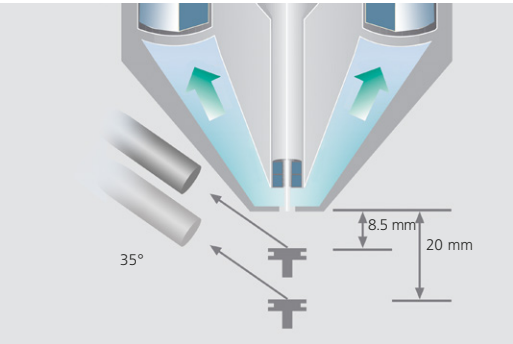
By making access to the specimen a design priority, you will achieve an optimum geometry for EDS, WDS and EBSD. The objective lens features a sharp profile that gives you a working distance of 8.5 mm while retaining a 35° take-off angle. You can maximize signal levels for simultaneous imaging and analysis,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

Coplanar Geometry for EBSD

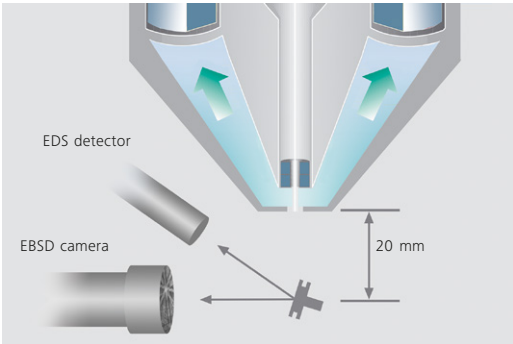
The EVO column and chamber geometry create an optimized environment for an EBSD detector. The EDS detector is positioned directly above and in the same plane as the EBSD detector. It is ideally positioned at a 35° take-off angle to enable simultaneous data collection from both systems. You can tilt the 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 ZEISS EVO chamber geometry 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.

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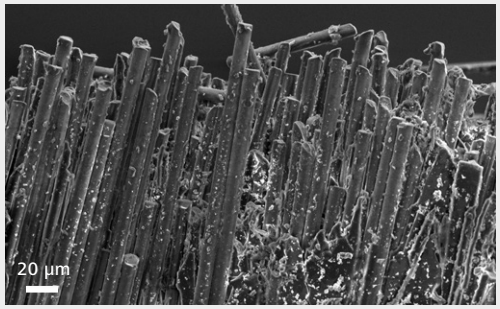
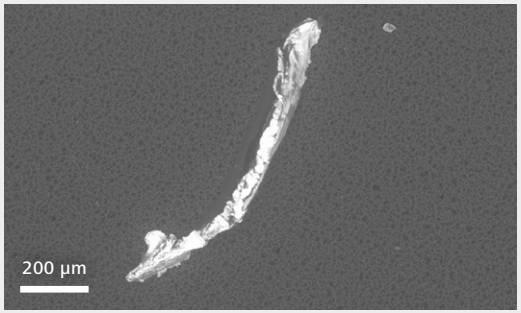
Typical Applications, Typical Samples

Aerospace & Automotive	Manufacturing Cleanliness	Metals & Steels
Task		
Routine analysis to ensure manufactured components meet quality and durability requirements.	Cleanliness inspection of manufactured components. Automated analysis of particles and identification of morphology and chemical analysis to meet ISO 16232 standard.	Imaging and analysis of the structure metals, fractures, and nonmetallic inclusions
ZEISS EVO Series Offers		
Sample flexibility with its three chamber size options – 10, 15 & 25. Samples weighing up to 5 kg with a height of 210 mm and width of 300 mm are easily handled by EVO MA 25.	For a fully integrated particle analysis and identification solution for advanced morphology and chemical analysis, SmartPI software and ports for EDS and WDS detectors are available on EVO 15.	Obtain crisp, clear compositional and crystallographic information from duplex steels and advanced alloys with EVO's best in class High Definition Backscattered Electron Detector (HDBSD).
With intelligent imaging and automated workflows, EVO MA is perfectly suited to process control environments. EVO MA will take care of the optimal settings for your sample type and will run around the clock with minimal user interaction.		Take advantage of EVO's easy access chamber door and robust stage by the addition of tensile testers, nano-indenters and heating modules for advanced materials testing of metallic samples.
With variable pressure (VP) technology as standard, EVO MA is perfectly suited to imaging non-conductive composite materials, fibers, polymers and textiles. VP imaging with the C2D detector enhances sample throughput by eliminating the need for time consuming sample coating.		EVO's class leading EDS geometry provides for high throughput, high accuracy X-ray analysis. In addition, its flexible port configurations provide for coplanar EBSD for microstructural characterization of grain boundaries, phase identification, strain analysis and slip system activity.

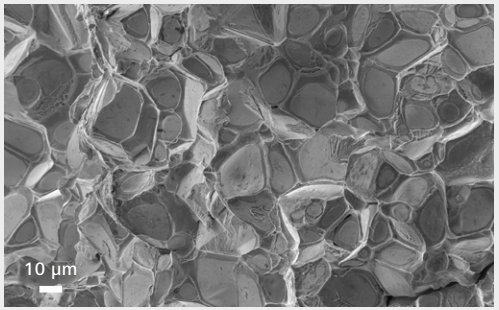
Example



Aerospace fiber composite material imaged with the C2D at 10 kV in VP mode.



Particle from a particle filter acquired with the HDBSD during a quality control task to analyze the cleanliness of an industrial process.



Advanced alloy material shows the tungsten core material-surrounded by a steel matrix. Imaged at 7 kV with the C2D-detector.

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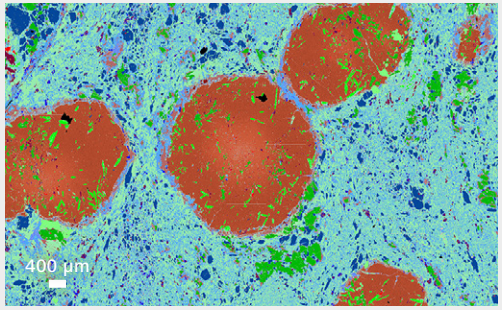
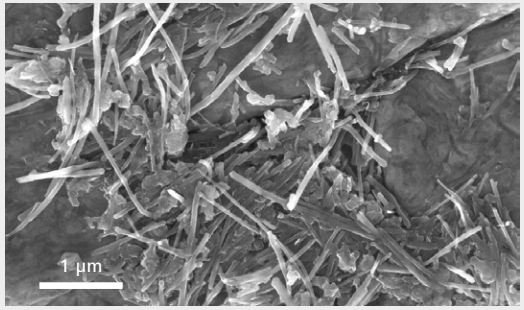
Typical Applications, Typical Samples

Raw Materials	Materials Science Research	Forensics
Task		
Morphology, mineralogy and composition analysis of geological samples	Analysis of both conducting and non-conducting material samples for research purposes	Imaging and analysis of crime scene evidence including gunshot residue (GSR), paint and glass analysis, bank note and coin forgery, hair and fiber comparisons and forensic toxicology
ZEISS EVO Series Offers		
The high stability analytical design, three chamber sizes, flexible port configuration options and compatible mineral analysis software make EVO an unquestionable solution for natural resources.	EVO MA has been designed to accept a wide range of imaging detectors and offers variable pressure operation as standard. Combined with the HDBSD, Beam Deceleration and coplanar EDS and EBSD geometry, EVO MA is a flexible research tool for materials analysis.	With its range of Variable Pressure and Extended Pressure detectors, EVO delivers consistent crisp imaging of samples with minimal sample preparation.
Image core samples in VP mode with both the C2D detector and HDBSD to obtain maximum structural and compositional information.	With EasyVP as standard, switching between high vacuum and variable pressure modes of operation is quick and easy for both conductive and non-conductive samples.	EVO's class leading EDS geometry provides for high through-put GSR analysis. EVO provides compatibility with third-party specialized GSR analysis software.
Boost the performance of EVO with the ZEISS cathodolu-minescence (CL) detector with clear streak-free imaging of carbonates.	The latest detector technology including Cascade Current Detector (C2D) and Extended Range Cascade Current Detector (C2DX) provides outstanding imaging of polymers, plastics, fibers and composites at high pressures in air and water vapor.	EVO LS offers the added benefit of environmental electron microscopy so that samples can be imaged in their original condition.

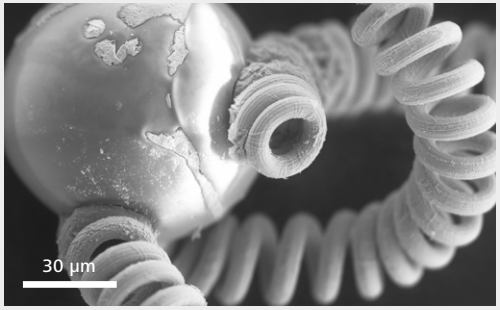
Example



Mineralogic mineral map of blueschist.



Aluminium nanofibers, imaged with the C2D detector at 10 kV and 40 Pa variable pressure.



Molten glass solidified on a tungsten fragment indicate the bulb was active at the time of the incident. Imaged with the C2D detector at 20 kV, 30 Pa.

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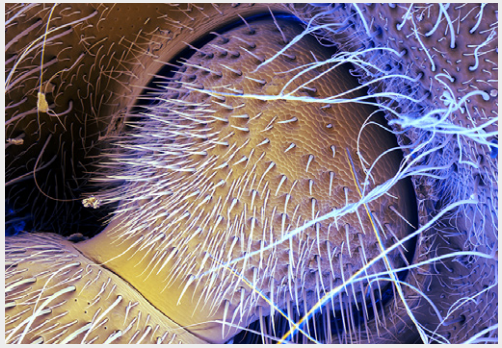
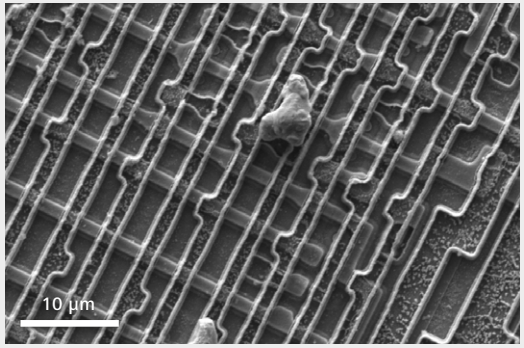
Typical Applications, Typical Samples

Life Sciences	Semiconductors & Electronics	Chemical Research
Task		
Research into plants, animals and microorganisms	Visual inspection of electronic components, integrated circuits, MEMS devices and solar cells	Morphological and compositional analysis of raw chemicals and active ingredients during micronization and granulation processes
ZEISS EVO Series Offers		
EVO LS is a true Environmental SEM, allowing specimens to be examined in their natural state under a range of water and air conditions. EVO supports Cryo and STEM imaging.	The range of detectors, including HDBSD and C2D provide superb high contrast topographic and compositional imaging in VP mode of semiconductor materials without charging artifacts.	The high sensitivity of the EVO detectors ensures sharp surface details can be obtained at low beam energies on sensitive powders and particles .
The suite of variable pressure and extended pressure detectors including HDBSD, VPSE-G4, C2D and C2DX offer unparalleled imaging of biological specimens.	The optional Beam Deceleration system provides highest resolution at lowest accelerating voltages, allowing you to visualize true surface details of solar cells and integrated circuits.	The HDBSD is perfectly suited to provide high contrast compositional imaging when studying bonding and granulation of primary powder particles
Image delicate hydrated biological specimens with the C2DX detector, which delivers excellent images at high pressures in water vapor.	The flexibility of EVO allows many third-party testing and analysis modules to be utilized including EBIC and nano probes for characterizing p-n junctions and IC failure analysis.	Use the CL detector to perform cathodoluminescence imaging on tablet cross-sections to identify active ingredients within the formulation.
Obtain highly detailed images of tissue samples without the need for active cooling by imaging samples in dynamic equilibrium in water vapor with the HDBSD and EVO LS.	The 3DSM software package allows you to visualize surface detail in 3D and to perform surface roughness and metrology of MEMS & MOEMS devices.	The Coolstage option allows perfect control of the EVO chamber environment to allow study of hydration and wetting.

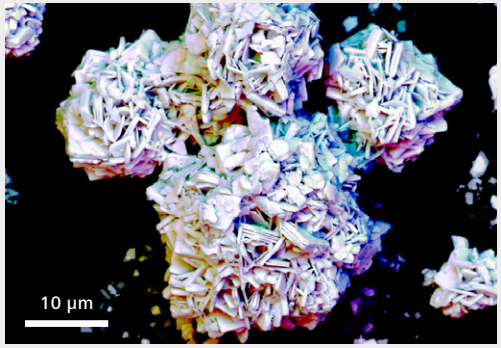
Example



False-colored image of a bee antenna.



Debris and contamination is evident on the surface of an integrated circuit imaged with the SE detector in high vacuum at 10 kV.



False-colored image of $LaCO_3$ (Lanthanum carbonate) crystals used as an oral phosphate binder.

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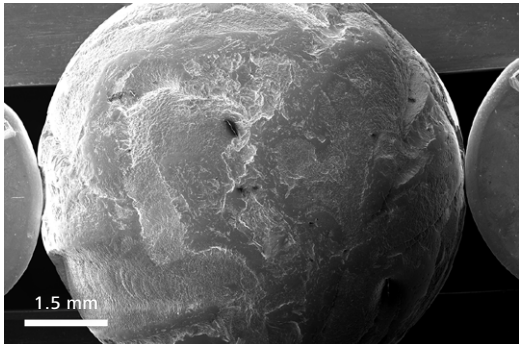
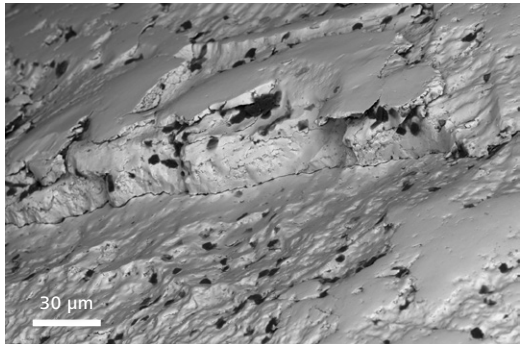
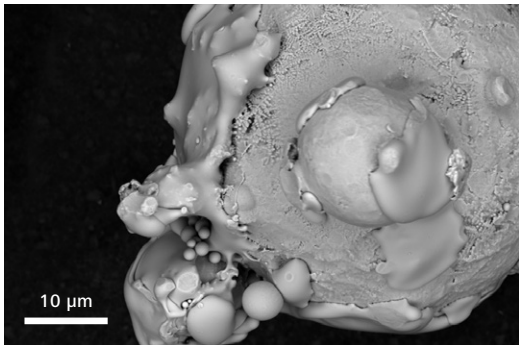
Metals & Steels



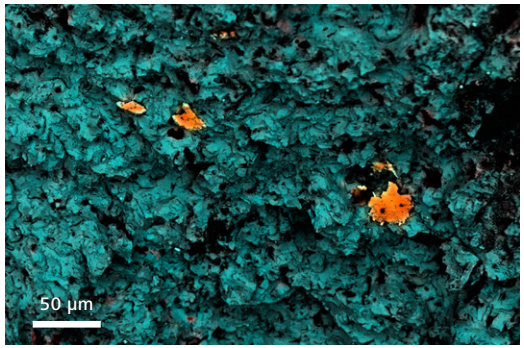
A stitched image of a ball bearing showing characteristic wear patterns, imaged at 20 kV with the SE detector.



Detail image of the surface of the ball bearing imaged with the HDBSD showing cracking and flaking of the surface structure.



SE image of stellite particles, a non-magnetic and corrosion-resistant cobalt alloy, used in hardfacing and acid-resistant machine parts. Imaged at 15 kV with the HDBSD detector.



EDS map of fractured sample showing fragments of tin (orange) against the iron (blue) background. Sample: courtesy of J. Scott, West Mill Innovation, UK

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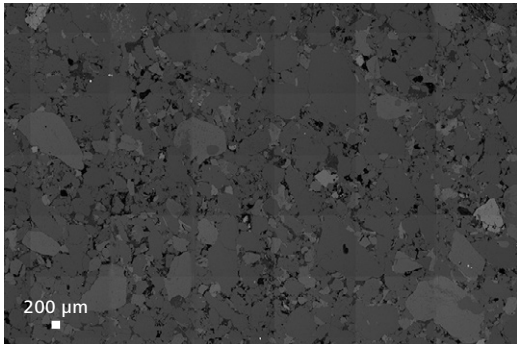
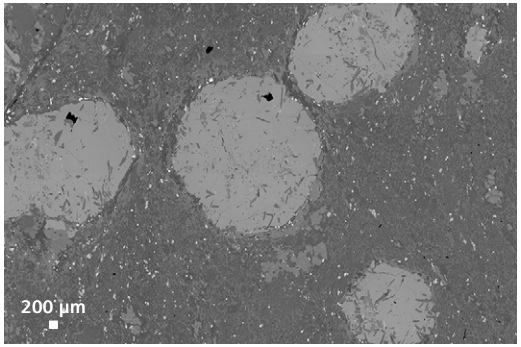
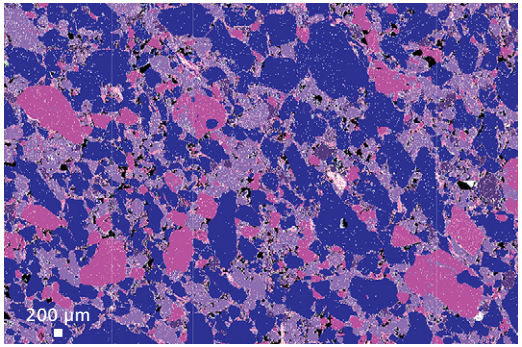
Raw Materials



BSE image of sandstone reservoir rock.



BSE image of blueschist.



Mineralogic mineral map of sandstone reservoir rock.

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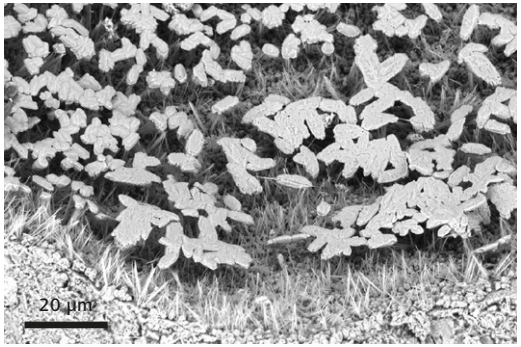
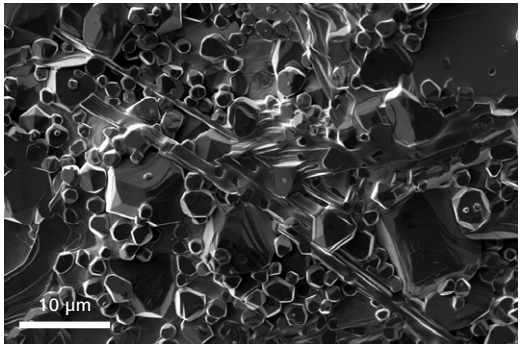
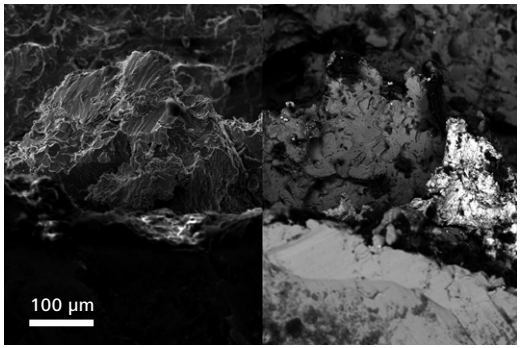
Materials Research



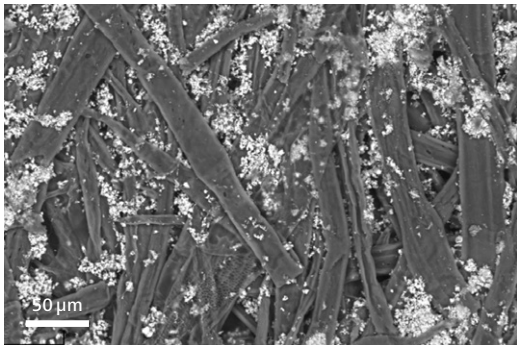
The C2D detector reveals the mineral expansion of self-healing concrete, imaged at 10 kV in VP mode.



Aerospace composite material imaged with the C2D detector at 10 kV in VP mode.



SE image (left) and BSE image (right) of a fractured material showing topographical and compositional details imaged at 20 kV. Sample: courtesy of J. Scott, West Mill Innovation, UK.



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

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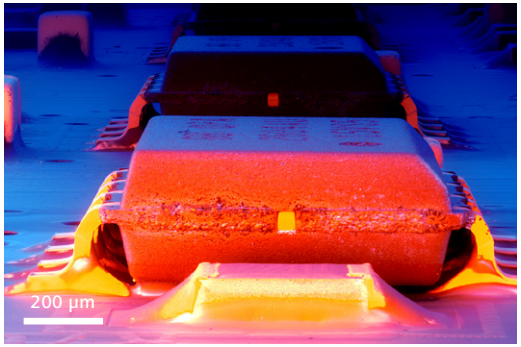
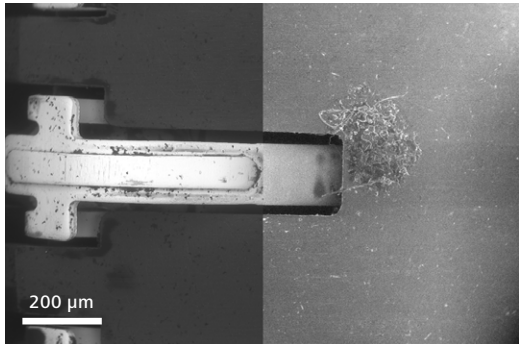
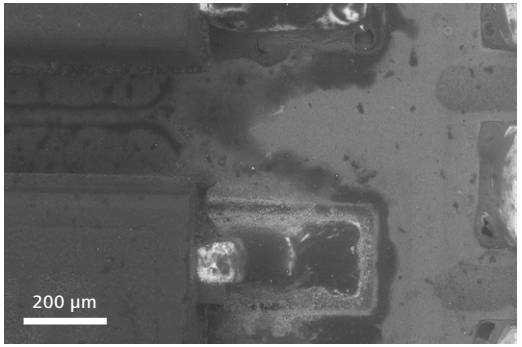
Semiconductors & Electronics



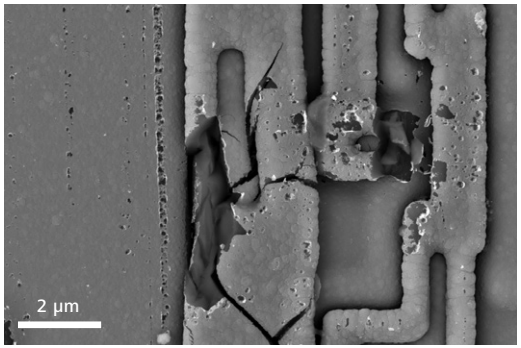
False-colored image of components mounted on a PCB aids visualization during routine inspection.



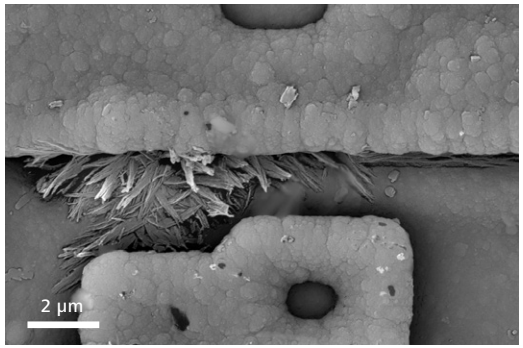
HDBSD image (left) and SE image (right) of the gold on nickel plated SIM card contact and the UL94V high temperature liquid crystal polymer (LCP) housing.



HDBSD helps to reveal corrosion and damage to a soldered component at 20 kV in variable pressure mode.



The HDBSD reveals damage to the tracks on the surface of memory chip imaged at 15 kV.



A flaw near the tracks of an integrated circuit is revealed using the HDBSD.

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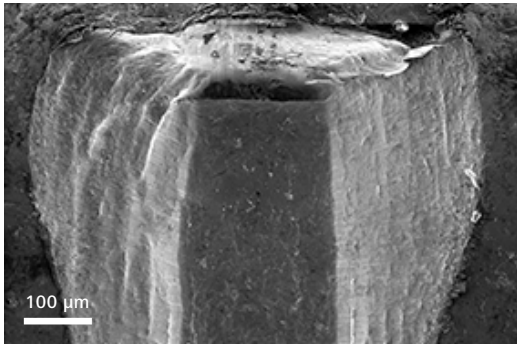
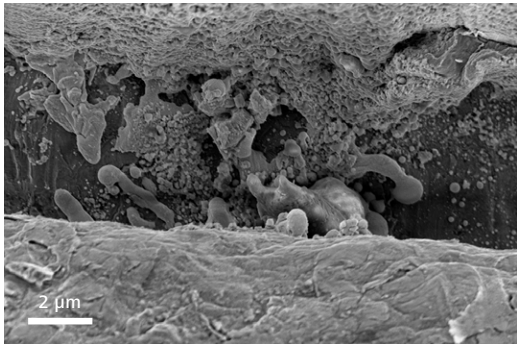
Forensics

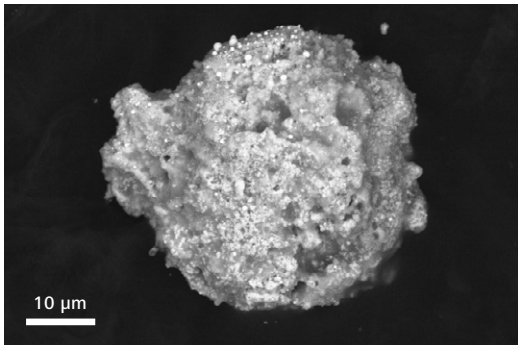


The mark from a firing pin on a gun casing can be used to help identify the weapon used, imaged with the SE detector at 10 kV.



Solidified molten fragments from a catastrophic explosive event can be used to determine its source.

The C2D produces excellent images of uncoated samples in variable pressure mode, perfectly suited to forensic fiber comparisons.



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

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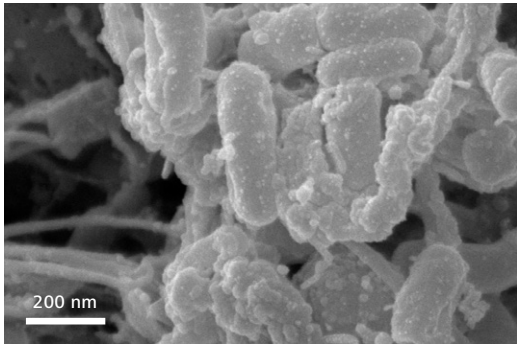
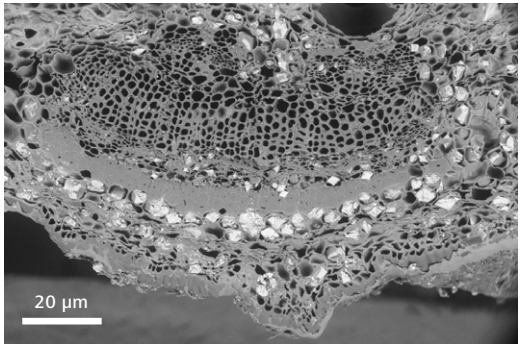
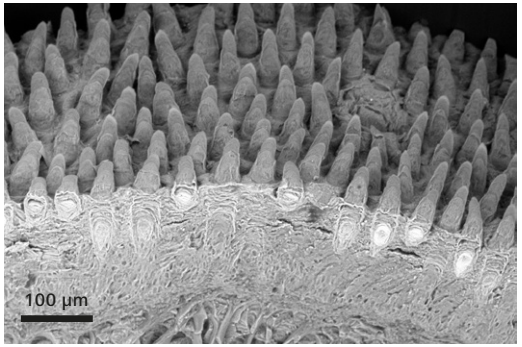
Life Sciences



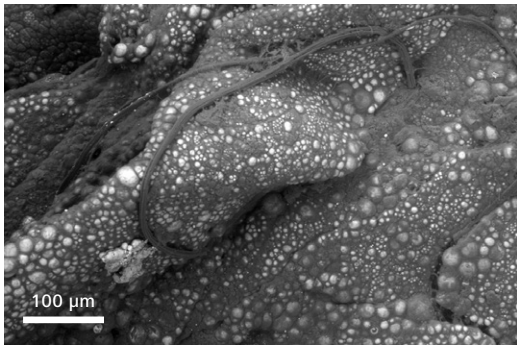
E. coli bacteria imaged in high vacuum with the ETSE detector.



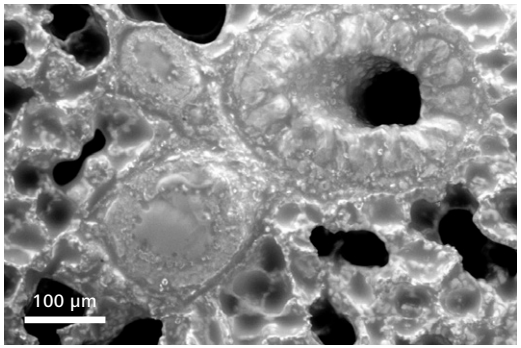
Cellular structure of cross-section of orange imaged with the HDBSD detector at 5 kV and 110 Pa variable pressure mode.



A cross section of mouse tongue imaged with the HDBSD at 266 Pa variable pressure mode. Sample: courtesy of R. Reimer, Heinrich Pette Institute, Germany.



Brown adipose tissue (BAT) from a kidney tissue sample, imaged without cooling in dynamic equilibrium in water vapor. Imaged with the HDBSD at 285 Pa variable pressure mode. Sample: courtesy of R. Reimer, Heinrich Pette Institute, Germany.



Lung tissue imaged with the HDBSD detector at 280 Pa pressure. Sample: courtesy of R. Reimer, Heinrich Pette Institute, Germany.

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Flexible Chamber Design

A choice of three chamber sizes (10, 15 & 25) and two stages (Z = 50 mm or Z = 80 mm) lets you to select the optimal solution for your application needs.

ZEISS EVO 10

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

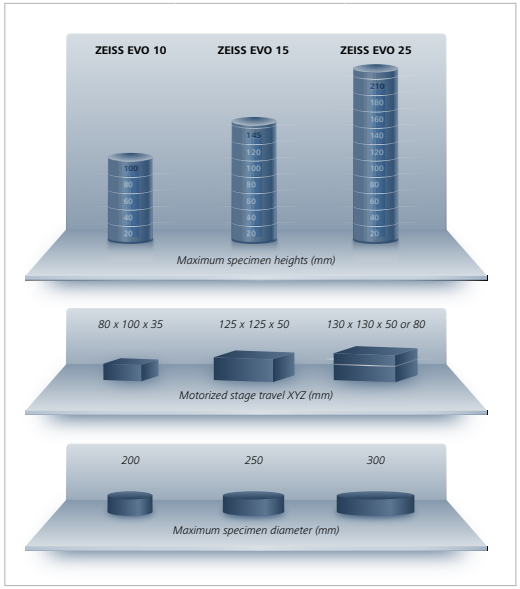
With EDS and WDS ports as standard, EVO 15 demonstrates perfectly the total flexibility concept of the EVO range. The EVO 15 chamber excels in analytical applications. Achieve optimum results with a single chamber configuration, using the coplanar geometry of the electron beam, EDS detector, EBSD camera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

ZEISS EVO 25

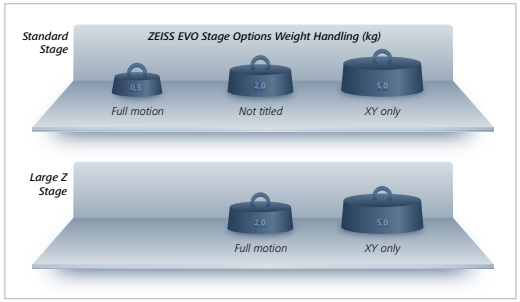
The EVO 25 chamber is tailor-made for automotive and aerospace or steel and metals applications that use the largest specimens. The chamber accommodates samples up to a maximum specimen diameter of 300 mm and a maximum height of 210 mm. Expand EVO 25 capabilities further with an optional 80 mm Z travel stage that can handle weights up to 2 kg including tilt.

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.

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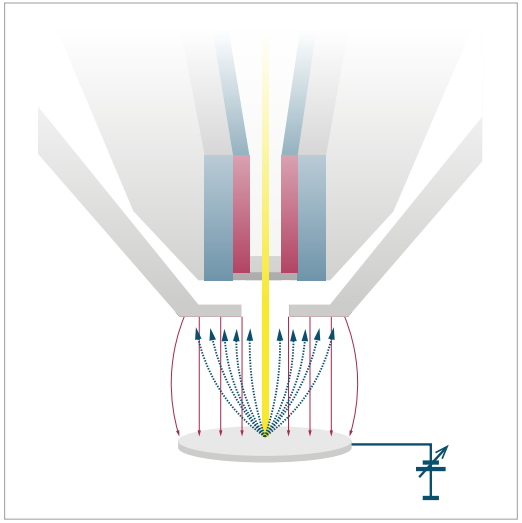
Beam Deceleration

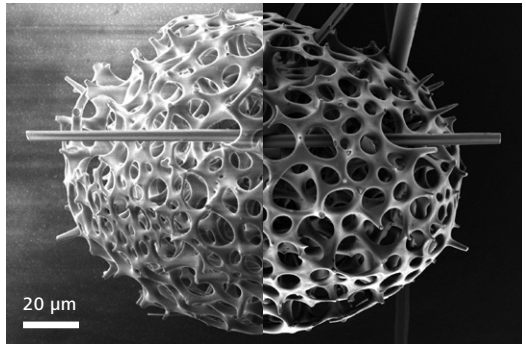
Beam Deceleration dramatically improves the low-kV performance of your EVO. By applying an electrostatic bias to your sample, you are able to land electrons on your sample with energies of a few hundred volts with the electron column performance of a 5 kV beam. The low landing energy of the electrons ensures sample charging is minimized producing clear and sharp images.

The stage bias acts to accelerate electrons from the sample towards the BSE detector, enhancing the detector's imaging performance. Both BSE and SE electrons are detected using the backscatter detector with beam deceleration enabled.
This provides a composite image rich in compositional and topographical details. Topographical information is further enhanced as high angle, low energy secondary electrons are deflected by the sample's electric field towards the BSE detector which increases their detection efficiency.

Use beam deceleration to image your samples with unprecedented clarity.



Imaging with beam deceleration. The primary beam energy is reduced when it approaches the sample because it is decelerated by the stage bias. When the electrons leave the surface, both SE and BSE are now accelerated away by the stage bias thereby gaining energy.



This image of a non-conductive radiolarian shows poor contrast, low surface detail and charging artefacts without beam deceleration (left) and high contrast with crisp, sharp surface detail with beam deceleration on (right).

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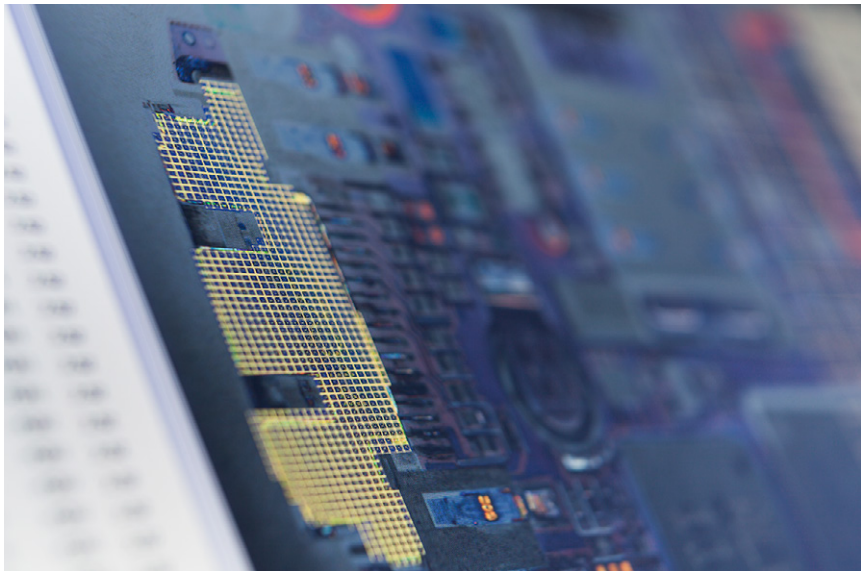
Automated Intelligent Imaging

Automated intelligent Imaging is a powerful but easy-to-use software tool that enables automated, unattended acquisition of images across batches of samples. Available in SmartSEM as part of the 4-step workflow, it is perfectly suited to routine inspection. It enables the user to define a boundary region, automatically generate regions of interest determined by the required field of view or magnification and begin automated acquisition.

Productivity enhancing features of Automated Intelligent Imaging in SmartSEM are:

- Select a boundary region to be automatically imaged using a series of shapes or by drawing freehand on an optical image of your sample.
- Perform single click selection of points of interest and random sampling across samples.
- Assign user defined magnification and detectors to be used.
- Replicate settings across samples and save for repetitive imaging tasks.

Automated Intelligent Imaging will improve your sample throughput, boosting your productivity and performance.



Automated Intelligent Imaging, part of the 4-step workflow, allows users to draw freeform areas of interest. ZEISS EVO then automatically acquires the dataset ready for review in ZEISS SmartBrowse.

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ZEISS 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 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. 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.

SmartBrowse collects the acquired dataset and displays it as a clickable, zoomable map providing in context viewing helping you to understand your sample.

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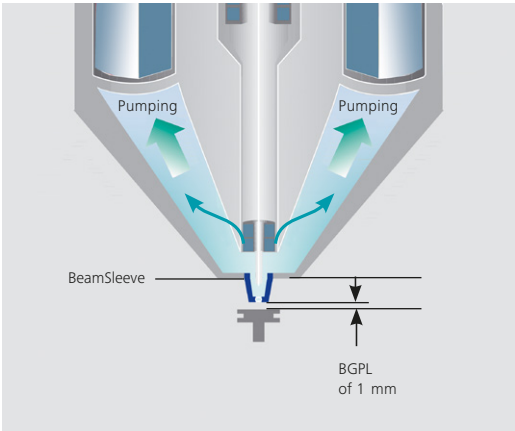
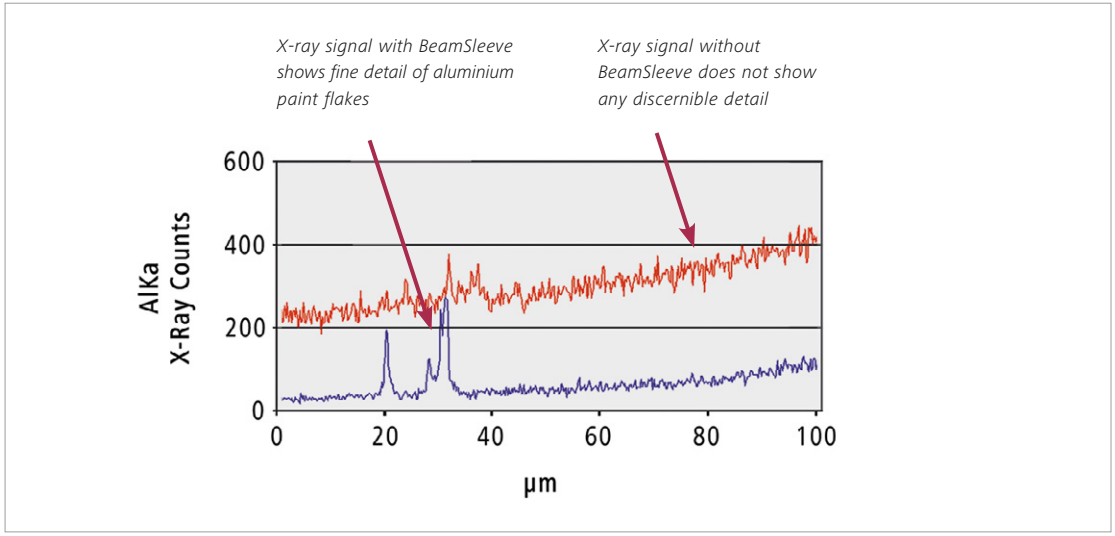
BeamSleeve

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 BeamSleeve.



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



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

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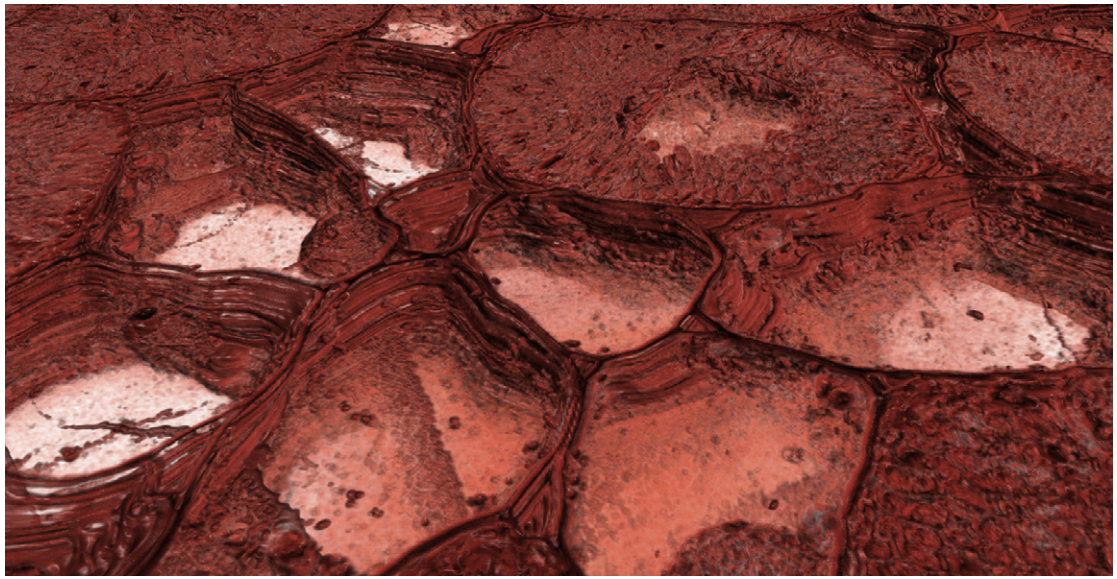
ZEISS Atlas 5 – Master Your Multi-scale Challenge

Atlas 5 turns your EVO into a solution for rapid, automated mapping of large areas. With a 16 bit scan generator and dual super-sampling signal acquisition hardware, you can acquire single images up to 32 k × 32 k pixels, with dwell times from 100 ns to >100 s, adjustable in 100 ns increments. This solution lets you create large image montages resulting in a large Field of View image at SEM nanometer scale resolution. Efficient workflow-driven software guides you effortlessly through all imaging tasks while its many automated functions let you acquire data easier and faster than ever before. The optional Atlas 5 Array Tomography module is specifically designed for automated imaging of serial sections of biological tissue to enable 3D visualizations of large volumes.



3D visualization, Medicago sp., root nodules, serial sections, 25 nm pixel size, 3D spatial symbiotic relationships between nitrogen-fixing bacteria rhizobia and the host legume plant. Sample: courtesy of J. Sherrier, J. Caplan and S. Modla, University of Delaware, US.

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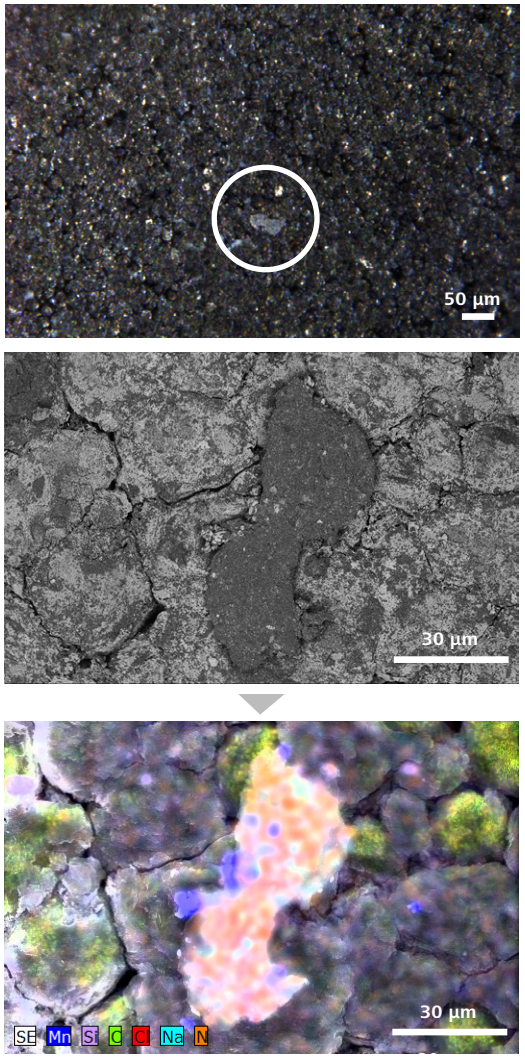
Correlative Microscopy with Shuttle & Find

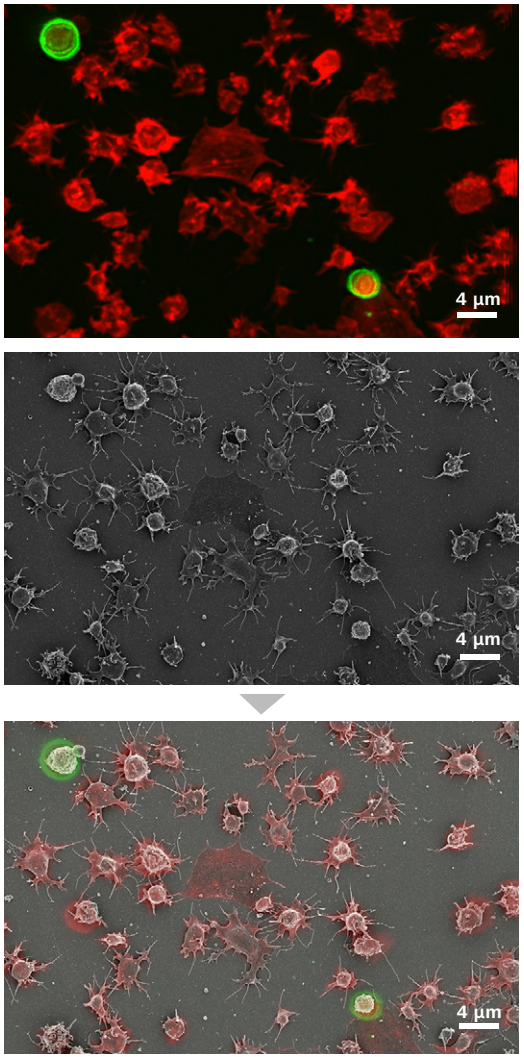
The Shuttle & Find software module allows an easy-to-use, productive workflow to overlay data from your light microscope and scanning electron microscope. Combine the optical contrast methods of your light microscope with the analytical methods of your electron microscope. Discover information about the function, structure and chemical composition of your sample.

How it Works:

Using a special specimen holder with three fiducial markers, a coordinate system is generated within seconds. Use the light microscope to define interesting regions in your sample. Then relocate the defined regions in the electron microscope where you will be able to improve the resolution by several orders of magnitude. Now you continue examining the sample more extensively. Finally, correlate the images taken by the different microscopical techniques with the Shuttle & Find software.



Lithium Ion battery. Top: light microscope image. Center: SEM image. Bottom: Overlay of both, combined with EDS analysis.



Platelets stained with AF647 (cellular platelet protein, false color: green) and AF555 – Phalloidin (false color: red). Top: Laser Scanning Microscopy fluorescence image. Center: SEM image. Bottom: Overlay. Courtesy of D. Woulfe and J. Caplan, University of Delaware, Newark, USA.

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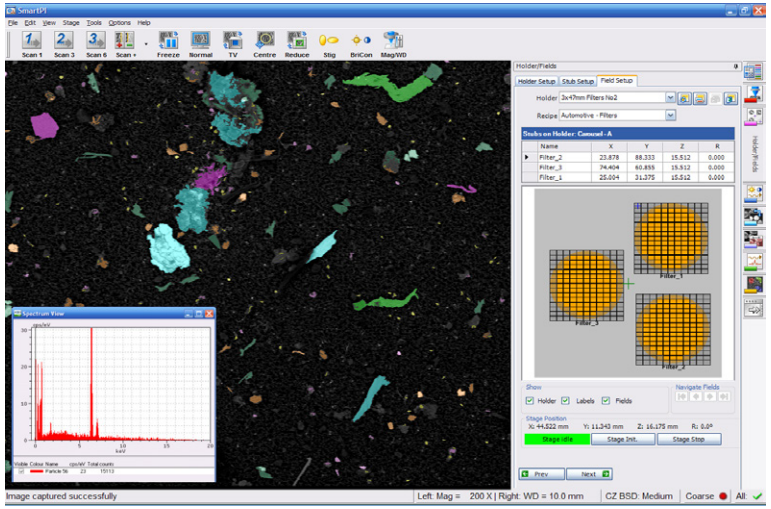
Automated Particle Analysis

From manufacturing cleanliness and engine wear prediction to steel production and environmental management, particle analysis solutions from ZEISS automate your workflow for increased reproducibility.

ZEISS SmartPI

SmartPI (Smart Particle Investigator) is a powerful particle analysis tool for your EVO. It automatically detects, investigates and characterizes particles of interest in your sample. Gain additional productivity from your EVO through automated analysis – for example, by running it fully unattended overnight and on weekends. Generate standard reports automatically, or interactively investigate your data. Advanced particle analysis allows you to optimize industrial processes by quantifying samples rapidly and objectively. Application specific plug-ins provide pre-built recipes and report templates tailored specifically to the industry you are working in.



Either use Image Analysis (IA) on its own or combine it with EDS data for rapid particle identification and classification.

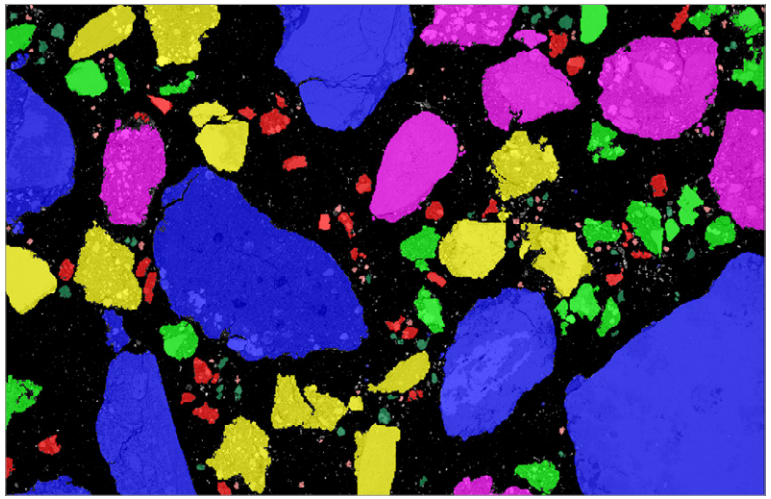


Image from ZEISS SmartPI IA, displaying particles of different size ranges in which the size range is defined by a unique color.

Automatically locate and characterize particles using image analysis and identify them using IA and EDS.

Store your particles in a database along with a full suite of modal data ready for investigation and reporting.

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Automated Mineralogy

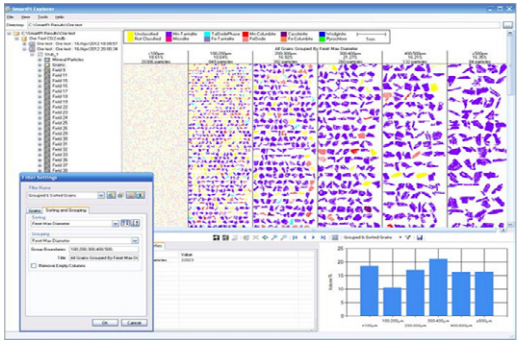
ZEISS Mineralogic combines an advanced mineral analysis engine with a range of application-specific outputs to your EVO, enabling you to characterize and quantify even the most challenging geological samples with submicron precision.

Oil & Gas

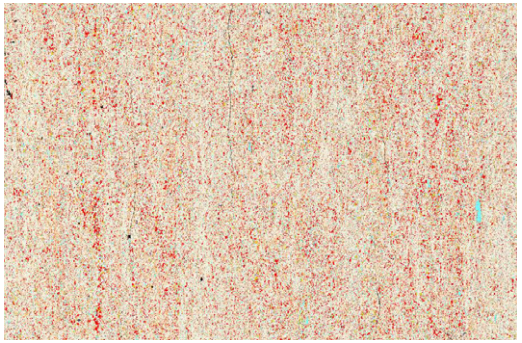
Use Mineralogic Reservoir as a part of your digital rock petrophysics workflow suite to gain a deeper understanding of your reservoir. This lets you automatically map and characterize minerals, porosity and organics. Tailor your system to analyze any type of rock, from conventional sandstone reservoirs to highly heterogeneous shale and mudrocks. Your automated petrological system provides unique insights into reservoir rocks, playing a vital role in characterizing samples from the centimeter to the nanometer scale.

Mining

Mineralogic Mining provides quantitative mineralogy for geometallurgy, optimization of mineral processing plant and ore characterization. Generate valuable understanding to support process modelling and decision-making, thereby reducing risks and costs. Target process improvements with quantitative mineralogy, elemental deportment, grain size distribution, and liberation and locking characteristics. Your automated mineralogy system is an essential part of the modern mining operation.



Particle Analysis: Quickly and simply investigate mining plant products, identify trends and highlight process improvements. For example, identify causes for tailings losses and concentrate dilution.



Section Analysis: Typical Mineralogic digital mineral map of a section of rock identifying and quantifying mineralogy, porosity, organics and texture. Sample: courtesy of University of Texas, Austin, US.

Your Flexible Choice of Components

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The unique "Future Assured" philosophy of EVO ensures that your microscope can develop in line with your applications. EVO can be enhanced with sample holders, new detectors, additional software options or even upgrades of the vacuum system to full environmental capabilities. Some of the most popular options and their benefits are described below.

Electron Source Options	Benefits Offered
Lab_6	Extended filament lifetime and stable probe currents ideal for analytics
Tungsten	Economic source technology provides easy exchange and high probe currents

Detector options include	Benefits Offered
SE	Vizualize surface detail in high vacuum modes of operation
VPSE-G4	Vizualize true surface detail in variable pressure modes of operation up to 400 Pa
C2D	Advanced variable pressure secondary electron imaging with a wider pressure range and improved image brightness and contrast up to 750 Pa
C2DX	High efficiency, extended pressure secondary electron imaging across full pressure range of 3000 Pa
HDBSD	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
YAG-BSD	Backscattered imaging with ultra fast detection
CL	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
EDS & WDS	Elemental X-ray analysis of your sample
EBSD	Analyze the crystallographic properties of your sample
Chamberscope & Downscope	View your sample within the chamber with a CCD camera. Available with picture-in-picture capability

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Software and Hardware Options Include	Benefits Offered
SmartSEM touch	Fast, easy to use interface provides access for novice users and automated workflows for visual inspection applications. Automatically acquire images across large areas with the swipe of a finger and browse your data in context.
Image Navigation	Quickly navigate to areas of interest in your sample using an image from a separate device e.g. a digital camera
Automated Intelligent Imaging	Boost your productivity with automatic unattended acquisition of images from user specified regions of interest
SmartBrowse	Contextualized image browsing with multiple detector overlays
Shuttle and 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 5	Acquire incredibly large images (32k × 32k pixels)
Mineralogic Analysis	Automatically detect and quantify mineral classifications in your sample
SmartPI (Particle Investigator)	Automatically detect, investigate and characterize particles of interest in your sample, particularly beneficial for industrial cleanliness.
BeamSleeve	Enhance imaging in variable pressure modes of operation and accuracy of EDS analysis by reducing beamscattering caused by charge compensation gas in the chamber
Bullet Comparison Stage	Easily compare bullets or cartridge cases with the ZEISS forensic stage
Drift Correction	Correction for systematic drift of the image while increasing resolution
Beam Deceleration	Use Beam Deceleration technology for highest resolution low voltage imaging or to image beam sensitive samples

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			ZEISS EVO MA10 ZEISS EVO LS10	ZEISS EVO MA15 ZEISS EVO LS15	ZEISS EVO MA25 ZEISS EVO LS25
Resolution	2 nm, 3 nm	@ 30 kV SE with LaB_6, W			
	3.4 nm	@ 30 kV SE VP mode W			
	15 nm	@ 30 kV 1 nA with LaB_6			
	5 nm, 8 nm	@ 3 kV SE with LaB_6 or W			
	15 nm, 20 nm	@ 1 kV SE with 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 – 1,000,000×	< 5 – 1,000,000×	< 5 – 1,000,000×
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, Depth, Analysis, Field, Fisheye(2)				
Pressure Range	10 – 400 Pa (750 Pa with optional license, MA Series)(3)				
	10 – 3000 Pa (LS configuration)				
Available Detectors	SE – Everhart-Thornley Secondary Electron Detector (supplied as standard)			CCD – Charge Coupled Device for Raman spectroscopy	
	HDBSD – High Definition Backscattered Electron YAG-BSD – YAG Crystal Backscattered Electron Detector				
	VPSE-G4 – Variable Pressure Secondary Electron Detector C2D – Cascade Current Detector Detector C2DX – Extended Range Cascade Current 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				

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		ZEISS EVO MA10 ZEISS EVO LS10	ZEISS EVO MA15 ZEISS EVO LS15	ZEISS EVO MA25 ZEISS EVO LS25
Chamber Dimensions		310 mm (Ø) × 220 mm (h)	365 mm (Ø) × 275 mm (h)	420 mm (Ø) × 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 = 50 mm T = -10° to 90°, R = 360° (continuous)	X = 130 mm, Y = 130 mm, Z = 50 mm or 80 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 vapor VP gas			
Image Framestore	3072 × 2304 pixels, signal acquisition by integration and averaging			
System Control	SmartSEM[4] GUI operated by mouse and keyboard			
	SmartSEM touch[2] GUI operated by 23" touchscreen, mouse and optional hardware control panel			
	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] With optional TTL upgrade
[4] SmartSEM – Sixth generation SEM control Graphical User Interface

Count on Service in the True Sense of the Word

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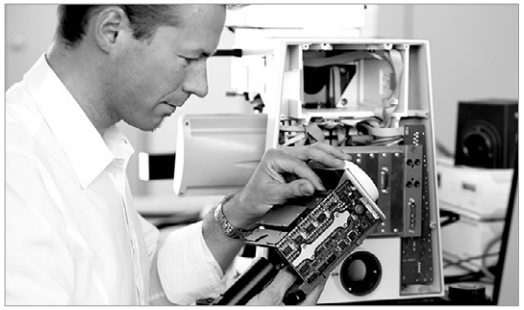
Because the ZEISS microscope system is one of your most important tools, we make sure it is always ready to perform. What's more, we'll see to it that you are employing all the options that get the best from your microscope. You can choose from a range of service products, each delivered by highly qualified 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 them – 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.



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

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