Imaging Below 1 kV.
Expert Knowledge
Integrated.

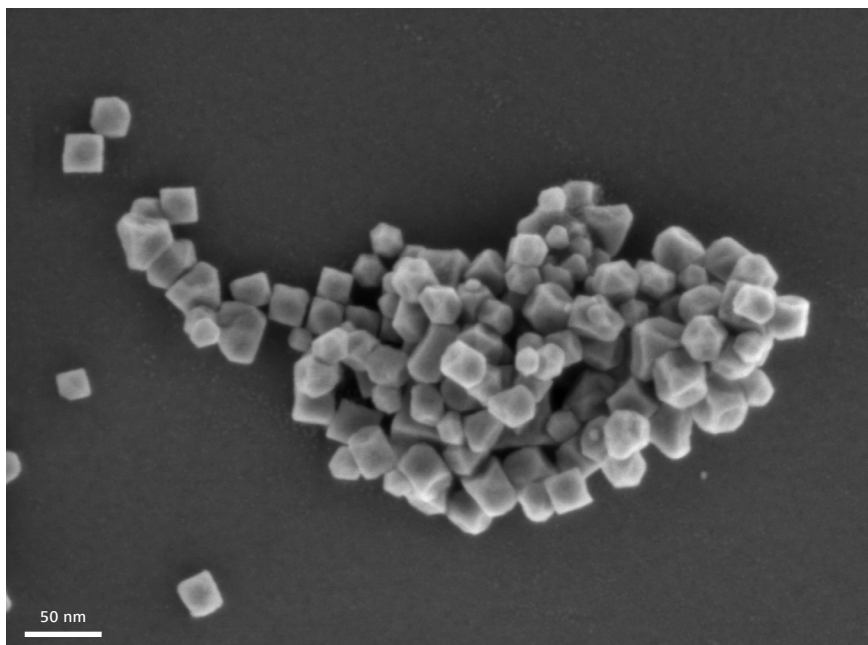**ZEISS GeminiSEM 560**

Field Emission SEM

Seeing beyond

ZEISS GeminiSEM 560

Your Field Emission SEM for Imaging Below 1 kV. Expert Knowledge Integrated.

Discover how to image with sub-nanometer resolution effortlessly with a field emission SEM that is your tool for imaging below 1 kV and offers integrated expert knowledge. Use it for your most demanding projects in materials and life science. Innovations in electron optics and a new chamber design let you benefit from better image quality, usability and flexibility. Combine excellence in imaging and analytics.

ZEISS GeminiSEM 560 is the new standard for surface imaging – introducing Gemini 3 and its new electron optical engine Smart Autopilot. It delivers ultimate sub-nanometer surface sensitive characterization for any sample.
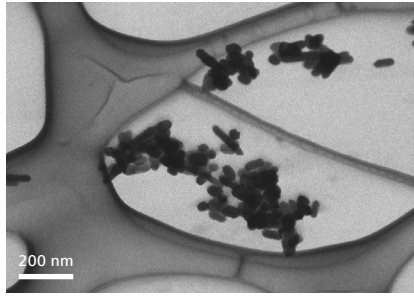
- Raise the bar for surface-sensitive, distortion-free, high-resolution imaging and image below 1 kV easily.
- Benefit from expert knowledge being integrated.
- Experience unique contrast.

50 nm

Magnetic FeMn nanoparticles, imaged at 1 kV, GeminiSEM 560.
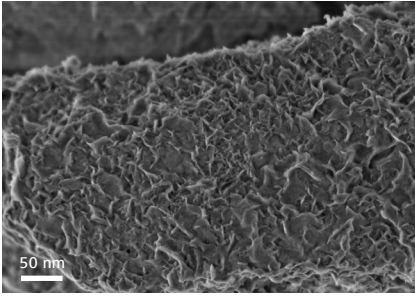
Details on the surface of a non-conducting mineral particle at low kV: GeminiSEM 560 at 800 V, Inlens SE.

3D STEM tomography on a CeO$_2$ nanoparticle. GeminiSEM 560, aSTEM, brightfield, 30 kV.

The New Standard in Surface Imaging

- GeminiSEM 560 raises the bar for surface-sensitive, distortion-free, high-resolution imaging and lets you image below 1 kV easily.
- Magnetic, field-free imaging of samples with sub 1 nm resolution below 1 kV – without the need for sample biasing or monochromation is enabled by Gemini 3 which includes the Nano-twin lens and the new electron optical engine Smart Autopilot.
- Achieve images of non-conducting, vacuum-sensitive material with a new variable pressure mode and a new Current Cascade (C2D) detector: ensure fast results and preserve features by bringing vacuum-sensitive specimens into the chamber through the new Gentle Airlock in VP mode.
- Analyze delicate samples with ease by leveraging the new, large chamber with dual EDS ports. Produce fast, shadow-free mapping ensured by an optimum detector solid angle.

Expert Knowledge Integrated

- Imaging of challenging samples is now accelerated by the new electron optical engine Smart Autopilot.
- Perform easy sample navigation by leveraging the greatly increased system's field of view.
- Smart Autopilot lets you save time while making lengthy alignments obsolete: the engine drives the electron optics to provide magnifications from less than 1× up to 500 kx, taking care of alignment, calibration and focus along the way.
- Smart Autopilot includes a new parallax autofocus and a new auto-wobble that provide you with clear, crisp images within seconds.
- Python scripting is able to use these features in automated workflows such as 3D STEM tomography.

Experience Unique Contrast

- Finding the sweet spot in your working conditions means that you've selected exactly the right combination of parameters to achieve the perfect image: the trick is finding it.
- Gemini column technology with its magnetic field-free imaging and its new Gemini 3 column enables you to find these sweet spots and discover new information from your sample.
- Magnetic contrast imaging is easy for GeminiSEM 560 with a magnetic field on the sample of less than 2 mT.
- Perform energy spectroscopic imaging with the energy-selective Inlens backscatter detector while simultaneously incorporating electron angular spectroscopic imaging, with the annular backscatter detector.
- Bring all of your data together with ZEN Connect to segment and report on your findings with ease.
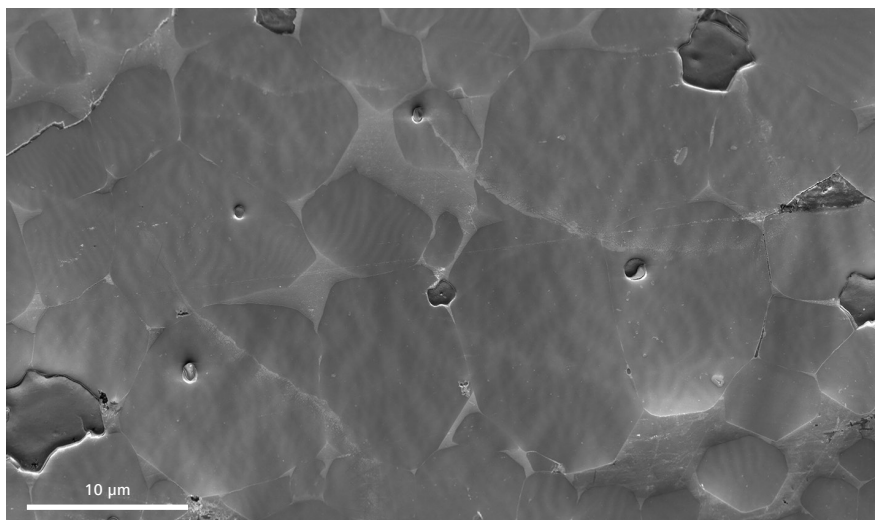

A sweet spot: Magnetic contrast on a NdFeB magnet, GeminiSEM 560, Inlens SE detector, 1 kV, WD 5 mm, 25° stage tilt.

Technical Data

ZEISS GeminiSEM 560

ZEISS GeminiSEM 560 offers:

Essential Specifications	ZEISS GeminiSEM 560
Electron Emitter	Thermal field emission type
Resolution	0.5 nm @ 15 kV
	0.8 nm @ 1 kV
Acceleration Voltage	0.02 – 30 kV
Probe Current	3 pA – 20 nA (100 nA configuration also available)
Maximum field of view in high resolution mode	1.6 mm at 1 kV @ WD = 7 mm
Maximum field of view in overview mode	5.6 mm @ 15 kV and WD = 8.5 mm
	130 mm @ max. WD (ca. 50 mm)
Store Resolution	Up to 32k × 24k pixels
Chamber Size	360 mm inner diameter
	270 mm height
Specimen Stage	X = 130 mm; Y = 130 mm
	Z = 50 mm
	T = -4° to 70°
	R = 360° (continuous)

Gun with high resolution gun mode

Smart Autopilot

Nano-twin lens

Tandem decel
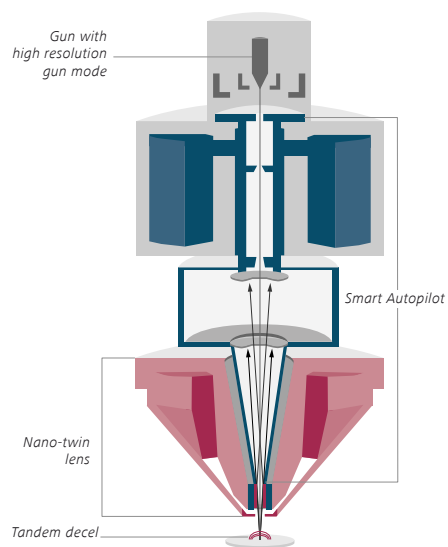
ZEISS GeminiSEM 560. Novel optical design of the Gemini 3 column. Nano-twin lens (red), Smart Autopilot (blue).

Introducing the Gemini 3 Column

Gemini 3 optics are optimized for resolutions at low voltages and for contrast enhancement. Sub-nanometer imaging below 1 kV is now possible without immersing the sample in an electro-magnetic field. Maximum resolution at all working conditions from 1 kV to 30 kV is ensured. Gemini 3 consists of two components which work synergistically: the Nano-twin lens and Smart Autopilot, a new electron optical engine. The Nano-twin lens delivers sub-nanometer resolution at low voltages with excellent signal detection efficiency. It works with significantly reduced lens aberrations at low kV compared to the standard Gemini objective lens and the Inlens detector signal is enhanced under low voltage imaging conditions. In combination with the Nano-twin lens, Smart Autopilot lets you benefit from the best possible resolution at each working condition through condenser optimization of the beam convergence angle. Switch seamlessly between sample navigation and high-resolution imaging with a large field of view overview mode. Achieve optimum image quality at high speed with a new autofocus.

The high-resolution gun mode results in minimized chromatic aberration thanks to the reduction of the energy width of the primary beam by 30% and allows even smaller probe sizes. Tandem decel, a two-step deceleration mode, combines the beam booster technology with a high negative bias voltage that is applied to the sample: the primary electron beam is decelerated; thus the landing energy is effectively reduced. Use this to further improve resolution below 1 kV or to boost the detection efficiency of diode-based backscatter detectors. Tandem decel's optional sample biasing of up to 5 kV further improves the excellent imaging capabilities at low voltages.