

Nova NanoSEM 50 Series

Excellent Performance for the Widest Range of Samples

Obtain spectacular results consistently on a variety of challenging materials (e.g., nano-particles and powders, nano-tubes and wires, plastic electronics, glass substrates, organic materials, diamond films, etc.).

Simple to use and extremely versatile. The Nova NanoSEM 50 Series is the perfect solution for the most demanding characterization and analysis at the nano-scale.

Benefitting from years of development on both SEM and DualBeam™, the xT software platform has gotten even easier to use. Now with presets, simple navigation/correlation and easy sample management, both basic and advanced users get the best results in the shortest time. The NanoSEM 50 series excels thanks to its advanced optics and unique detection system, which delivers information from every angle. A 2-mode final lens, operating in both magnetic immersion and field free modes, delivers excellent contrast and resolution on all samples.

The magnetic immersion field ensures that >95% of all generated secondary electrons are forced back into the final lens, delivering an outstanding signal-to-noise ratio when using the in-lens detectors. Further SE/BSE filtering also is possible in the lens, which affords easy separation of topographic and material contrast. The introduction of the under-the-lens DBS detector, in combination with beam deceleration, ensures that almost all BSE signal can be detected and separated with its unique annular segmentation. The combination of annular detection with the magnetic immersion field provides the fastest, easiest method for filtering charge on non-conductive material.

KEY BENEFITS

Field emission SEM with ultra-stable, high current Schottky gun

Advanced optics and detection, including an immersion mode, beam deceleration, in-lens TLD-SE and -BSE, DBS and STEM for best selection of the information and image optimization

Beam landing energy down to 20 eV

1.4 nm @ 1 kV without beam deceleration

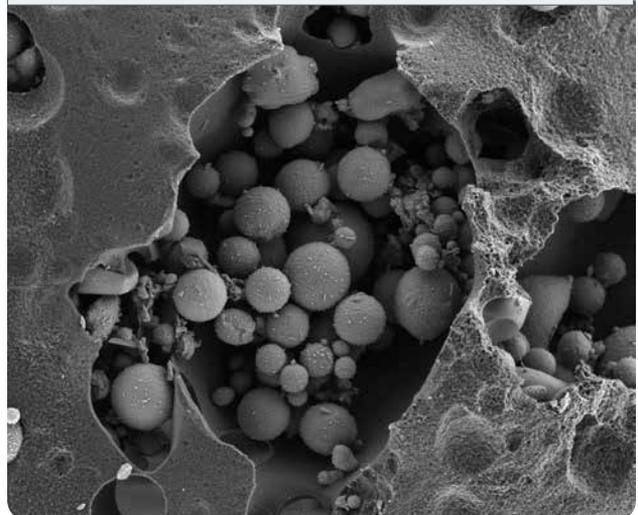
World's only true high-resolution, low vacuum FESEM: 1.8 nm @ 3 kV

Greater than 200 nA for analysis in high- or low vacuum

Integrated 16-bit scanning/patterning engine

Ultra-clean scroll- and turbo-pumped vacuum system

150 x 150 mm high precision and stability piezo stage (Nova NanoSEM 650)



Analyze More Samples Including Non-Conductive or Contaminating Materials. Characterization can vary from unique low vacuum capabilities up to ultra-high resolution, thanks to FEI's Helix™ detector technology. This delivers excellent high resolution images, even at lower beam voltages required for beam sensitive samples, while the Gaseous Analytical Detector ensures the most accurate EDX detection of non-conductive materials, even in low vacuum. Myriad sample sizes can be accommodated easily inside the large chamber on the Nova NanoSEM's high-precision, high-stability stages.

ESSENTIAL SPECIFICATIONS

Electron optics

- High resolution field emission-SEM column, with:
 - 2-mode (field-free and immersion) final lens
 - 60 degree objective lens geometry
- Heated objective apertures
- Through-the-lens differential pumping
- Beam deceleration with stage bias from +50 V to -4000 V
 - High stability Schottky field emission gun
- Source lifetime, 12 months guaranteed

Electron beam resolution

- High vacuum imaging, optimum WD
 - 0.8 nm at 30 kV (STEM)
 - 1.0 nm at 15 kV (TLD-SE)
 - 1.4 nm at 1 kV (TLD-SE) without beam deceleration
 - 4.0 nm at 100 V (DBS)
- High vacuum analysis, analytical WD
 - 3.0 nm at 15 kV and 5 nA (TLD-SE)
- Low vacuum imaging, optimum WD
 - 1.5 nm at 10 kV (Helix detector)
 - 1.8 nm at 3 kV (Helix detector)

Electron beam parameter space

- Beam landing energy: 20 eV - 30 keV
- Probe current: 0.6 pA - 200 nA continuously adjustable
- Max. Horizontal Field Width: 4.4 mm at 10 mm WD (corresponds to 29x minimum magnification)

Chamber

- Left to right: 379 mm
- Analytical working distance: 5 mm
- Ports: 21
- EDS take-off angle: 35°

Experience Significant Advancements for Prototyping.

The Nova NanoSEM 50 Series offers the most extensive set of integrated tools, including a 16-bit on-board digital pattern generator and dedicated patterning software, a high-speed electrostatic beam blaster and gas-injection systems for direct electron beam writing of nanostructures. The Nova NanoSEM 650's stage is powered by piezo-motors for producing finer, predictable and repeatable XY movements over a range of 150 mm.

For excellent imaging and analytical results across a wide range of materials, consider the benefits you would realize with the addition of the easy to use, versatile Nova NanoSEM to your laboratory.

Detectors

- In-lens SE detector (TLD-SE)
- In-lens BSE detector (TLD-BSE)
- Everhardt-Thornley SED
- Low vacuum SED (LVD)
- IR-CCD
- High sensitivity low kV Directional Backscattered Detector (DBS), lens-mount* or retractable*
- STEM BF DF HAADF detector*
- TV-rate low vacuum solid-state BSED (GAD)*
- UHR low vacuum SED (Helix detector)*

Vacuum system

- Complete oil free vacuum system
- 1 x 220 l/s TMP
- 1 x PVP-scroll
- 2 x IGP
- Chamber vacuum (high vacuum) < 6 x 10⁻⁶ mbar (after 24 hours pumping)
- Chamber vacuum (low vacuum) < 2 mBar
- Evacuation time: < 3.5 minute

Sample holders

- Multi-stub holder, mounts directly onto the stage, hosts up to 5 standard stubs (Ø12 mm)
- Vise Specimen Holder*, to clamp irregular, large or heavy specimens to the stage
- Cross-Sectional Holder for non-loadlock systems
- Universal Mounting Base (UMB)* for stable, flexible mounting of many combinations of samples and holders such as flat and pre-tilt stubs, and row holders for TEM grids
- Various wafer and custom holders*, available on request

* optional

Stage and sample

Nova NanoSEM	450	650
Type	Eucentric goniometer stage, 5-axes motorized	
XY	110 x 110 mm	150 x 150 mm piezo Optional Stage Mapping
Repeatability	< 2.0 μm (@0° tilt)	< 1.0 μm (@0° tilt)
Z	65 mm	10 mm
Rotation	n x 360°	n x 360° piezo
Tilt	-15° / +75°	-10° / +60°
Max. sample height	Clearance 85 mm to eucentric point	Clearance 55 mm to eucentric point
Max. sample weight	500 g in any stage position (up to 2 kg at 0° tilt)	500 g
Max. sample size	\varnothing 150 mm with full rotation (larger samples possible with limited rotation)	

Image processor

- Dwell time range from 0.050 to 25,000 μs /pixel
- Up to 6144 x 4096 pixels
- File type: TIFF (8, 16, 24-bit), BMP or JPEG, standard
- Single-frame or 4-quad image display
- Smartscan™ (256-frame average or integration, line integration and averaging, interlaced scanning)
- DCFI (Drift Compensated Frame Integration)
- Image registration

System control

- 64-bit GUI with *Windows 7*, keyboard, optical mouse
- “Beams per quad” graphical user interface concept, with up to 4 simultaneously active quads
- 24-inch LCD display, WUXGA 1920 x 1200 (second monitor optional)
- Joystick*
- Multifunctional control panel*

Accessories

- Sample / chamber cleaning: FEI CryoCleaner, FEI Integrated Plasma Cleaner
- Analysis: EDS, EBSD, WDS, CL

- Q-Loader: loadlock for fast sample transfer
- Navigation: Nav-Cam™, Correlative Navigation, CAD Navigation
- FEI Gas Injection: up to 2 units (other accessories may limit number of GIS available) for beam-induced deposition of the following materials:
 - Platinum
 - Tungsten
 - Carbon
- Prototyping: Integrated 16-bit patterning engine, Fast Beam Blanker, Electron Beam Lithography modules
- Cryostage
- Manipulators
- Electrical probing

Warranty and training

- 1 year warranty
- Choice of service maintenance contracts
- Choice of operation / application training contracts

Documentation

- Operating instructions handbook
- On-line help
- Prepared for RAPID™ (Remote Diagnostic Support)



Nova NanoSEM 450 with optional Nav-Cam and Plasma Cleaner



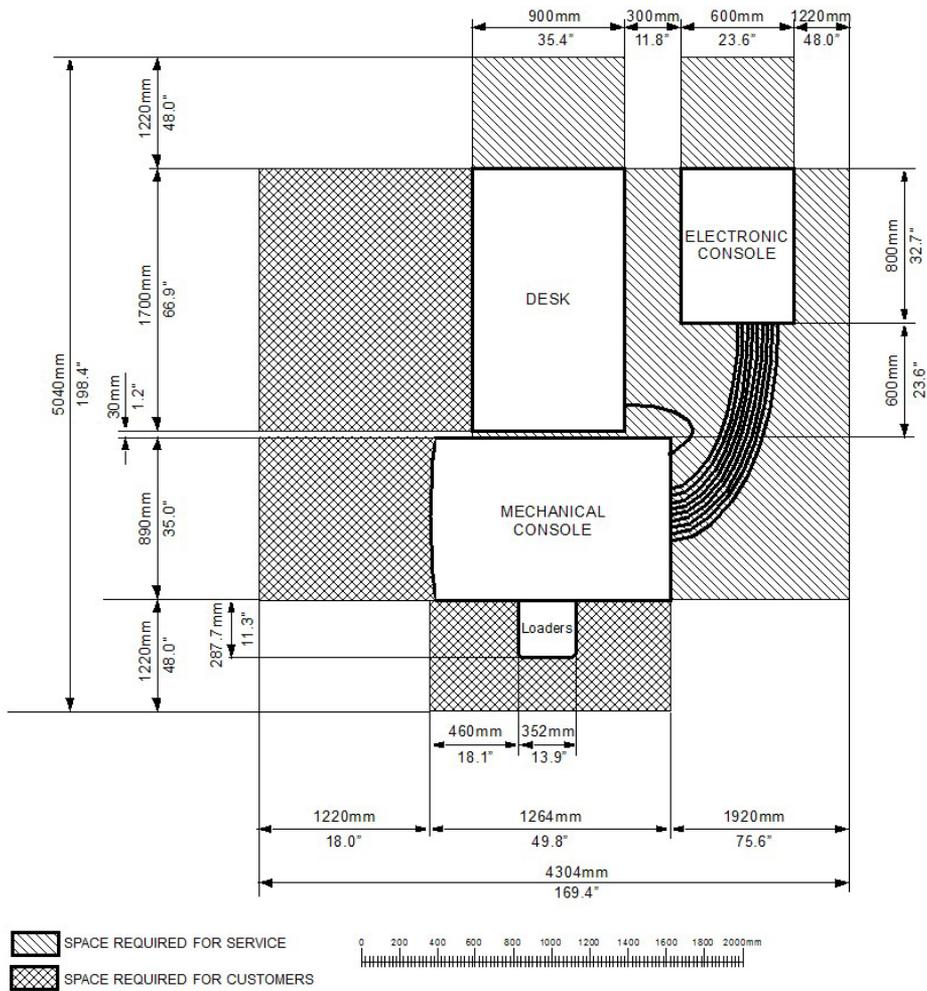
Nova NanoSEM 650 with optional Nav-Cam and QuickLoader

Installation requirements

(refer to pre install guide for detailed data)

- Power
 - Voltage 230 V (-6%, +10%),
 - Frequency 50 or 60 Hz (± 1%)
 - Consumption: < 3.0 kVA for basic microscope
- Environment
 - Temperature 20°C ± 3°C
 - Relative humidity below 80% RH
 - Stray AC magnetic fields < 100 nT a-synchronous, < 300 nT synchronous
- Door width: 120 cm
- Weight: basic system 750 kg
- Compressed air 4-6 bar - clean, dry and oil-free
- System chiller
- Acoustics: < 60 dBC standard utilities

Floorplan



Specifications are subject to change.

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TÜV Certification for design, manufacture, installation, and support of focused ion- and electron-beam microscopes for the electronics, life sciences, materials science, and natural resources markets.

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