FEI COMPANY™
TOOLS FOR NANOTECH

Helios NanoLab™

Sub-nanometer field emission SEM meets next generation FIB

Helios NanoLab

The leading-edge tool for FIB/SEM applications

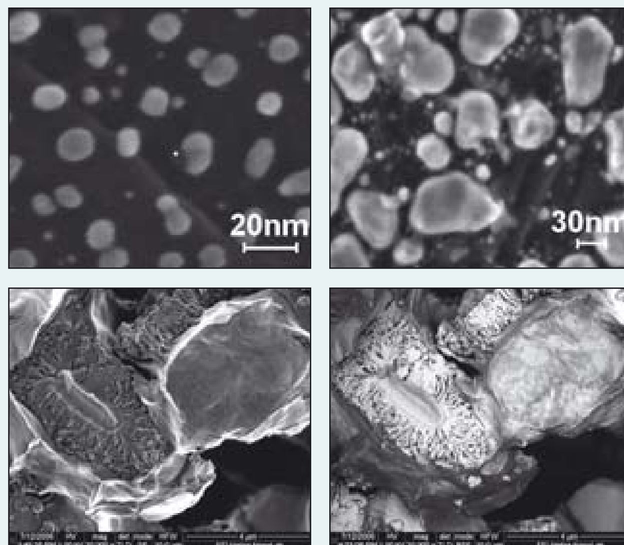
Imaging, analysis and control of matter at the nanoscale are key factors to succeeding in NanoResearch today. Resolution, accuracy, reproducibility, robustness and flexibility are pivotal characteristics required in a leading-edge tool. Following seven generations of success with small DualBeam™ microscopes, FEI introduces the Helios NanoLab™, the next generation platform. Combining unsurpassed sub-nanometer resolution SEM performance with stunning next generation Sidewinder™ FIB capabilities and innovative gas chemistries, Helios NanoLab offers a wide range of cutting-edge NanoWork. Extreme ease of use, stability and robustness, make Helios NanoLab the highest resolution DualBeam to date for scientists and technologists who strive to expand the boundaries and achieve new results.

A NanoLab with unsurpassed imaging performance

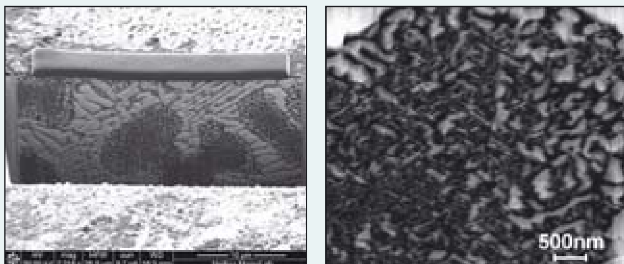
What puts the Helios NanoLab in a class of its own is its ability to offer the highest imaging, contrast, stability and speed performance together with the largest range of SEM / FIB applications. It ensures best resolution, reproducible metrology and best control of the beam for writing purposes.

The outstanding imaging capabilities of the Helios NanoLab start with its novel FESEM technology, featuring resolution in the sub-nanometer at 15kV and better than 1.5nm at 1kV without beam deceleration. Stunning image quality and contrast are achieved, especially when using the new Helios NanoLab through-the-lens detector. Its innovative design allows for superb imaging in SE and BSE modes over the entire energy range. When imaging is used for metrology purposes, Helios NanoLab introduces a significant breakthrough with its electron beam electrostatic scanning, which allows for pioneering accuracy performance.

Imaging technology



Stunning resolution and contrast performance, as shown with gold on carbon
Top left: sub-nanometer resolution at 15kV
Top right: better than 1.5nm at 1kV
Unsurpassed high contrast imaging owing to its novel through-the-lens detector, as shown on a superconducting wire
Lower left: 1kV, SE
Lower right: 1kV, BSE



Sidewinder FIB delivers rapid, clean milling and outstanding cross-sectional images with superb contrast and resolution as shown here on galvanized steel.

The Titan™ connection

Helios NanoLab in part owes its new performance to the market-leading engineering technology of Titan. Combining similar shielding and constant power lenses as well as a refinement of auto-alignments, it achieves the unsurpassed resolution, stability and ease of use required for today's work at the sub-nanometer scale. Preparation of the thinnest S/TEM samples with minimum damage becomes easy, making Helios NanoLab the undisputed partner for getting the best results from your TEM.

Features

- *First Schottky FESEM to go sub-nanometer*
- *FIB largest range of current and energies coupled to outstanding resolution*
- *New integrated 16-bit Digital Pattern Generator for electron and ion beams*
- *Thinnest samples prepared with very low damage, high speed and little effort*
- *Limits are pushed forward in 2D and 3D nano-characterization and -prototyping*

A new level for NanoWork

While pushing the limits of 2D and 3D nano-characterization, through integrated Slice and View™ tomography or FEI's automated 3D EBSD collection package called EBS3™, Helios NanoLab also delivers the most advanced integrated solutions for nanoprototyping. Its 16-bit digital patterning engine teams up with FEI-developed FIB milling protocols, which are readily available from the user-friendly software interface. A wide range of patterning strategies are available to optimize electron and ion beam writing and processes; including FEI's proprietary gas injection processes to deposit the largest number of different materials in 3D.

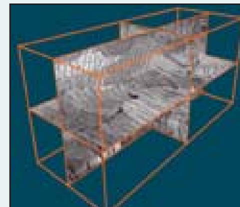
For electron beam lithography, Helios NanoLab rewrites the rules with its novel high-speed and linear electro-static scanning coupled to a new, fast, integrated beam blanker.

Helios NanoLab excels in preparing the highest quality samples. Using FEI's AutoTEM™ G² software, thin samples can be prepared rapidly and automatically, with high reliability and extreme ease of use.

Ultimate sample preparation

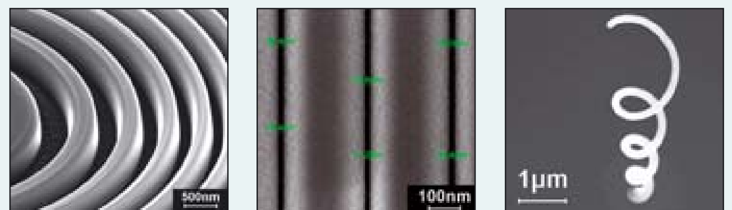
Sidewinder FIB allows samples to be prepared to meet the most stringent requirements with respect to quality
Left: sub-100nm TEM sample
Center: 16nm radius atom probe tip or speed
Right: 108µm chunk milled away in less than 1 hour

2D and 3D nanoanalysis



Collect 2D cross sectional information or 3D volumetric information with FEI's Slice and View automation software

Integrated advanced nanoprototyping



Left : advanced artifact free patterning, Fresnel Lens
Center : sub-20nm features, nanofluidic channels
Right : nanometric 3D milled and deposited objects, free-standing deposited Pt spring

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