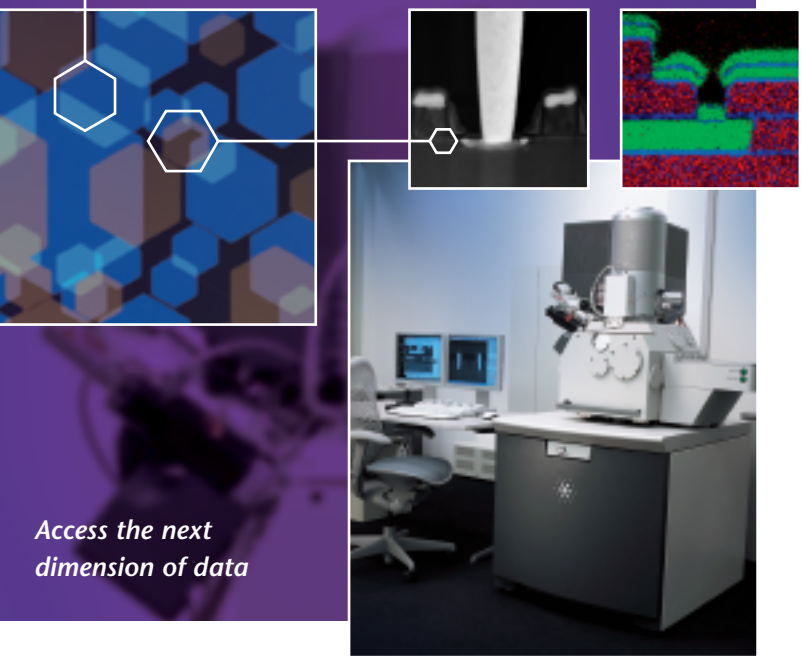
PRODUCT DATA

FEI COMPANY™



Access the next dimension of data

Strata 400 STEM

Bridge the gap between SEM and TEM

FEI's Strata 400 STEM is designed to support the increasing need for high resolution analytical capabilities as device geometries shrink below 100 nm and new material systems are introduced. The Strata 400 STEM includes integrated sample lift-out and handling, with SEM-STEM (scanning transmission electron microscopy) imaging to enable high-contrast, high-resolution analysis. FEI's innovative Flipstage™ (patent pending) moves the sample from milling to STEM-imaging position in seconds, without breaking vacuum. The new Sidewinder™ ion column provides improved sample throughput and ultimate sample quality.

- *Fast and simple high resolution, high contrast imaging for complete structural analysis*
- *Rapidly characterize process and defect excursions using FEI's reliable and proven DualBeam™ products*
- *Speed your "time to answer" by performing material and defect analysis on a single tool that delivers high-resolution images and compositional data*
- *Versatile sample handling optimizes cost of ownership*
- *Integrated iterative thinning and SEM-STEM imaging without breaking vacuum eliminates contamination*
- *Reduced training requirements and optimum system utilization with automated routines*
- *Your single source for complete sample management solutions*

SEM-STEM and TEM Sample Preparation

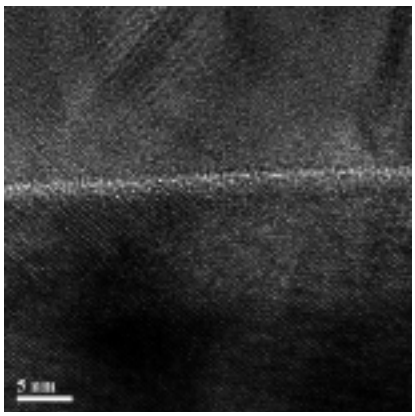
For SEM-STEM and TEM preparation, the Strata 400 STEM is ideal. As feature size shrinks, it becomes necessary to make large numbers of thin-film samples for process development, process monitoring, and defect characterization. To support this need, the Strata 400 STEM can be configured to automatically prepare multiple samples in a single session. The slice and view capability of the DualBeam™ can be used to obtain the thinnest possible sample without destroying the target area. In addition, enhanced low-kV milling with the ion beam can be used to improve sample quality.

Complete In Situ Sample Preparation and Analysis

The real power of the Strata 400 STEM comes from its ability to not only fully prepare, but also image and analyze thin-film samples. Sample preparation and imaging occurs without breaking vacuum, using the Flipstage sample handling and STEM detector combination. For bulk specimens, an in-situ extraction system is used to transfer thin samples to a TEM grid, if Ångstrom level analysis is required. Alternatively, samples can be extracted in situ in a full-wafer DualBeam, or mechanically pre-thinned and mounted on grids, before loading in the Strata 400 STEM for final sample preparation, imaging and analysis.

Optimized STEM Imaging and Analysis

The Flipstage™ accommodates six TEM grids, each of which can each hold several extracted samples. Pivoting the grid mount enables specimens to be positioned for ion beam thinning and for SEM-STEM imaging. The STEM detector offers bright field, dark field and high-angle dark field modes. The high angle dark field mode allows a selection from 12 separate segments for maximum flexibility in image formation. These imaging modes often show complementary information, with the dark field modes being particularly valuable for showing materials contrast. The Strata 400 STEM, when equipped with EDX analysis, also provides high-spatial resolution chemical data of thinned samples, with resolutions below 30 nm possible, more than an order of magnitude better than can be achieved on a bulk sample.



TEM image of gate structure with 2 kV Ga+ final polishing

The SEM-STEM technique can be used to evaluate TEM sample integrity or for final imaging of the sample. Iterative thinning and imaging of a sample enables control over sample quality, in particular, STEM imaging during sample thinning allows the sample thickness and section location to be monitored directly. By solving the analysis problem in the preparation tool, the number of samples that need to visit the TEM can be reduced, improving throughput and overall laboratory output.

Specifications

Electron source	Schottky thermal field emitter, over 1 year lifetime
Ion source	Gallium liquid metal, 1000 hours guaranteed
Beam voltage	200 V - 30 kV SEM, 2 kV - 30 kV FIB
Image resolution	< 0.8 nm achievable SEM-STEM mode
EDX resolution	< 30 nm on thinned samples
Sample types	Wafer pieces, packaged parts, TEM half-grids
Max sample size	75 mm diameter, loadlock compatible
Flipstage	Removable Row Holder holds up to six TEM grids Total tilt range > 150 degrees (excluding tilt of main DualBeam stage) External load base for loading/unloading grids from row holder In-situ section extraction system
SEM-STEM detector	Multi-region: bright field, dark field, 12 high-angle dark field segments
User interface	Windows 2000® GUI with integrated SEM, FIB, GIS, imaging and patterning Simultaneous patterning and imaging mode

Key Options

Gas chemistry	Range of proprietary deposition and etch chemistries
Automation software	AutoFIB™, AutoTEM™, AutoSlice&View™
Hardware	EDX Analysis

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