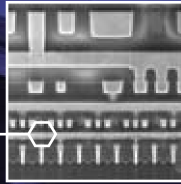
PRODUCT DATA

FEI COMPANY™



Right, First, Fast

Expida™ 1255 DualBeam™

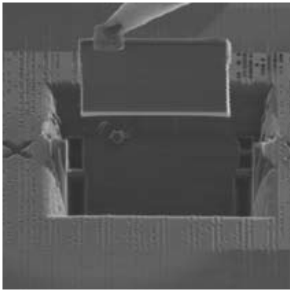
Full Wafer Defect Analysis for Fab Support Laboratories

- *3D imaging and analysis of subsurface structure and buried defects*
- *Fast, accurate root cause analysis for rapid recovery from yield excursions*
- *Shortened analytical cycles for accelerated process development and ramp*
- *Fast, accurate navigation to defects locations detected by in-line inspection and review tools*
- *Superior low-magnification imaging for defect navigation on unpatterned wafers*
- *Automated, high-throughput S/TEM sample preparation with optional in-situ lift-out capabilities*

The Expida 1255 full wafer DualBeam combines high resolution scanning electron microscope (SEM) imaging with focused ion beam (FIB) imaging and milling for process development and root cause analysis applications in near-fab semiconductor manufacturing support laboratories. Its 300 mm full wafer capability integrates effectively with in-fab inspection and control processes to provide dramatically faster results, lower analytical costs, higher analytical throughput and better quality information than can be obtained with conventional analytical procedures in outside laboratories. Its ability to provide high resolution images and compositional analysis of sub surface features and buried defects is essential in developing and controlling advanced semiconductor manufacturing processes and the three dimensional structures they create.

DualBeam Analysis...

The core value of DualBeam analysis derives from its ability to cut precisely located cross sections to expose subsurface structure for high resolution imaging and analysis. The Expida's Sirion™ electron column provides superior charge-free imaging at low voltage without sacrificing performance at higher voltages. Its excellent low magnification capability makes finding isolated defects on bare wafers fast and easy. The Expida's high performance Sidewinder™ ion column offers higher currents in a smaller beams for faster, more precise milling and imaging. Its excellent low voltage performance reduces surface damage in TEM sample preparation. In the DualBeam configuration the electron and ion beams intersect at the sample surface where simultaneous electron imaging and ion milling permit fine control of the cross sectioning process. Beam chemistry options provide additional capabilities: precisely controlled deposition of metal or insulator, selective etching of metal or insulator, and enhanced delineation of material interfaces in cross sectional images. Integrated backscattered electron (BSE) imaging helps to identify contaminants with atomic number contrast. Optional X-ray analysis provides more definitive elemental composition.



With AutoTEM software and NanoLift hardware options Expida can automatically prepare multiple, site-specific thin sections for S/TEM analysis, transfer them to sample grids and seal the grids in a capsule ready for transport to a dedicated high-voltage S/TEM.

...On a 300 mm Full Wafer Platform

Much of the benefit of full wafer analysis derives from its ability to navigate quickly and accurately to defects discovered by in-line inspection. The Expida's 5-axis, 300 mm stage can attains speeds up to 100 mm per second, with a positioning accuracy better than 1.5 micrometers. Equally important, the reliability of full wafer navigation dramatically reduces the risk that critical process or defect information will be destroyed during sample preparation. Speed and reliability are further enhanced by extensive automation options. AutoFIB automatically mills cross sections at designated locations. AutoTEM creates multiple, site-specific, ultra thin sections for S/TEM analysis. AutoSlice&View acquires a series of cross sections that can be reconstructed into a 3D model. Automation increases operator productivity and reduces training requirements while the overall speed and ease of automated DualBeam analysis enables denser sampling plans for added statistical significance and more confident decisions.

S/TEM Sample Preparation

Continuing reductions in semiconductor device size are driving demand for ultra high-resolution S/TEM analysis—and the ultra thin samples it requires. NanoLift provides in-situ sample lift-out, loadlock, and sealed transport for multiple TEM samples from sample preparation in the Expida to imaging and analysis in a dedicated high voltage S/TEM. Nanolift™ and Expida are essential components of FEI's UltraView™ tool suite, offering a complete, cost-effective solution for high throughput S/TEM sample preparation and analysis.

Specifications

Electron Column	Sirion , Schottky thermal field emitter, lifetime > 1 year
Ion Column	Sidewinder, Ga liquid metal, 1500 hours
Beam Voltage	SEM: 200 V - 30 kV FIB: 5 kV - 30 kV
Fib current	1 pA - 20 nA
Image Resolution	SEM 3 nm from 1 kV - 30 kV FIB: 7 nm (5 nm achievable)
Stage	5-axis motorized (tilt eucentric) X, Y motion 305 mm 100 mm/second

Key Options

Beam Chemistry	Range of deposition and etch chemistries
Software	AutoFIB AutoTEM AutoSlice&View CAD Navigation

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