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DATASHEET

ExSolve 2 WTP

High volume automated wafer lamella prep

Fast, accurate and precise cut placement. The ExSolve 2 WTP saves over 25% on TEM sample prep capital expense for leading electronics manufactures with a proprietary fast milling process and automation.

TEM data is used extensively to gather insights during development of successive process nodes. However, as devices become more and more complex, the volume of TEM data necessary to support each generation has exploded. Unfortunately, conventional TEM sample prep methods, which require massive technician workforces, have not kept pace with this increased demand. In addition, the inconsistencies introduced by the manual nature of the work are detrimental to process development. The faster manufacturers can produce large quantities of precise, consistent TEM data during development, the faster they will reach production.

To help reach escalating production goals, the Thermo Scientific™ ExSolve™ 2 WTP meets these development challenges head-on with a combination of innovative enablers and stabilizers. Enablers include a new capping strategy and improved cut placement methodology to improve accuracy. The protective Engineered Capping Layer — ECL for short — ensures consistent final lamella thickness by tuning the mill rate of the region of interest to the protective cap.

To ensure cut accuracy, underlying layers are milled to expose structures that can be used as landmarks. These landmarks are then fed forward to enable more precise cut placement for FIB milling after the ECL has been deposited atop the region of interest.

Stabilizers include hardware improvements, such as the Stage Mass Dampeners, Cap Probe Assembly, and FIB Power Supply, all of which directly benefit the focus of the FIB for better control of sample thickness and cut placement. Improved automated calibrations increase tool availability while maintaining tighter control over process stability.

TEM sample thickness has been reduced by 30% while placement control has been improved by 50% over the 1st generation ExSolve system. These improvements are critical as devices shrink to the 7 nm node. The ExSolve 2 WTP's thinner samples and fine-tuned placement control brings an end to samples cutting into adjacent features during placement.

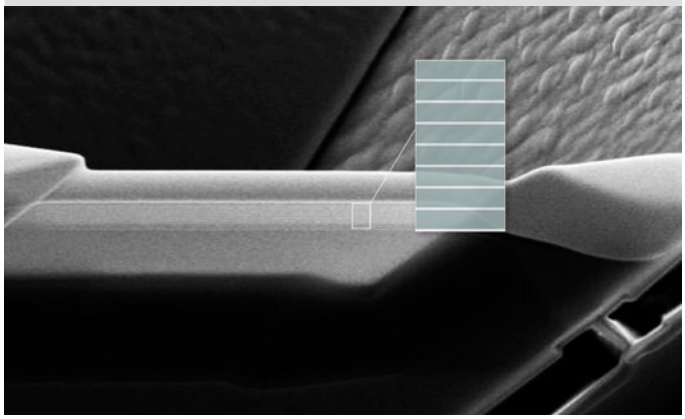
Key Benefits

Fast, repeatable, precise automated TEM prep for process control and semi-automated prep for the defect use case. At 25 nm thick the ExSolve 2 WTP can produce 4 lamella per hour.

Thickness, cut placement, and damage layer improved to enable lamella thickness down to 18 nm, with 5 nm (3σ) cut placement accuracy. 1 kV final clean allows damage layer reduction to 1.5 nm.

Factory Automation System is FA compliant for connection with user's host system. Wafers are handled by either a dual load port EFEM or VCE

Workflow connectivity allows critical process data to be tracked from sample prep to plucking and imaging. All imaging and metrology data is consolidated in a web-based viewer.



Engineered capping layer (ECL) for mill rate matching

In addition, the sample's damage layer is reduced by more than 50% due to a 1kV final mill, made possible by the ExSolve 2's FIB-centric architecture.

ExSolve 2 is fully automated, so there is no longer the need for a massive technician workforce. By consistently reproducing

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identical samples, ExSolve 2 WTP allows the Thermo Scientific Metrios™ DX to maintain its automated operation uninterrupted by human interaction. The sample TEM data can then seamlessly pass through the near-line workflow, saving even more time during development. Through a combination of improvements to cut placement, sample thickness, placement control, and automation, ExSolve 2 WTP can provide semiconductor and memory manufacturers with a faster time to data and thus a faster time to production.

In addition to preparing a wide variety of TEM samples, ExSolve 2 WTP is part of a fast, complete workflow that includes the TEMLink 150 G2 and the Metrios DX TEM.

As part of the workflow the ExSolve 2 WTP can receive critical job information such as recipe name, wafer ID, Lot ID, sample ID and custom fields, from a job file. This capability minimizes the human interaction to the bare minimum. Once the FOUP is identified the ExSolve 2 WTP runs automatically with the information received, allowing user to focus on other tasks.

The ExSolve 2 WTP also comes equipped with an extensive and highly customizable database utility. All images are stored, and can be searched, sorted and easily browsed using multiple criteria, both online and offline through Microscope Data Services (MDS). A new Centralized Data Services (CDS) extends the database to allow for complete job tracking from wafer to data by including Metrios DX TEM/STEM images and metrology data all in the same location. This minimizes the decision making time for the user by combining and reporting all the workflow data throughout multiple tools.

Additional features:

- Focused ion beam (FIB) for high accuracy milling
- SEM for recipe development and monitoring
- Optical microscope for pattern alignment
- Complete recipe development software
- iFast Developers Kit Professional Offline License enables customers to work with recipes on a separate, customer provided computer with USB dongle to enable functionality
- Separate host computer workstation (Windows® 7) for connecting to customer networks
- Full E95 compliant user interface for automated performance High-precision stage accommodates up to 300 mm full wafers and integrated wafer loadlock
- Designed for SEMI S2-0706, S8-0711 and CE compliance
- Fully compatibility with our automated TEM workflow:
  - ETM (ExSolve TEMLink Metrios)
- Positions for up to 5 GIS (Gas Introduction System) ports.
- FIB & SEM deposition available for Carbon, Tungsten or TEOS
- Brooks JET™ Equipment Front End Module (EFEM) - integrated atmospheric transfer system with robot, aligner, load ports, and controls mounted on an integral frame.

Options:

- Dark Field Optical Microscope Illumination - Advanced illumination source to augment the optical microscope for pattern alignment. Improves contrast on difficult to align wafers that have reduced surface topography/alignment features
- 300 mm Factory Automation
- 2nd 300 mm load port
- Centralized Data Services (CDS)

Installation Requirements:

Please contact your sales representative for a complete pre-installation requirement document

ExSolve 2 WTP	
Imaging modes	SEM, FIB, OM, Dark Field OM
Operation	Automated
Gas Introduction System	Up to 5 ports
FIB and SEM deposition	Carbon, Tungsten & TEOS
Stage	300 mm full wafer
Throughput @ 25nm thick	4 lamella/hour
Cut placement	5 nm (3σ)
Damage layer thickness	1.5 nm

Find out more at **thermofisher.com/EM-Sales**

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