Brochure

ThermoFisher SCIENTIFIC

Arctis Cryo-Plasma-FIB

Automation, throughput and connectivity for the cryo-electron tomography workflow

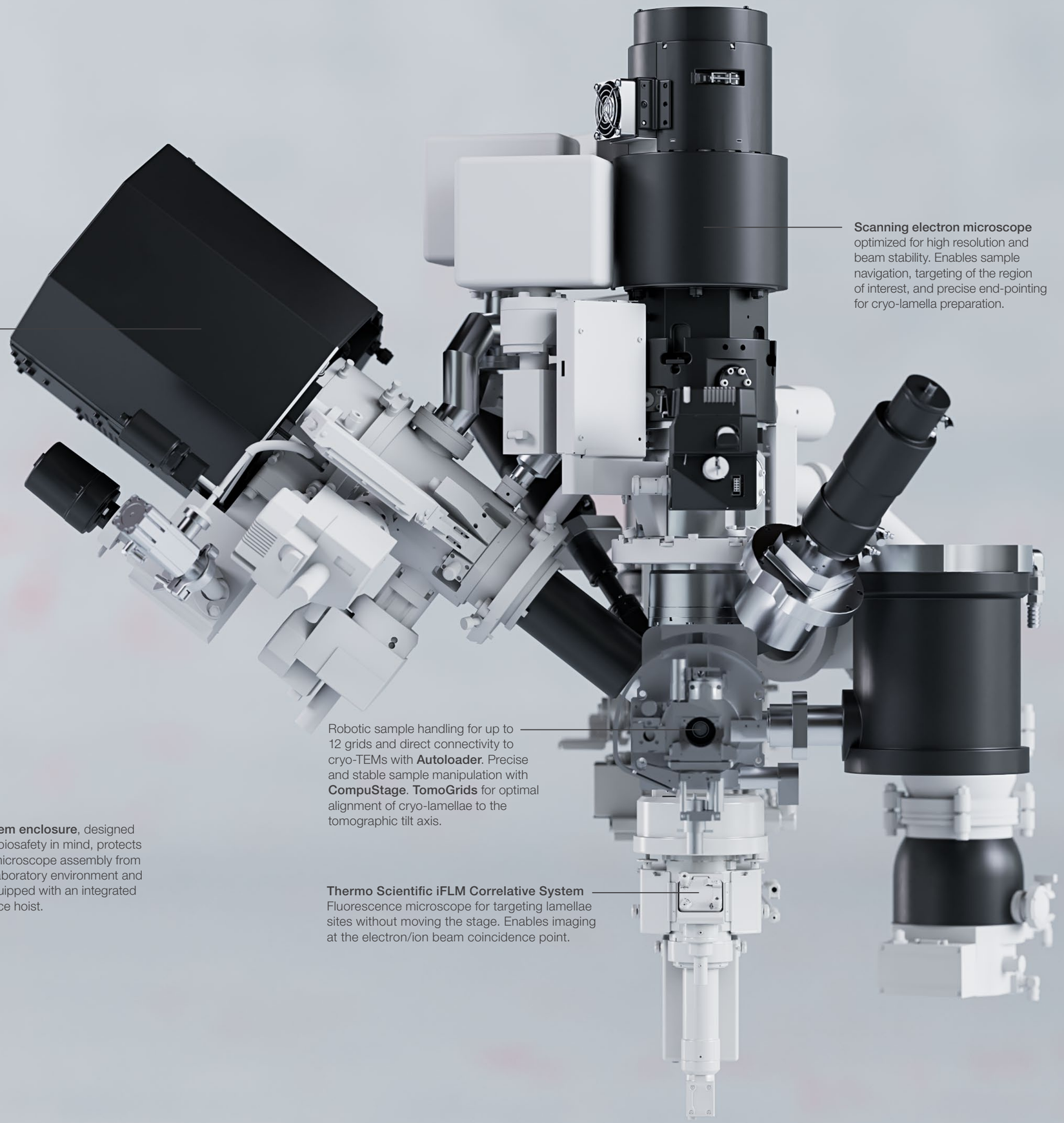
thermo scientific

Take the next step

The Thermo Scientific™ Arctis™ Cryo-Plasma-FIB automates high-throughput TEM lamellae production and features Autoloader connectivity for the cryo-electron tomography workflow.

Plasma focused ion beam
provides multiple ion species (xenon, oxygen, argon) for high-quality lamella preparation without gallium implantation. Obtain outstanding performance for large volume material removal and precision milling.

Scanning electron microscope
optimized for high resolution and beam stability. Enables sample navigation, targeting of the region of interest, and precise end-pointing for cryo-lamella preparation.



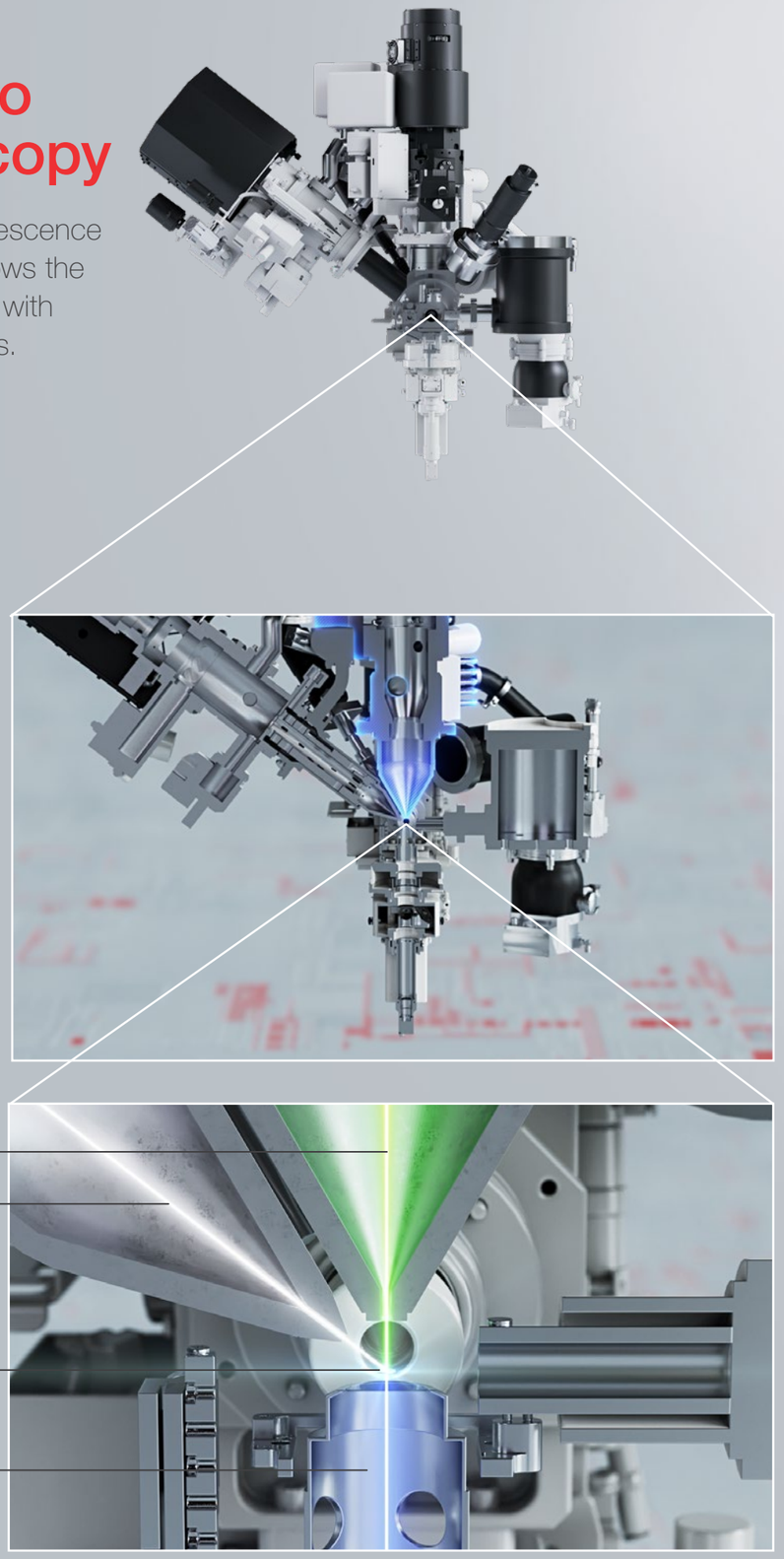
System enclosure, designed with biosafety in mind, protects the microscope assembly from the laboratory environment and is equipped with an integrated service hoist.

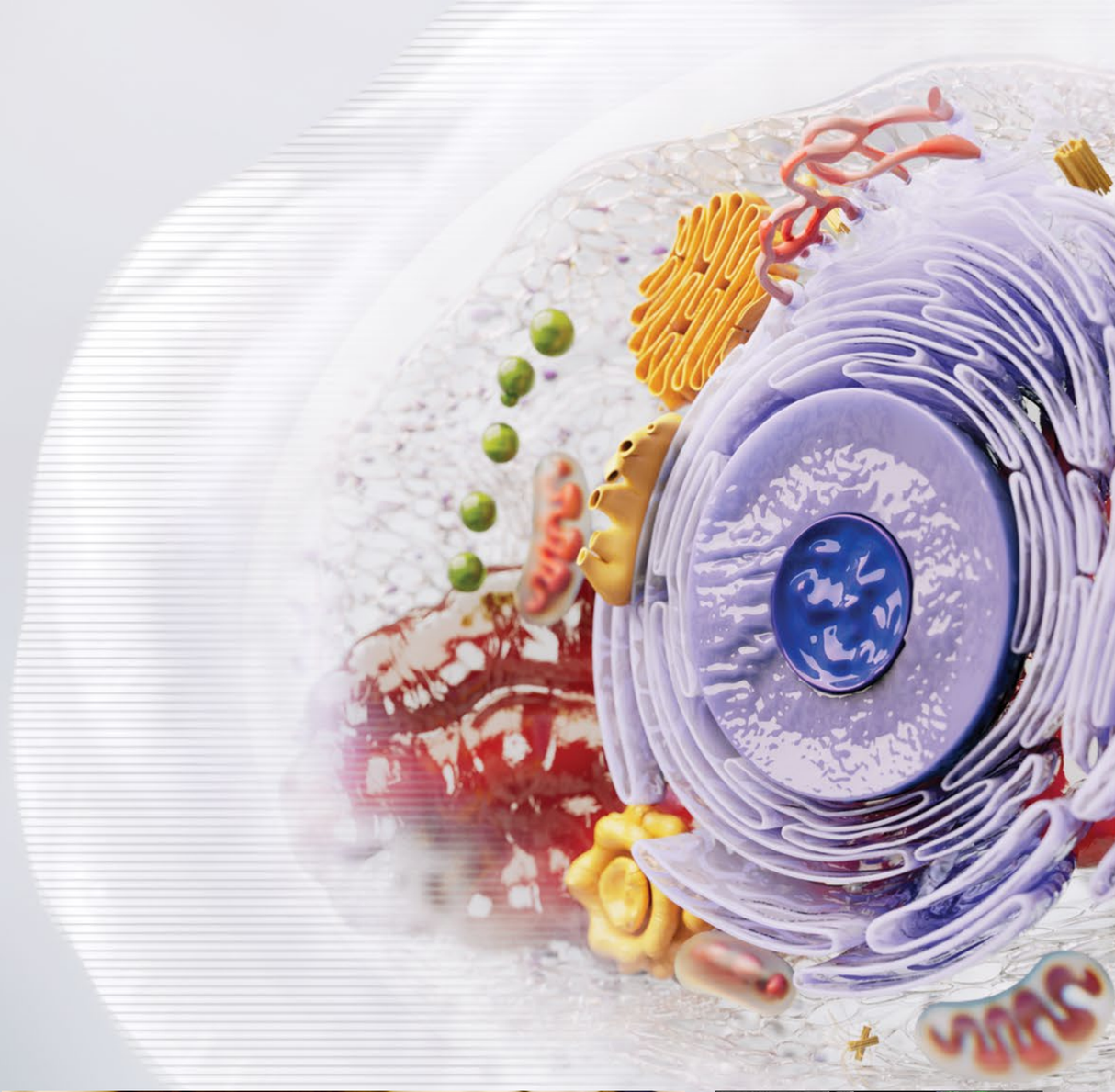
Robotic sample handling for up to 12 grids and direct connectivity to cryo-TEMs with **Autoloader**. Precise and stable sample manipulation with **CompuStage**. **TomoGrids** for optimal alignment of cryo-lamellae to the tomographic tilt axis.

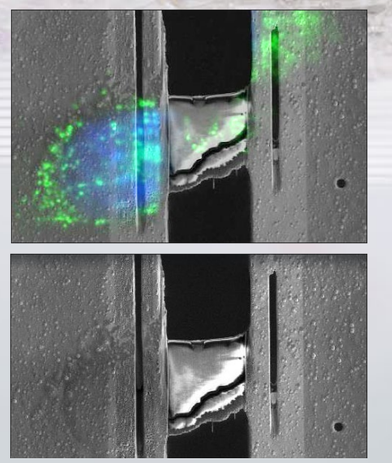
Thermo Scientific iFLM Correlative System
Fluorescence microscope for targeting lamellae sites without moving the stage. Enables imaging at the electron/ion beam coincidence point.

Correlation to light microscopy

“On-board” integrated fluorescence light microscope (iFLM) allows the same area to be observed with light, ion, or electron beams.



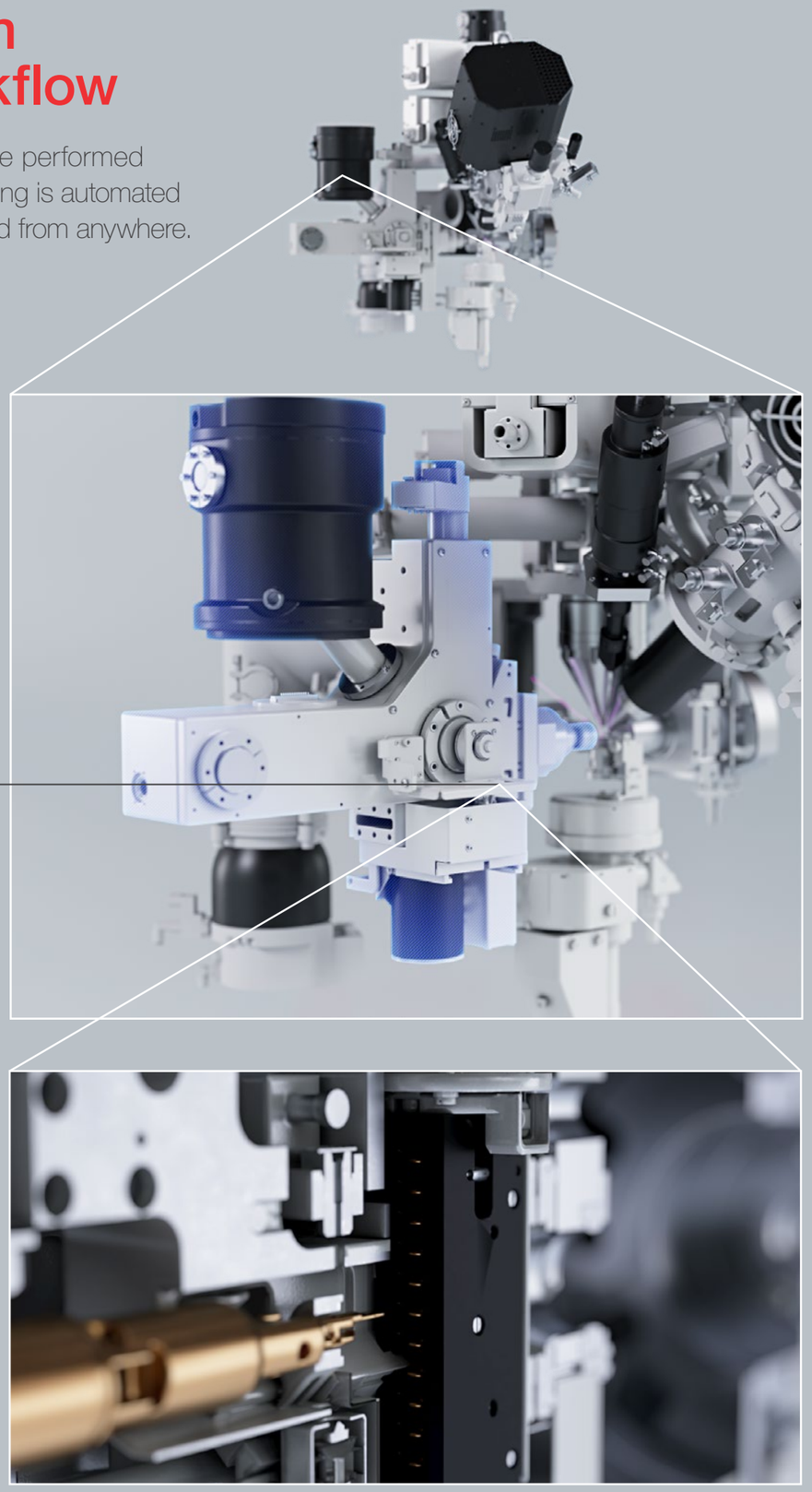




Fluorescence imaging for targeting, intermediate verification, and final target confirmation can easily be done before, in-between, and after ion milling without moving the stage.

Transform your workflow

System setup can be performed remotely. Lamella milling is automated and can be monitored from anywhere.



Cryo CompuStage (top right) tilts 180* to image the top and bottom of thick samples. The robotic arm of the Autoloader (top left) provides easy and robust transfer of 12 grids at a time from an Autoloader cassette (bottom left) avoiding unnecessary manual handling and ensuring consistency.

"One of the things that I find exciting about Arctis [Cryo-PFIB] is the degree to which it is an automated workflow. And so, this ability to have it running essentially unsupervised and produce high quality, large numbers of lamella is transformational."

–Jim Naismith
Director of The Rosalind Franklin Institute

Connected cryo-electron tomography workflow

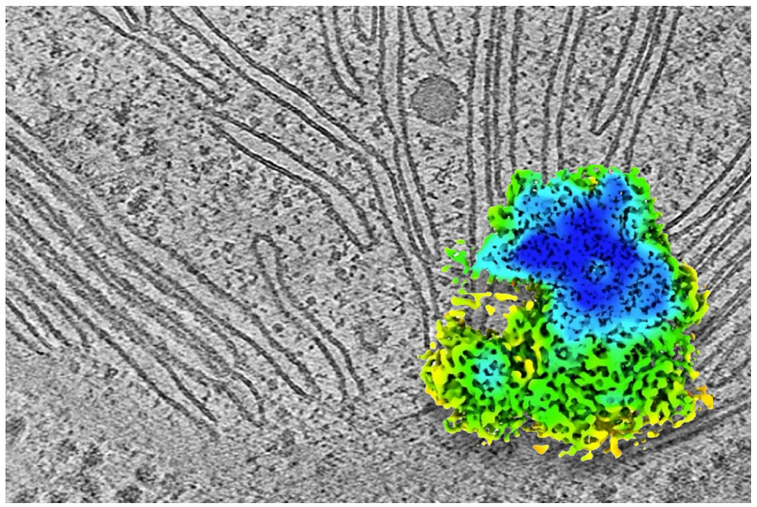
Specially designed TomoGrids always ensure correct lamella alignment to the tomographic tilt axis, from initial milling through high-resolution TEM imaging. The direct connection to any Autoloader-equipped cryo-TEM (e.g.,Thermo Scientific Krios™ or Glacios™ Cryo-TEMs) eliminates manual grid handling and transfer steps between FIB-SEM and TEM.

Synapse of neuronal cell. Sample courtesy of MRC-LMB.

Thermo Scientific
Vitrobot™ System

Thermo Scientific
Arctis Cryo-Plasma-FIB

Thermo Scientific
Krios Cryo-TEM



Reconstruction and visualization of ribosome from *Chlamydomonas*

High-quality lamellae with consistent thickness

Reliable control of thickness significantly increases throughput, saves time, and gives you confidence in the quality of your final lamellae. An ultra-clean working environment is ensured for multiple days through the proven combination of a compact sample chamber and a dedicated cryo-box for shielding against water condensation.

Arctis Cryo-Plasma-FIB technical highlights*	
Ion optics	
Ion gun	High-performance PFIB column, with inductively coupled plasma (ICP) source for fast ion switching
Ion species	Xenon, argon, oxygen
Switching time	<10 minutes, only software operation
Beam current range	1.5 pA to 2.5 µA
Accelerating voltage range	0.5–30 kV
Maximum horizontal field width	0.9 mm at beam coincidence point
Resolution (Xe+ beam)	<20 nm at 30 kV
Electron optics	
Electron gun	High-stability Schottky field emission gun
Column	UHR non-immersion field-emission SEM column
Source lifetime	Minimum 12 months
Gun maintenance	Auto bakeout, auto start and no mechanical alignments Continuous beam current control and optimized aperture angle
Beam current range	1.5 pA to 400 nA
Accelerating voltage range	0.2–30 kV
Detectors	In-lens detection system: T1 (BSE) and T2 (SE) / In-chamber: ETD (SE)
Resolution (T2)	<2.6 nm at 2 kV
Fluorescence microscope	
Coincidence point	Triple beam coincidence at sample position for photons, electrons, and ions
Objective	100x Zeiss Epiplan Neofluar NA 0.75; Piezo-driven
Objective working distance	4.0 mm
Modes	Fluorescence and reflection (motorized filter changer)
Filters	4-channel fluorescence Semrock LED-DA/FI/TR/Cy5-B-000 (Quadband) BrightLine® full-multiband filter set, optimized for DAPI, FITC, TRITC, & Cy5 and other like fluorophores, illuminated with LED-based light engines

Arctis Cryo-Plasma-FIB technical highlights*	
Camera	Basler a2A4504-18umPRO with Sony IMX541 CMOS sensor (20.2 MP resolution)
Imaging FOV	>150 µm (diagonal)
LED source	CoolLED, 4 channels (365 nm/450 nm/550 nm/635 nm)
Vacuum system	
Vacuum system	Completely oil-free pumping system
Vacuum chamber pressure (at cryo-conditions)	$<5 \times 10^{-5}$ Pa
Cooling and shielding	Nitrogen-cooled Autoloader and CompuStage with Thermo Scientific DualBeam™ System cryo-box
Stage and sample holder	
Type	CompuStage, computerized 4-axis specimen cryo-stage with ±90-degree alpha tilt Single axis specimen carrier holder for optimized stability and drift performance
Eucentric point	10 mm (from electron column pole piece)
Compatible grid carriers	TomoGrids, AutoGrids, FIB-AutoGrids
Sample loader	Autoloader: automated loading of cassettes (up to 12 grid carriers) under cryo-conditions
Protective coating	
Gas injection system	Retractable platinum GIS for chemical vapor deposition
Conductive coating	
Sputtering	Retractable platinum-ion sputter target for conductive sputter coating
Environmental protection	
Enclosure	System fully enclosed
Enclosure height	2.6 m
Nitrogen cooling	
Nitrogen refilling	Automatic liquid nitrogen filling system / Software controlled

* Specifications subject to change without notice.

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Learn more at **thermofisher.com/Arctis**

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