



METEOR specifications sheet

Reduce transfer steps and improve sample yield with integrated cryo-CLEM





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Introduction

METEOR is a top down cryo-CLEM imaging system that is easily retrofitted to your cryo focused ion beam (FIB)/ scanning electron microscope (SEM) system. It's designed to overcome the challenges in the current cryogenic electron tomography (cryo-ET) workflow by providing the capability to perform in situ fluorescence light microscopy (FLM) in your cryo FIB/ SEM chamber.

Not only does it reduce the number of transfer steps between microscopes, protecting the fragile sample from unnecessary contamination, it will also allow you to confirm the presence of the region of interest (ROI) in the lamella directly after FIB milling. METEOR is highly adaptable to your current workflow and works well with your transfer systems and sample holders, making it easy to adopt.



What will you achieve with METEOR?

METEOR can ensure an efficient lamella preparation workflow and increase sample yield for downstream acquisition of high resolution three dimensional EM data, which helps reveal the biological structures in their near-native cellular environment.

Through fluorescence aided cryo electron tomography, METEOR will help you to unravel molecular functions, structure and interaction more easily. It will help reveal the connections between different organelles and intracellular molecules. It's a poweful tool that can be applied to a wide range of research areas including microbiology, neurosciences, immunology, virology, developmental, cell and molecular biology.

Key benefits



Increase sample yield

Target your ROIs and correlate better and more effectively with the integrated FLM. Reduce transfer steps and thereby sample damage.



Optimise your workflow

Save time and work more efficiently by having both FLM and FIB in the same microscope.



Boost productivity

Produce high quality lamellae more easily. Obtain insight into your biological system through getting useful tomography data more quickly.



Improve cost efficiencies

Use your cryo TEM time more effectively on useful lamellae. Remove the need for a separate cryo FLM dedicated solely to ROI finding.

Workflow at glance

1. Load sample in cryo-FIB/SEM/FLM



2. Move to FLM position and capture 3. Move to SEM position and capture FLM image SEM image SEM FIB 5. Move to a region of interest (ROI) 6. FIB mill lamella based on the FLM image

4. Image correlation

7. After milling: verify if fluorescence (from ROI) is still present



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System specifications

Optics

Objectives: the following options are available*

- Olympus Fluorite objective
 - 10x (WD 11.0 mm, NA 0.30)
 - 20x (WD 3.1 mm, NA 0.45)
 - 50x (WD 1.0 mm, NA 0.80)
 - 100x (WD 1.0 mm, NA 0.90)
- Olympus Apochromat objective
 - 50x (WD 0.35 mm, NA 0.95)
 - 100x (WD 0.35 mm, NA 0.95)
- Olympus Semi-Apochromat objective
 - 50x (WD 10.6, NA 0.5)

* Depending on shuttle and sample stage configuration the choice of objectives can be limited due to space restrictions.

Objectives stage:

- Travel range: 31 mm
- Minimal incremental motion < 50 mm

Lightsource:

Omicron LedHub fitted with 4 LED sources:

- 385 nm
- 470 nm
- 505 600 nm bandpass filter
- 625 nm

Camera: the following options are available

- 10bit CMOS camera 1280 x 1024 5.3 μm pixel size (IDS UI-5240SE Rev. 4)
- 12bit sCMOS camera 2048 x 2048 6.5 μm pixel size (Andor Zyla 4.2)

Filters:

Equipped with a filter wheel with four slots, several multiband or single-band configurations are possible that can be optimized to the user's needs. Example configuration:

- 440/40 nm single-band bandpass filter
- 525/30 nm single-band bandpass filter
- 607/36 nm single-band bandpass filter
- 684/24 nm single-band bandpass filter

Reflection imaging mode is also available.

System Control

Comes with a control PC next to the FIB/SEM computer for acquiring your fluorescence images.

Imaging modes:

- Fluorescence imaging
- Reflection imaging

Odemis Integrated Software

ODEMIS, a user-friendly open-source acquisition software, is installed together with METEOR. It will ensure image acquisition parameters are primed for high quality fluorescence images. Users can furthermore implement their own scripts in Python to automate routine processes, e.g. camera exposure time optimisation.

Software functions:

- Adjust all relevant imaging parameters (power, exposure time, gain excitation and emission filter)
- Tiling and stitching functionality to acquire large sample areas.
- Control of the FIB/SEM stage to navigate the sample and find the region of interest
- A history trail that records your previous stage coordinates
- Switch between SEM and FLM positions to verify fluorescence signals in the lamella.
- Z-stack acquisition plugin
- Camera pixel binning option
- Multicolour imaging
- Option to save imaging pre-sets
- Odemis viewer to inspect the images
- Licence-free (free updates)

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