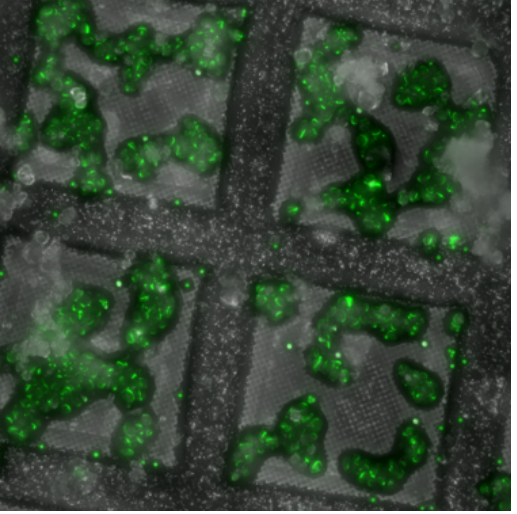
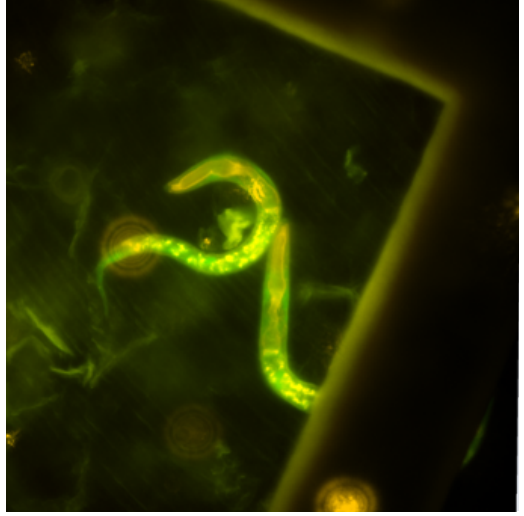
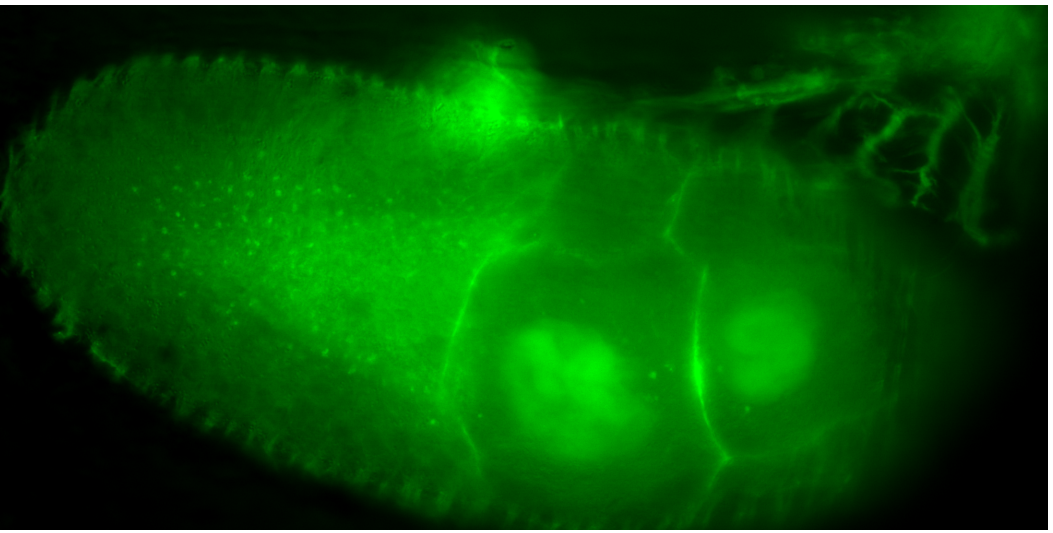
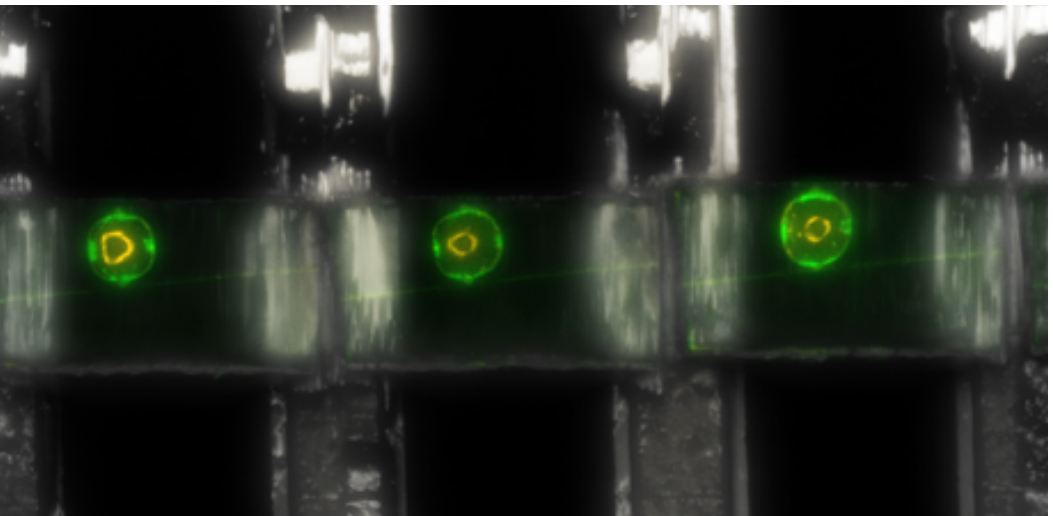








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METEOR 2.0

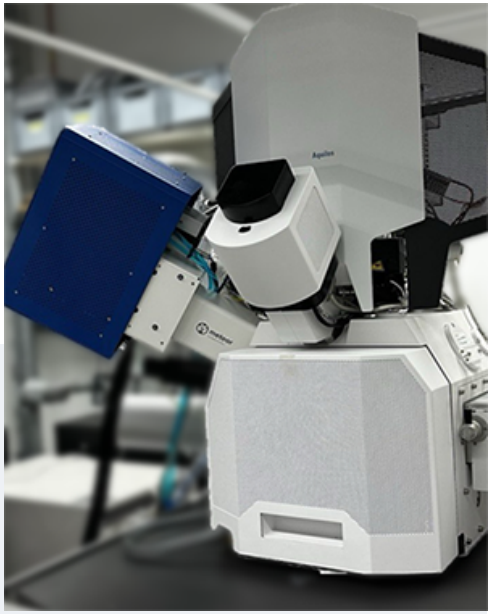
Integrated cryo-fluorescence for accurate, efficient and contamination-free lamella preparation

Introduction



METEOR 2.0 is a next-generation cryo-fluorescence microscope designed for seamless integration into cryo-focused ion beam (FIB) and scanning electron microscope (SEM) systems. Fluorescence imaging directly within the high vacuum chamber eliminates unnecessary transfer steps, reducing the risks of ice contamination, devitrification, and sample damage.

METEOR 2.0 empowers users with a streamlined and reliable workflow to meet the evolving demands of cryo-ET research, ensuring accurate, contamination-free, and efficient lamella preparation.



Key Advantages



Integrated design minimizes ice contamination

Identify and verify the presence of the region of interest (ROI) in the safety of the high-vacuum chamber, lowering the chance of ice contamination.



Reliable detection of ROI in final lamella

The sensitive system allows detecting even the faintest fluorescence signals in the final lamella.



Fast sample screening

A large field of view, rapid filter switching, and smart imaging algorithms enable quick identification of ROIs.



User-friendly and evolving automation software

ODEMIS software offers user-friendly imaging control and supports automated workflows for enhanced efficiency.



High-resolution images for accurate ROI targeting

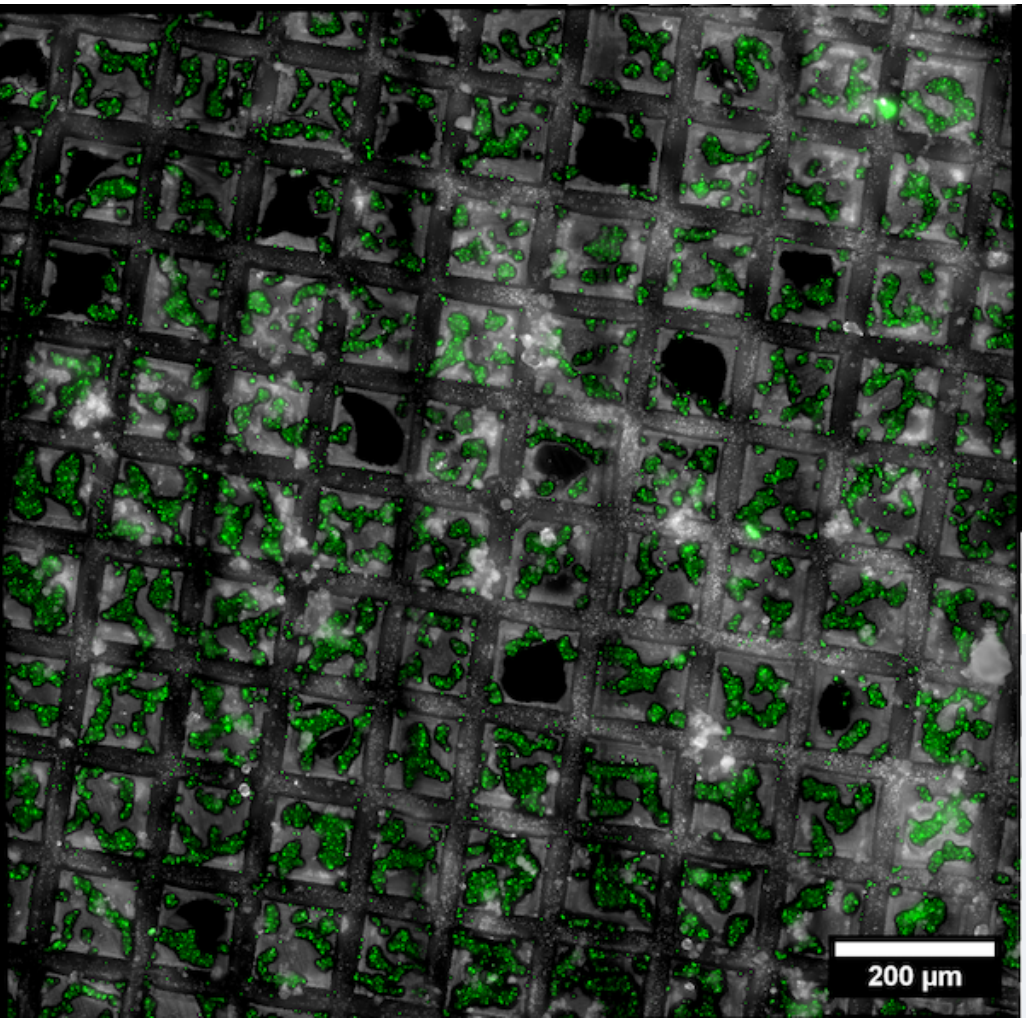
High-NA objectives, high-QE cameras, and optimized optics enhance signal collection, ensuring high-resolution fluorescence imaging for accurate ROI localization.



Customizable and future-proof

User-configurable optics ensure compatibility with evolving research needs. Backwards-compatible updates keep the system up to date.

Screen your grids for potential ROIs within minutes



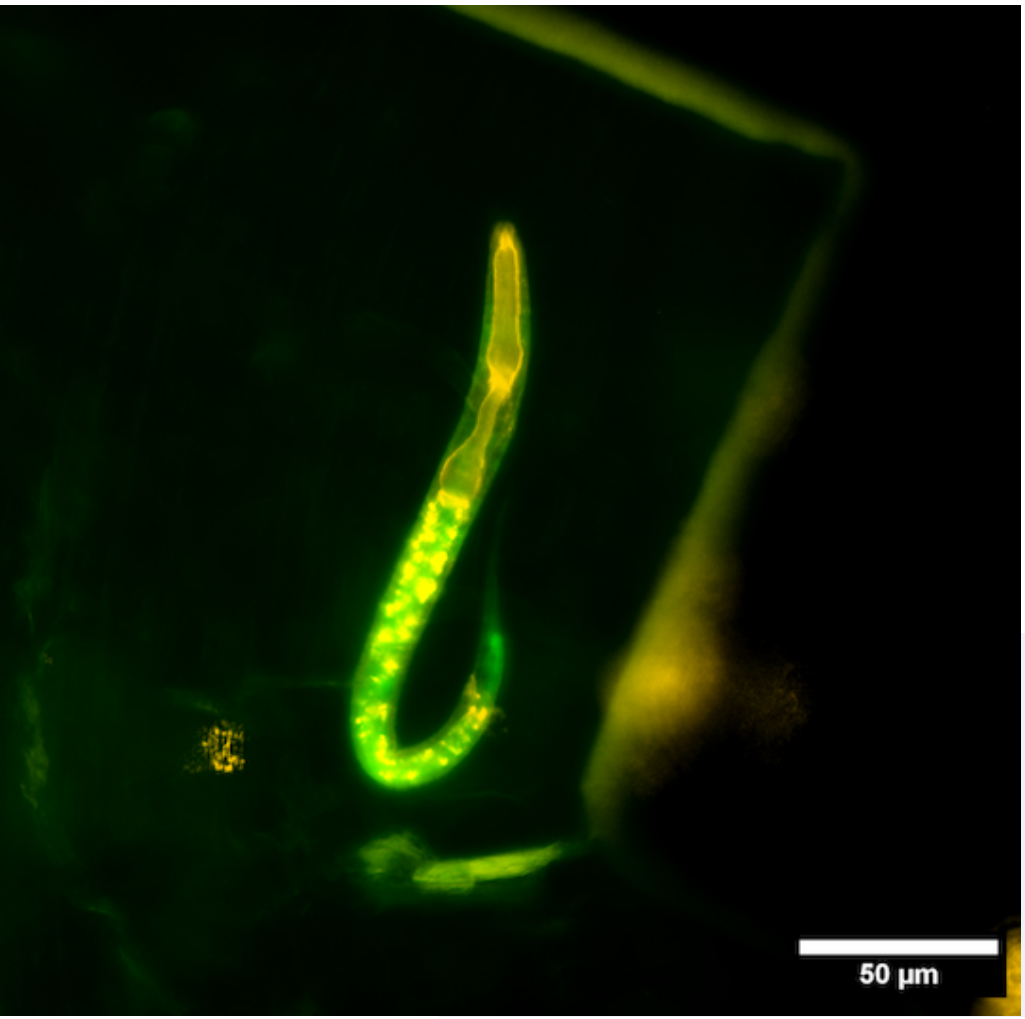
METEOR 2.0 combines a large field of view with tiling, stitching and autofocus algorithms to enable rapid screening of samples for potential milling sites.

The high-speed filter wheel allows fast multi-channel imaging, providing a comprehensive overview of all fluorescent signals in the sample in a single screening session.

Grid overview map (reflection + fluorescence) covering 1.2x1.2 mm² area around the grid center. Imaging time ~5 minutes based on 100 ms and 20 ms exposure times for fluorescence and reflection channels, respectively.

Sample courtesy of Prof. Takayuki Kato, Institute for protein research, Osaka university, Osaka, Japan

Acquire high-resolution images at each ROI with full context



METEOR 2.0 features high-magnification, high-NA objective lenses ensuring biological structures are captured with high-resolution and exceptional detail.

The system's large field of view allows visualization of complete organisms while maintaining resolution at subcellular level. The single bandpass filters minimize spectral bleed-through, ensuring accurate representation of labeled structures.

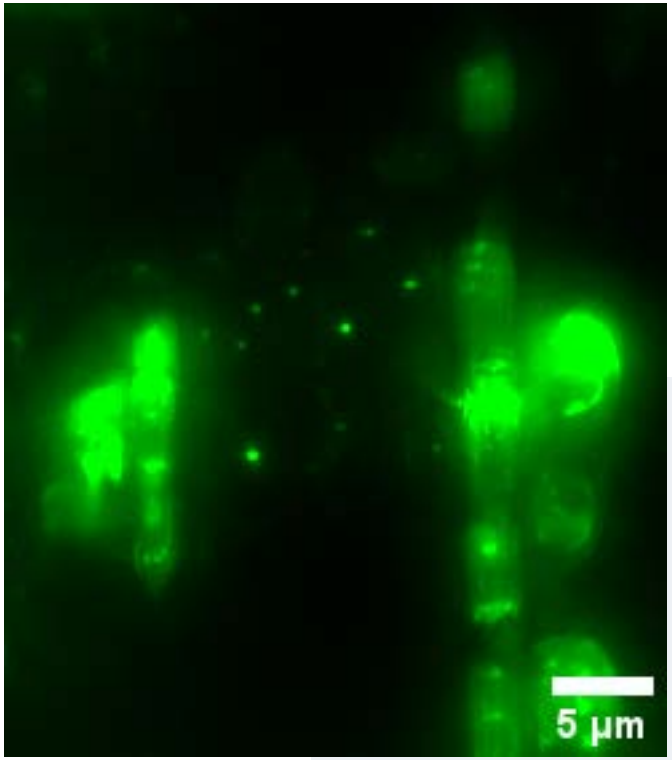
Maximum intensity projection (MIP) of z-stack showing exterior of the pharyngeal muscle (orange) in a whole waffle frozen C. elegans larva. Image HFW: 266 µm

Images courtesy of Oda Schiøtz and Christoph Kaiser, Max Planck Institute for Biochemistry, Martinsried, Germany

Detect any remaining fluorescence in your final lamella while keeping it safe

METEOR 2.0 combines the high-photon collection capability of high-NA objectives with an optimized optical path to ensure maximum number of photons reach the camera. Additionally, the high quantum efficiency of the camera makes the most of these photons in image formation.

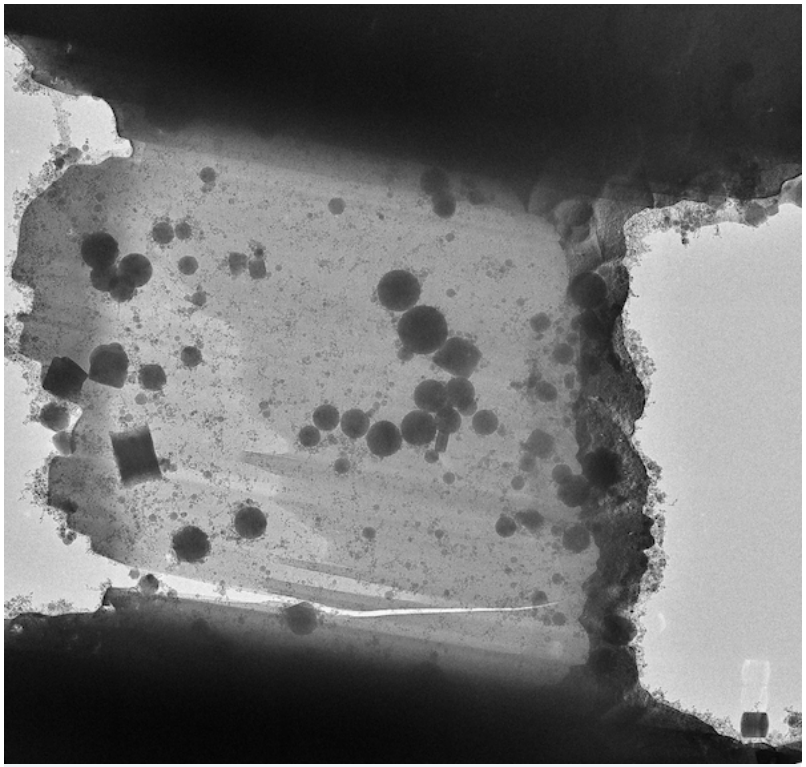
As a result, even the weakest remaining fluorescence signal in the final lamellae can be detected by minimum excitation power, safeguarding the lamella from damage or devitrification.



Remaining fluorescence from Abp140-GFP in a 200 nm thick lamella milled in yeast.

Sample courtesy of Prof. Takayuki Kato, Institute for protein research, Osaka university, Osaka, Japan

Minimize ice contamination on your final lamella

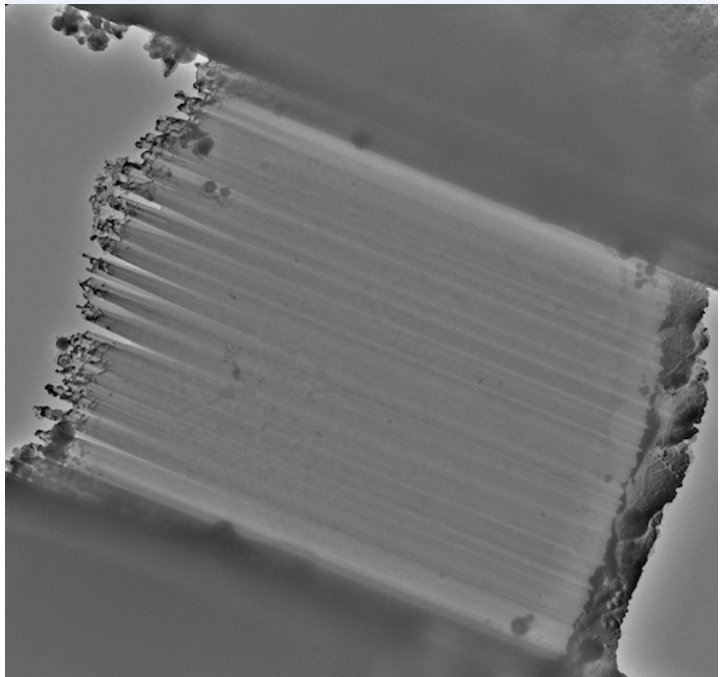


TEM overview image of a lamella where the presence of ROI was verified using a standalone cryo confocal FM.

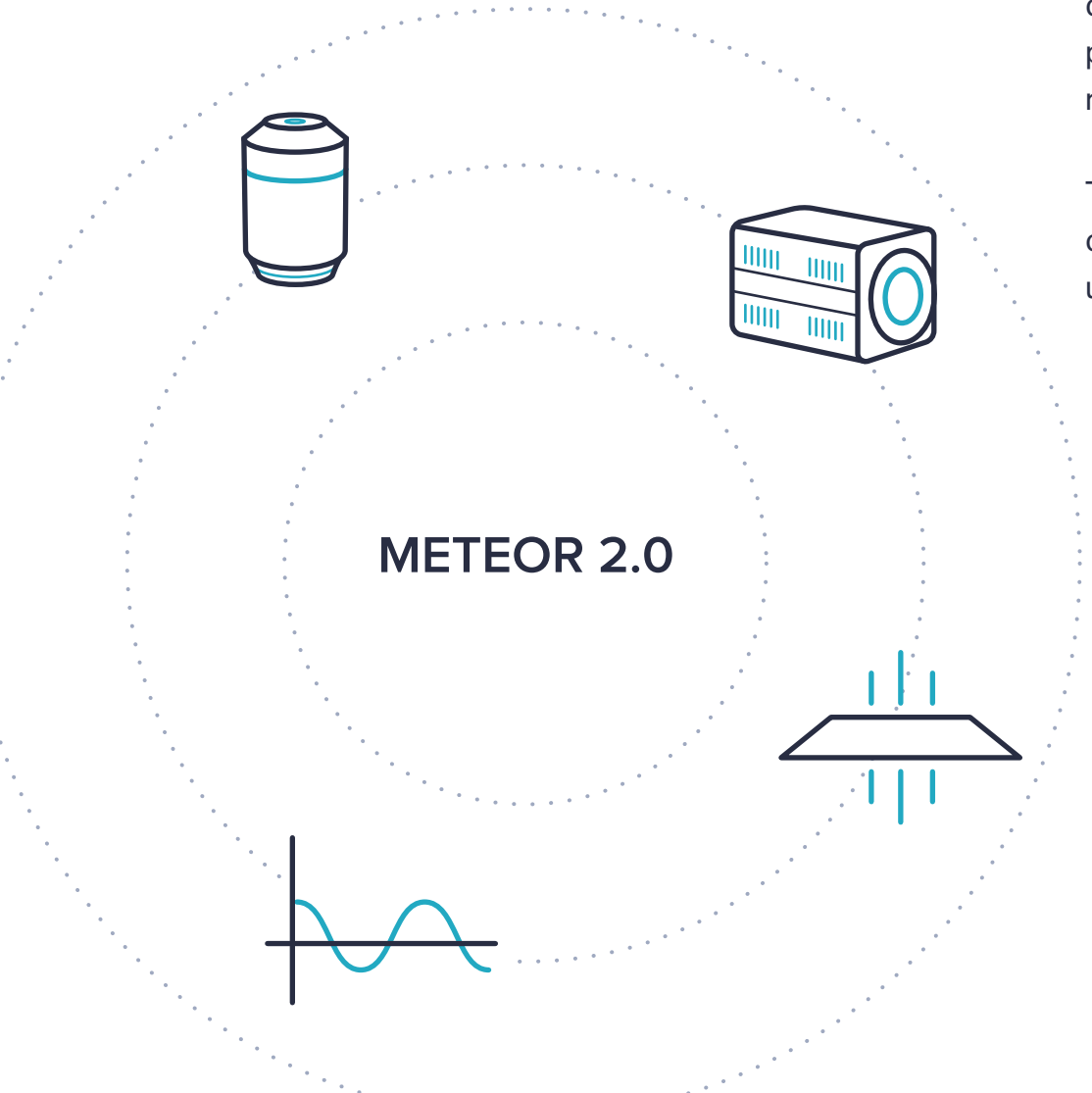
Image courtesy of Dr. S. Berkamp, FZ Juelich, Germany

METEOR 2.0 enables fluorescence verification of lamellae immediately after FIB milling in the high-vacuum cryo-FIB/SEM chamber. This prevents contamination from additional transfers, ensuring pristine sample conditions, increasing the cryo-ET throughput.

TEM overview image of a lamella where presence of ROI was verified using METEOR



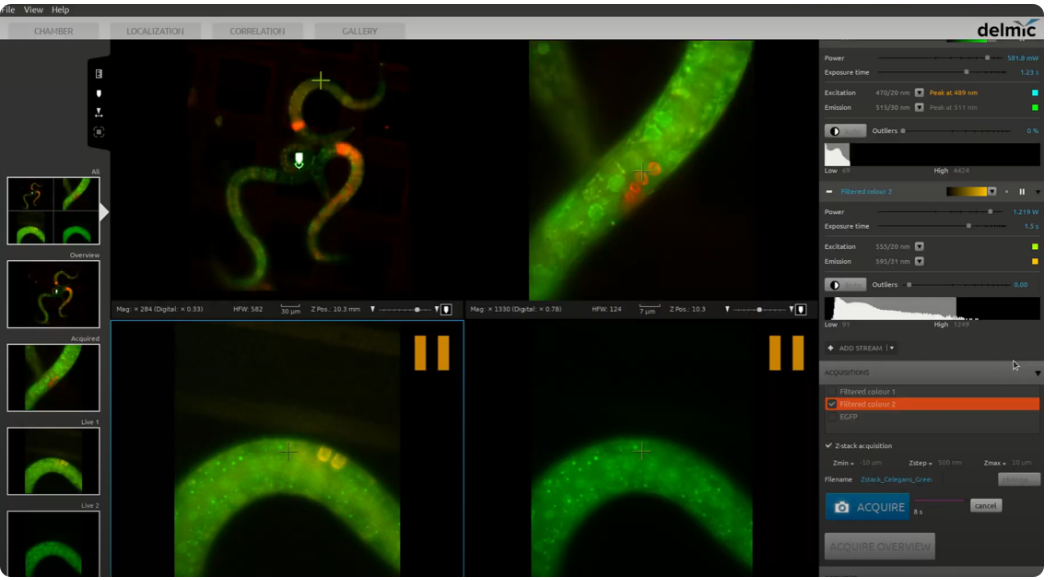
Customize METEOR 2.0 to your research needs



METEOR 2.0 is highly customizable in choice of objective lens, camera, illumination wavelengths and emission filter set, providing the opportunity to match the configuration to the research question at hand.

The configuration can easily be changed and upgraded based on changing research needs. Our backwards-compatible updates keep the system up to date.

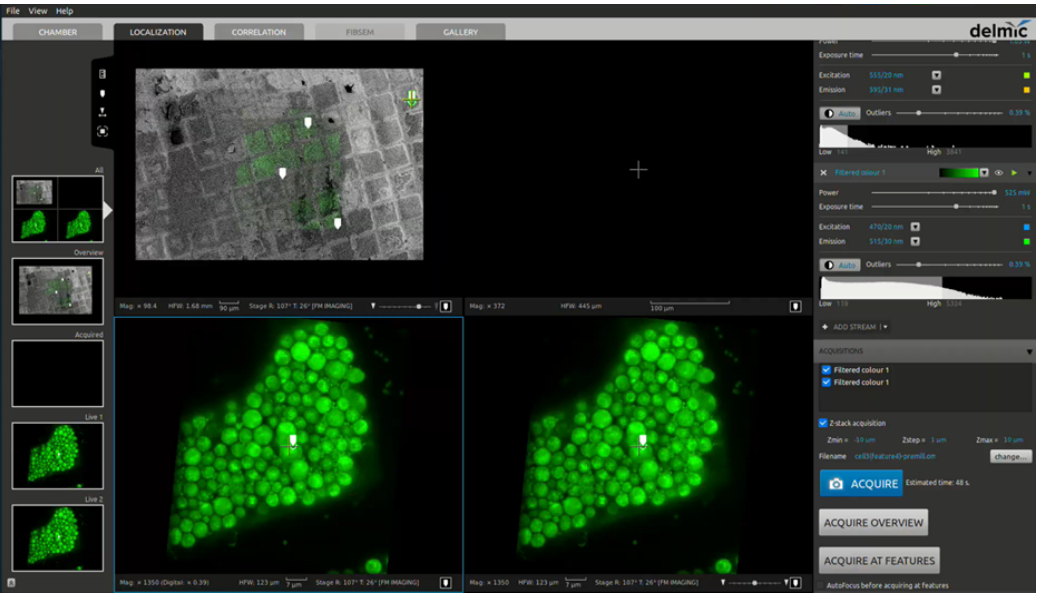
Perform all your fluorescence imaging steps with the ODEMIS software



METEOR 2.0 is powered by Delmic's ODEMIS software, an intuitive, user-friendly and open-source platform designed to streamline fluorescence imaging workflows.

- Switch between FIB, SEM, and FM imaging with one click.
- Adjust, save, and reuse imaging settings.
- Navigate FM mode via cryo stage.
- Capture & stitch large overview maps with autofocusing.
- Adjust autofocus for grid imperfections.
- Correlate SEM & FM maps for navigation.
- Save XYZ coordinates of ROIs with focus positions.
- Perform z-stack acquisition as a 3D TIFF file.
- Seamlessly integrates with third-party software (MAPS, AutoTEM, ImageJ, etc.).
- Visualize and inspect images with ODEMIS viewer:
  - Maximum intensity projection of z-stacks
  - Histogram adjustments
  - Metadata inspection
  - .png export of images with scale bars for presentations or publications
- Free license & updates.

ODEMIS Advanced: All-in-one software for accurate and automated correlative cryo-lamella milling



ODEMIS advanced is an open-source software encompassing all required functionalities for automated correlative cryo lamella preparation.

Combining multi-modal imaging capability with 2D and 3D correlation functionalities, Odemis Advanced serves as a one-stop platform eliminating the need for multiple software solutions in correlative cryo lamella preparation workflow.

ODEMIS Advanced expands upon the standard ODEMIS functionalities, providing:

- FIB and SEM imaging
- Streamlined determination of FIB/SEM coincidence point.
- 3D FIB and FM correlation for accurate ROI targeting
- Automated multi-site lamella milling for high throughput
- Automated FM checks at lamella sites for reduced user interaction

METEOR Publications

- de Jager, L. et al. StableMARK-decorated microtubules in cells have expanded lattices. J Cell Biol 224, **(2025)**
- Pöge, M. et al. Making plant tissue accessible for cryo-electron tomography. Preprint at BioRxiv **(2025)**
- Berkamp, S. et al. Structural organization of p62 filaments and the cellular ultrastructure of calcium-rich p62-enwrapped lipid droplet cargo. Preprint on BioRxiv **(2024)**
- Schiøtz, O. H. et al. Serial Lift-Out: sampling the molecular anatomy of whole organisms. Nat Methods 21, 1684–1692 **(2024)**
- Glynn, C. et al. Charting the molecular landscape of neuronal organisation within the hippocampus using cryo electron tomography. Preprint at BioRxiv **(2024)**
- Dumoux, M. et al. Cryo-plasma fib/sem volume imaging of biological specimens. Elife 12, **(2023)**
- Berkamp, S. et al. Correlative Light and Electron Cryo-Microscopy Workflow Combining Micropatterning, Ice Shield, and an In-Chamber Fluorescence Light Microscope. Bio Protoc 13, **(2023)**
- Bieber, A. et al. In situ structural analysis reveals membrane shape transitions during autophagosome formation. PNAS **(2022)**
- Smeets, M. et al. Integrated Cryo-Correlative Microscopy for Targeted Structural Investigation In Situ. Micros Today 29, 20–25 **(2021)**

System specifications

Compatible FIB/SEM systems

- TFS Aquilos (2)
- TFS Hydra (Bio)
- TFS Scios
- ZEISS Crossbeam 550(L)*
- JEOL JIB-4700F
- TESCAN Amber (2)
- TESCAN Amber X (2)
- TESCAN Solaris X (2)
- TESCAN Solaris (2)

Objective lens

Olympus plan fluorite objectives:

- 20x (WD 3.0 mm , NA 0.60)** FoV: 665 µm x 665 µm
- 50x (WD 10.6 mm , NA 0.50) FoV: 266 µm x 266 µm
- 50x (WD 1.0 mm , NA 0.80) FoV: 266 µm x 266 µm
- 100x (WD 1.0 mm , NA 0.90) FoV: 133 µm x 133 µm

Objective stage

- Piezo stage
- Minimum accurate incremental motion: 50 nm

Light source

Omicron LedHub fitted with 4 LED sources:

- 378/52 nm
- 474/26 nm
- 555/23 nm
- 635/18 nm

* Different configuration may apply
** For large scale screening purposes only

Emission filters

6-slot filter wheel with a stepper motor equipped with Brightline single bandpass filters. Filters can be optimized to user needs.
Example configuration:

- 432/36 nm
- 515/30 nm
- 555/30 nm
- 698/70 nm
- Pass through (for reflection mode imaging)
- Extra slot (for user-defined filter)

Camera

Choice between:

Andor Zyla 4.2

- sCMOS camera
- 6.5 µm pixel size
- 82% QE
- Sensor Temp.: -10˚C

Andor Sona 4.2B-6

- sCMOS camera
- 6.5 µm pixel size
- 95% QE
- Sensor Temp.: -45˚C

Imaging mode

Fluorescence imaging and reflection imaging

Software

- Odemis base software
- Odemis Advanced licensed software

Interested?

For more information on this topic visit **www.delmic.com**

About

Delmic is a passionate high-tech company based in Delft, the Netherlands that develops powerful and user-friendly solutions for light and electron microscopy. Our systems are used by researchers and companies all over the world in fields ranging from life sciences, geology, material sciences to nanophotonics.

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DELMIC B.V.
Kanaalweg 4
2628 EB Delft
The Netherlands
www.delmic.com
info@delmic.com
+31 1574 401 58