

CMS196V³

Cryo-Correlative Microscopy System for Vitrified Sample Characterisation



Automatic LN₂ Top-up

Controlled top-up keeps samples vitrified at liquid nitrogen temperature

Self-contained Cryo Chamber

Ensures contamination-free sample handling

Encoded Motorised XY

High precision, automated mapping of the whole grid at high resolution



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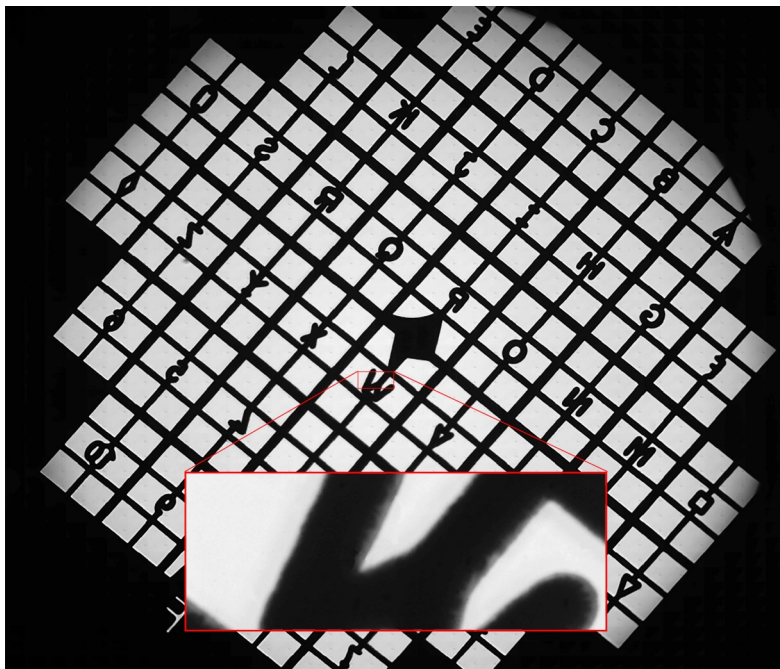
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Introducing the CMS196V³

The CMS196V³ is a cryo-correlative microscopy system enabling the full workflow of Correlative Light and Electron Microscopy (CLEM). While electron microscopy (EM) provides structural information at very high resolution, it can give only restricted insight into biological and chemical processes due to limitations in staining and sample preparation processes. Fluorescence microscopy on the other hand is a very sensitive method to detect biological, chemical and genetic processes and events inside living cells.

Cryo-CLEM brings together the specific advantages from both low temperature fluorescence and cryo-EM by imaging the same sample location with both techniques, and superimposing the complementing information.

The CMS196V³ maintains the vitrified state of the sample by liquid nitrogen cooling and provides proven capabilities to safely handle and transfer your cryo samples. These can then be imaged with optical microscopy whilst keeping them free of contamination at all times. The integrated, encoded and motorised XY stage enables co-ordinate mapping required to locate the same sample position in the fluorescence microscope as well as in the electron microscope.



Features

SELF-CONTAINED AUTOMATED LN₂ TOP-UP

The chamber liquid nitrogen top-up keeps samples vitrified constantly at liquid nitrogen temperature, reducing photo bleaching and maintaining structural detail of samples.

INTEGRATED ENCODED MOTORISED XY STAGE

The encoded, motorised stage provides a highly stable platform allowing high precision automated mapping of the complete EM grid with 1µm resolution.

SAMPLE CASSETTE HOLDER

The holder ensures contamination free sample loading, storage and transfer. The cassette can hold up to 3 grids, saving sample transfer time. Cassettes are available for different grid types including FEI, Planchette, Bessey, Polara, CryoCapcell as well as for custom designs.

INTEGRATED LED CONDENSER

The integrated LED condenser allows brightfield transmitted light, which is ideal for initial viewing of the grid and location of the sample.

AUTOFILL

Optional liquid nitrogen autofill can extend the use of the system unattended for up to 6 hours.

MICROSCOPE COMPATIBILITY

The CMS196V³ is compatible with a wide range of research grade upright microscopes and high NA objectives.

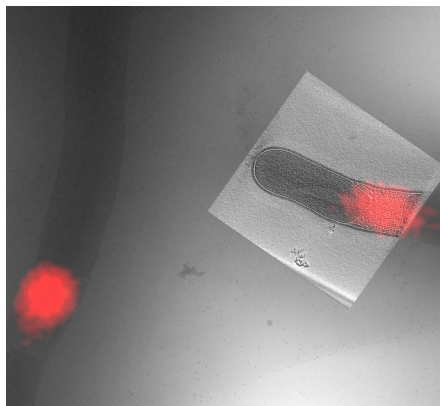
CUSTOM OPTIONS

Please contact us with details of your requirements.

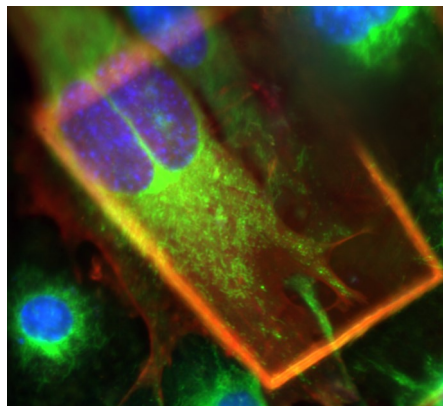


Application Examples

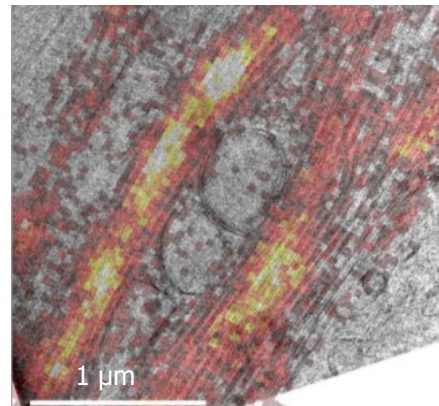
The CMS196V³ is the perfect solution for the correlation of high resolution structural information with biochemical processes within cells. It is used in renowned laboratories worldwide and is featured in numerous articles in leading scientific journals.



Correlative cryo-fluorescent light microscopy and cryo-electron tomography of WGA stained *Streptomyces* bacteria targeting cross-membrane lipid structures [Ref 2].



Cryo-widefield fluorescence of mouse embryonic fibroblast cells on quantifoil gold finder grids [Linkam CLEM workshop at the Crick Institute, London 2015].



Overlay of super-res cryoCLEM and diffraction-limited cryoFLM images of U2OS cells, transfected with rsEGFP2-MAP2, over an 18.6 nm thick slice through the sample [Ref 3].

Testimonial

Dr Roman Koning, Netherlands Centre for Electron Nanoscopy (NeCEN), and Leiden University Medical Centre (LUMC)

*"The Linkam cryo-stage was crucial for investigating the ultrastructure of *Streptomyces* bacteria. The CMS196 was indispensable to efficiently localize with fluorescent microscopy the cross-membranes for structural investigation of their intricate structures with cryo electron tomography. Without it this study would not have been possible".*

References

- Tuijtel M.W., Koster A.J., Jakobs S. *et al.*
"Correlative cryo super-resolution light and electron microscopy on mammalian cells using fluorescent proteins." (2019) *Nat Sci Rep* 9, 1369 DOI: 10.1038/s41598-018-37728-8
- Celler K., Koning R.I., Koster A.J., van Wezel G.P. *et al.*
"Cross-membranes orchestrate compartmentalization and morphogenesis in *Streptomyces*." (2016) *Nat Commun.* 13,7. DOI: 10.1038/ncomms11836
- Yagüe P., Koning R.I., Koster A.J. *et al.*
"Sub-compartmentalization by cross-membranes during early growth of *Streptomyces* hyphae" (2016) *Nat Commun.* 12,7:12467. DOI: 10.1038/ncomms12467

Technical Specification

Temperature Range

Hold at liquid nitrogen temperature

EM Grids Supported

Standard EM grids including FEI, Planchette, Bessy, CryoCapCell and Polara, as well as options for custom designs

Motorised XY Resolution

1µm encoded

Integrated LED Condenser

For transmitted light brightfield

Integrated LN Dewar Hold Time

30 minutes

Optional LN Autofill (3L) Hold Time

Up to 6 hours

Microscope Compatibility

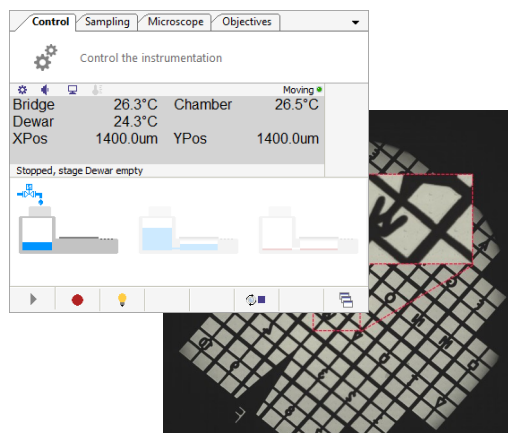
Compatible with a wide range of research grade upright microscopes



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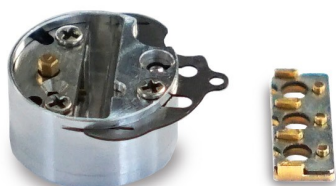


Software

Linkam's LINK software for the CMS196V³ provides complete control and monitoring of the system.

When combined with our optional high sensitivity camera and imaging module, LINK enables fully automated and tiled image capture. The system produces a single, tiled image of the full EM grid at high resolution. This can then be used to navigate the sample as well as to save co-ordinates of areas of interest. Linkam provides a simple and easy-to-use co-ordinate translation tool for correlating Light and EM images.

A full SDK is available for users to develop and integrate control of the CMS196V³ into their own applications.



Cassette and Cassette Transport

The CMS196V³ is a flexible platform with cassettes available for the most popular types of EM grids including: standard EM, FEI, Planchette, Bessy, Polara, CryoCapcell and more. Linkam can also develop custom cassettes for other EM grid types to meet your needs.



3L Autofill Dewar

Add the optional liquid nitrogen 3L autofill Dewar to extend the use of the system unattended for up to 6 hours. The Dewar and siphon are controlled by LINK software to ensure the chamber temperature is precisely maintained.

Contact Details

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We make scientific instruments that help characterise materials from polymers to biological tissue and metals to composites. Our instruments are used for research by the world's most advanced scientific organisations and companies. Each of our instruments are designed and manufactured in-house by our team of highly experienced electronics, software and mechanical design engineers. We design and develop solutions for sample characterisation by collaborating with the best scientists in the world. Will you be next?

Linkam products are constantly being improved, hence specifications are subject to change without notice.
TASC products are a family of techniques developed by Prof. Mike Reading (Cyversa) and Linkam.



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