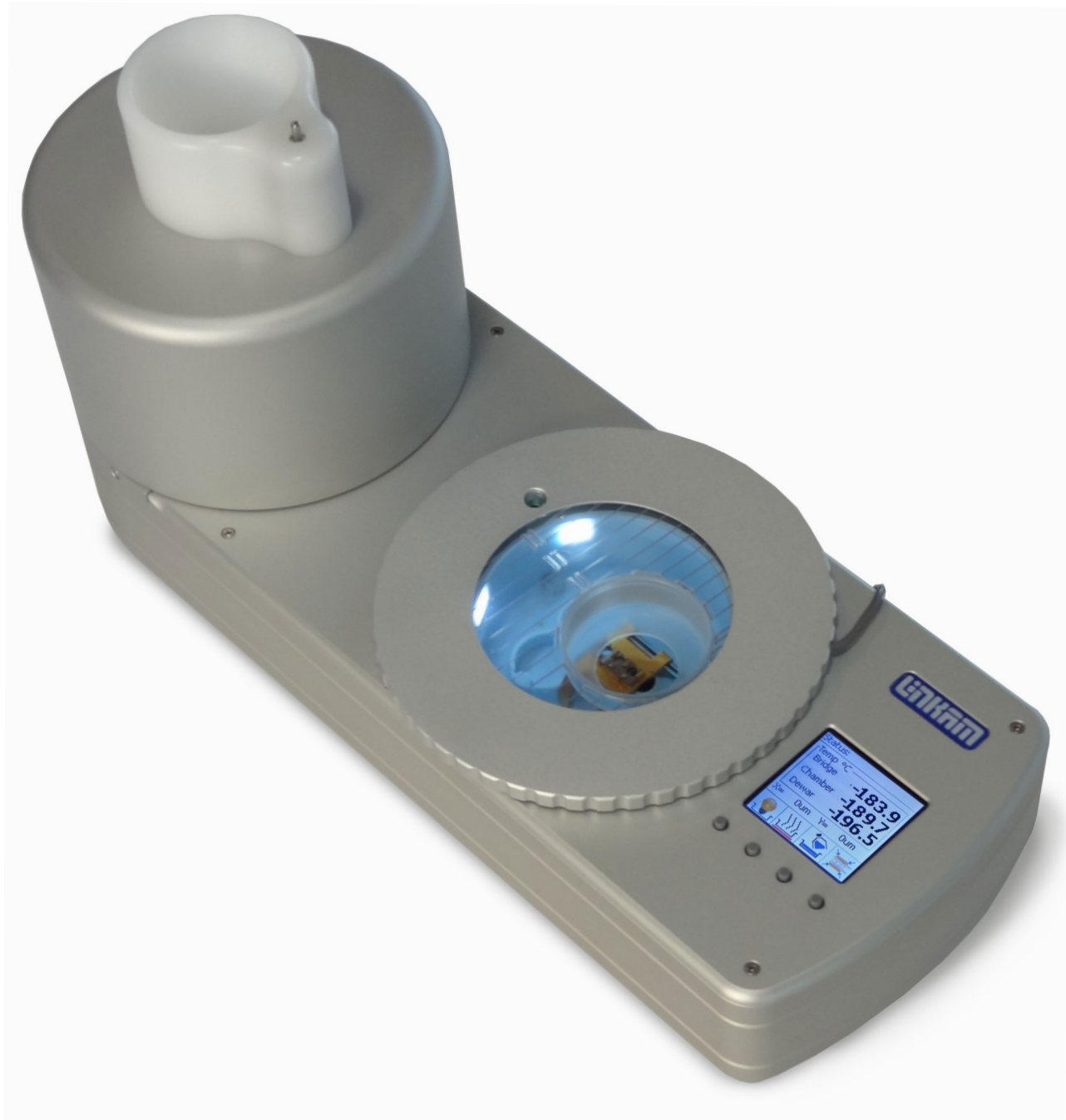


# CMS196

Vitrified Sample Characterisation



## Automatic Liquid Nitrogen Top Up

Keeping samples vitrified at  $-196^{\circ}\text{C}$

## Self-Contained Cryo-Chamber

Ensuring contamination free sample handling

## Encoded Motorised XY

Allowing high precision movement and resolution to  $1\mu\text{m}$

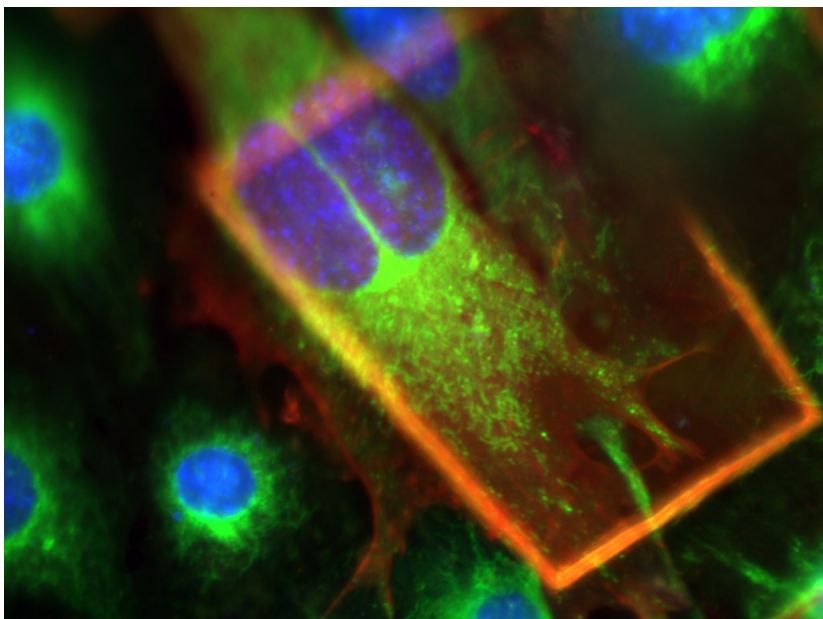
# Introducing the CMS196M

The CMS196M is a Cryo-Correlative Microscopy system enabling the full workflow of 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 stage brings it all together: it is a new and emerging technique to combine the individual advantages from both Fluorescence and EM by imaging the same sample location with both techniques and superimposing the complementing information.

The CMS196M maintains the sample vitrified by means of liquid nitrogen cooling and provides proven capabilities to safely handle and transfer your cryo samples and image them with optical microscopy while keeping them free of contamination at all times. The integrated, encoded, motorised XY stage enables coordinate mapping required to locate the same sample in the fluorescence microscope as well as in the EM.

## Features



### SELF-CONTAINED AUTOMATIC LIQUID NITROGEN TOP UP

The chamber top-up keeps samples vitrified constantly at  $-196^{\circ}\text{C}$ , reducing photobleaching and maintaining structural detail of samples.

### INTEGRATED ENCODED MOTORISED XY STAGE

The motorised stage allows high precision movement and position readout to better than  $1\mu\text{m}$ .

### SAMPLE CASSETTE HOLDER

The holder ensures contamination free sample loading, storage and transfer. A number of different grids are supported with custom cassette holder options available.

### INTEGRATED CONDENSER OPTICS

The condenser optics allow brightfield transmitted light and phase contrast techniques.

### LINK SOFTWARE

The LINK software gives full system control and monitoring. Add the Linkam Imaging system option to allow automated mapping of samples.

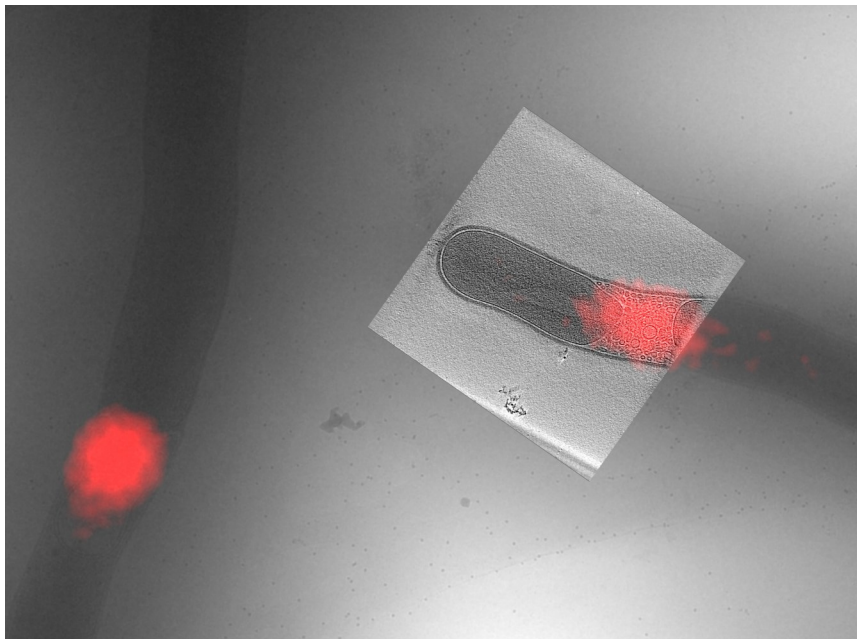
### AUTOFILL

Optional Liquid Nitrogen autofill system can extend the use of the system to over 6 hours, unattended.



## Application Examples

The CMS196M is the perfect solution for the correlation of high resolution structural information with biochemical processes within cells.



*Correlative cryo-fluorescent light microscopy and cryo-electron tomography of WGA stained Streptomyces bacteria targeting cross-membrane lipid structures (image Courtesy of Roman Koning, Leiden University Medical Centre).*

## References

Celler K, Koning RI, Willemse J, Koster AJ, van Wezel GP. Cross-membranes orchestrate compartmentalization and morphogenesis in Streptomyces. Nat Commun. 2016 Jun 13;7:ncomms11836. doi: 10.1038/ncomms11836.

Yagüe P, Willemse J, Koning RI, Rioseras B, López-García MT, Gonzalez-Quiñonez N, Lopez-Iglesias C, Shliha PV, Rogowska-Wrzesinska A, Koster AJ, Jensen ON, van Wezel GP, Manteca Á. Sub-compartmentalization by cross-membranes during early growth of Streptomyces hyphae. Nat Commun. 2016 Aug 12;7:12467. doi: 10.1038/ncomms12467.

## Testimonial

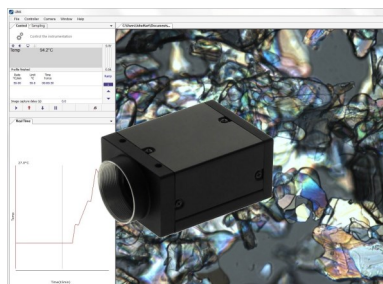
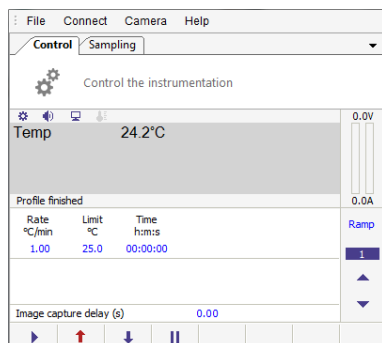
**Dr Roman Koning, Netherlands Centre for Electron Nanoscopy & LUMC**

*"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".*

## Technical Specification

<b>Temperature Range</b>	Hold temperature at $-196^{\circ}\text{C}$
<b>EM Grids Supported</b>	Standard EM grids and many others including Bessy, Planchette, FEI and Polara
<b>Motorised XY Resolution</b>	1 $\mu\text{m}$
<b>Integrated Condenser Optics</b>	For transmitted light brightfield and phase contrast techniques
<b>Liquid Nitrogen Hold Time</b>	30 minutes
<b>3L Dewar (Optional) Hold Time</b>	6 hours
<b>Microscope Compatibility</b>	Compatible with a wide range of research grade upright microscopes

## Discover More...



### LINK Control Software

Take control of your experiment with the new LINK software. In addition to temperature, LINK can control or monitor many of the other stage parameters such as vacuum, humidity, tensile force and shear force (dependent of stage type and sensors). LINK can be programmed with up to 100 ramps and provides real time graphical feedback. LINK supports a number of modules to further enhance your system, including LINK Imaging Module for synchronised image capture, LINK Extended Measurements module for recording the measurement of key features in your images, LINK 21CFR11 Module for data regulatory compliance and LINK TASC providing image analysis based thermal analysis.

### Imaging Options

Imaging can be added to all Linkam stages. We source high quality cameras for competitive prices. With the imaging module options, you can see how your samples change in correlation to a controlled manipulation while also annotating images with notes, angles, area and distances.

### Cassette Options

The CMS196M is a flexible platform with grid cassettes available for the most popular types: standard EM, Bessy, Planchette, FEI, Polara and more. Linkam can also develop custom cassettes to meet your needs.

### 3L Autofill Dewar

Add the optional liquid nitrogen 3l autofill dewar to extend the use of the system to over 6 hours, unattended.

## Contact Details

Linkam Scientific Instruments  
Unit 8  
Tadworth  
United Kingdom  
+44 (0)1737 363 746

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?