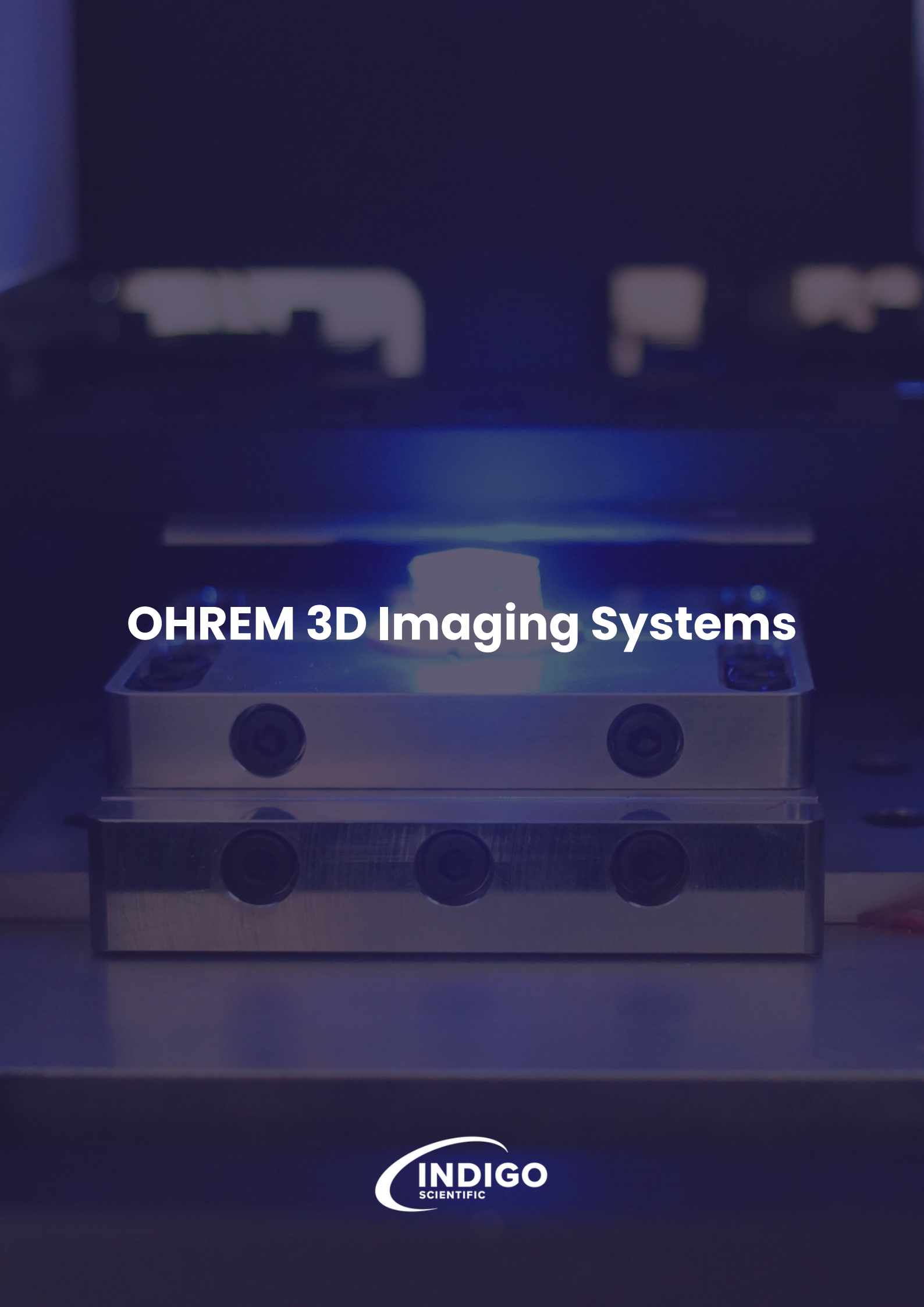
# Optical High Resolution Episcopic Microscope (OHREM)

Visualise Detail in Larger, Denser, Samples in 3D with OHREM Instruments

INDIGO SCIENTIFIC



# OHREM 3D Imaging Systems

INDIGO SCIENTIFIC

# High-Resolution Episcopic Microscopy (HREM)

Advanced 3D Imaging for Biological and Medical Research

## About Indigo Scientific

Indigo Scientific is a UK-based imaging systems company with over 20 years' experience in optical solutions. We specialise in HREM imaging instruments, delivering advanced 3D analysis technology worldwide.

Optical HREM MICRO System

## Introduction to HREM

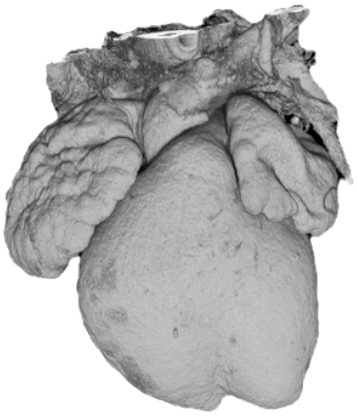
HREM generates full 2D datasets of perfectly aligned images that create highly detailed 3D morphological data with voxel sizes below 1 micron. Whole samples can be imaged—from individual organs to structures up to 25 mm, in a single dataset.

## How HREM Works

The HREM technique works by capturing the block's surface and combining the images into equally spaced sections that form a volume. These volumes can then be measured and analysed down to 1-micron voxel sizes.

## Advantages to HREM

- No clearing required and no image interpolation or distortion
- Capture dense tissue and bone with high contrast and clarity
- Produce aligned 3D datasets with 1–8 micron voxel sizes
- Easily manipulate image datasets



# HREM Applications

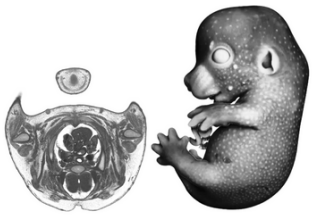
## Proven in Applications from Mice to Plant Structures

HREM is widely used in publications worldwide to study a broad range of specimens. From mice to plants, it has many applications, and its high contrast on dense, complex samples often makes it the preferred choice over conventional techniques.

Sample sizes can range from under 1 mm to as large as 25 mm, with even larger experimental samples possible using imaging capabilities of up to 60 mm.

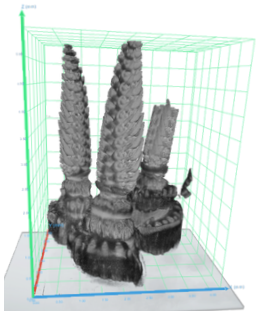
### Embryonic Mice

HREM has been used to study whole embryonic mice in many publications, highlighting subtle morphological changes that are often unseen with other techniques.



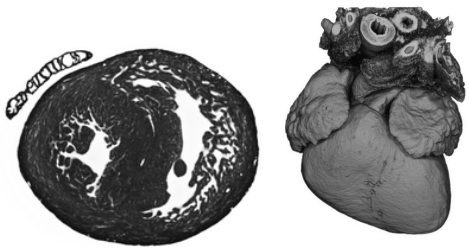
### Plant Matter

Study whole plant morphology in samples such as barley, citrus fruit, and seeds.



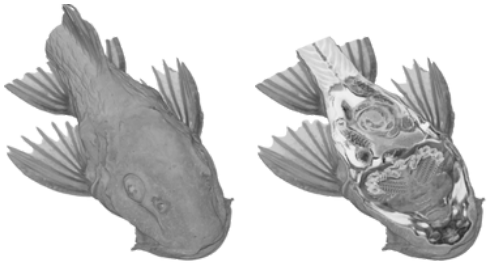
### Mouse Organs

Image mouse hearts at various stages of development — a popular sample type for HREM.



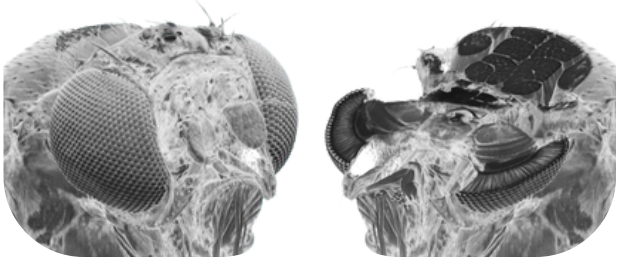
### Fish

Whole zebrafish, catfish, and other common study specimens — imaged as whole organisms or as extracted organs.



### Insects

Image dense insect structures with ease, including the Drosophila fly.



### Much More

Examples include crocodile skin, chicken embryos, mouse brains, tumours, human skin, and more.

For video examples and additional samples, visit: https://www.indigo-scientific.co.uk/3d-optical-hrem-imaging/hrem-examples

# Optical HREM Products

## Products Custom Built and Tailored to Application

Indigo Scientific manufactures complete HREM systems — from consumables to full imaging instruments. Each system is designed and assembled in the UK specifically for imaging HREM samples.

We offer two systems for HREM imaging: the Micro and the Ultra. Both deliver high-quality images, but they differ in capability and flexibility. The Ultra system supports advanced series imaging with multiple fluorescence channels and an XY scanning stage for larger blocks or surface scans.

## OHREM Micro

The Micro offers 3D image generation in a compact, simple form factor with a small footprint. It is designed for throughput operations, providing single-shot imaging of whole samples.

Micro systems offer the same OHREM image quality while making the technology more accessible to all labs and settings. With a monochrome 20-megapixel output, the Micro delivers single-shot, high-resolution images ideal for 2D and 3D analysis of dense, complex structures.

The instrument features a highly accurate encoded Z-stage that supports sample heights up to 25 mm, enabling block imaging at 1-micron section spacing.

### Micro Summary

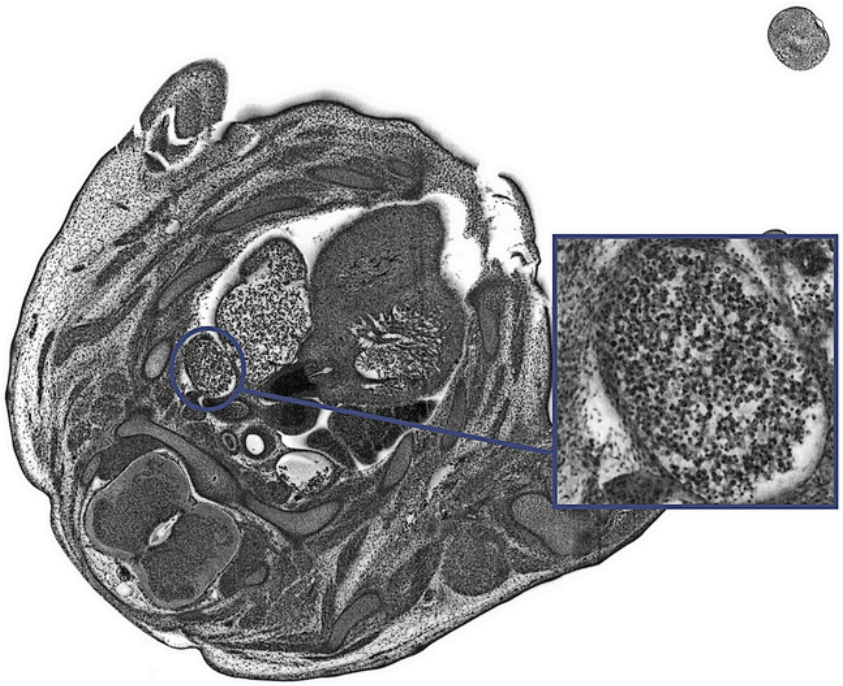
- Fast, high-resolution 20-megapixel imaging
- Compact and economical form factor for smaller labs
- Ideal for labs trialling HREM imaging workflows
- Simple front-facing design for easy setup
- Upgradeable to multiple fluorescence channels

# OHREM Ultra

Ultra systems offer flexible imaging modes, supporting both HREM and multiple fluorescence channels, with a wide range of additions and options for enhanced imaging.
The Ultra features a larger form factor that accommodates an automated XY scanning stage, enabling scans of samples up to 60 mm using various magnifications.

This also allows multiple blocks to be imaged in a single run.
With the Ultra system, experiments can be driven by the resolution required rather than the size of the sample. Throughput can be increased by imaging several samples in one run.

Ultra systems come standard with a 30 mm Z-range, which can be extended to 50 mm to support larger samples.



### Ultra Summary

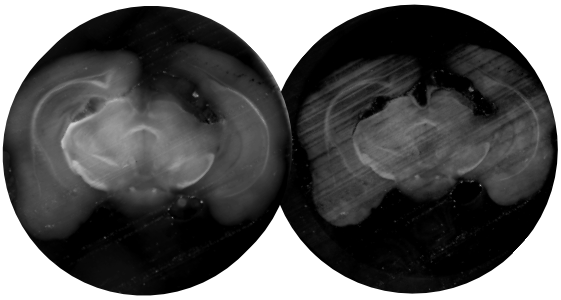
- Imaging for samples up to a 60 mm FOV with scanning
- Designed for multiple fluorescence applications as well as standard HREM
- Compatible with 60 mm, 80 mm, and 160 mm blades
- Simultaneously image up to 4 samples in one run

# Consumables, Options & Upgrades

Our HREM systems can be expanded with a range of imaging upgrades and workflow options that enhance capability and adapt the instrument to specialised applications. These additions allow users to increase contrast, add fluorescence imaging, improve optical performance, and integrate custom hardware for advanced experimental setups.

## Structured Illumination

Improve removal of out-of-focus information and reduce optical artefacts with the structured illumination add-on, providing clearer, higher-contrast images.

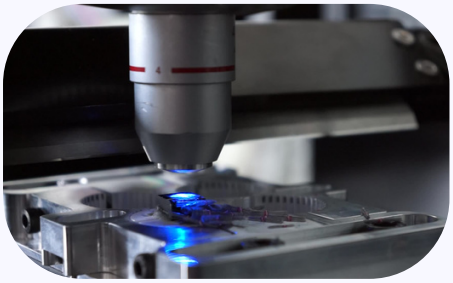


## Multi-channel

Add custom illumination channel configurations for dye-based experiments and labelling, enabling both block-face imaging and wide-field HREM workflows.

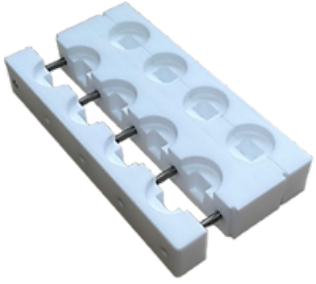
## Further Upgrades

We offer a range of additional options to tailor the system to your imaging needs, including upright optics and alternative camera sensors. For more advice, please contact us.



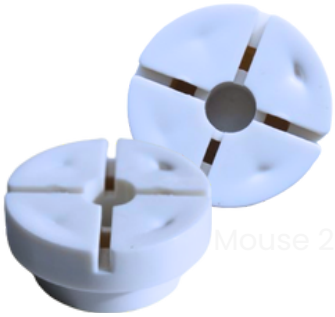
## Split Moulds

Split moulds provide several advantages over traditional moulds: they are heat-resistant for demanding thermal processes, fully customisable to any size, and—most importantly—the split design allows easy extraction of taller blocks.



## Sample Bases

Sample bases are designed for use with OHREM instruments and are made from bondable plastics that fit directly into the holder. Their grooved design improves surface adhesion, helping the block form a stronger, more stable structure during cutting.



Mouse 2D Section

# HREM Software

## Software for HREM Images

We provide a strong starting point for HREM images, enabling most of the functions and manipulations researchers require. Our image stacks are compatible with 3D software packages such as Imaris, Dragonfly, Fiji, and others.

### OHREM Acquire

Optical HREM Acquire is included with every system, providing full control of the Optical HREM platform. With dedicated tools designed to make HREM imaging easy, the software. Developed in-house, the bundle gives you as much control as possible while keeping operation simple.

- Control of both Micro and Ultra systems
- Integrated stitching for larger fields of view
- Directory management and saving tools
- And much more

### 3D Viewer

Easily transform 2D image stacks into 3D data with a lightweight, license-free viewer designed for effortless sharing and fast HREM processing.

- Generate 3D models at any resolution
- Built-in fast HREM inversion pipeline
- Live window and level adjustment
- Crop models on the fly to reveal fine detail.

### Translation Tools

Combine whole stacks or individual images using the translation tool's stitching wizard, offering flexible methods for assembling HREM or other biological images.

- Montage large images with manual or automated tools
- Apply montages across entire stacks
- Save magnification presets (1×, 2×, 5×, 10×)
- Align mismatched stacks using the overlay tool

### Stack Viewer

Easily view OHREM TIF/TIFF stacks with a responsive viewer that lets you scroll, zoom, and inspect images without the need for complex software.

### More Information

For more information on our custom software visit: https://www.indigo-scientific.co.uk/software

# Specifications

Specifications for HREM Systems

| | Optical HREM Micro | Optical HREM Ultra |
|---|---|---|
| **Overview** | Smaller form factor HREM imaging instrument with single shot capabilities | Flagship model with dual channel and XY scanning stage for flexible HREM imaging |
| **Optics** | Zoom optics (FOV: ~2mm - ~25mm) or fixed objective | Zoom optics (FOV: ~2mm - ~25mm) or fixed objective |
| **XY** | Fixed XY Stage with slight XY adjustments for sample centering. | XY Stage for scanning, multiple samples, positioning with range of 80mm |
| **Max Sample Size/FOV** | 25 x 25 x 25 | 60 x 60 x 30 (with scanning) |
| **Digital Output** | 20 Megapixel, 12-bit monochrome, tif/tiff/jpg/jpeg etc. | 20 Megapixel, 12-bit monochrome, tif/tiff/jpg/jpeg etc. Higher sensitivity/lower resolution available on request. |
| **Channels** | 1 Morphology channel | 2 Channels including morphology channel |
| **Options/ Extras** | • Dual/multi-fluorescence and focus adjustment,<br>• Different imaging capabilities<br>• Motorised XY (no scanning)<br>• Fixed zoom optics available | • 2 position sample holder<br>• 4 position sample holder<br>• Dual extraction for multi-samples<br>• Dual/multi-fluorescence and focus adjustment<br>• Different imaging capabilities<br>• Structured Illumination<br>• Increased Z height to 50mm<br>• Upright compound optics available<br>• Whole system desk controller |

# Get In Touch

## Contact Our Team

To learn more about HREM get in touch with us

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