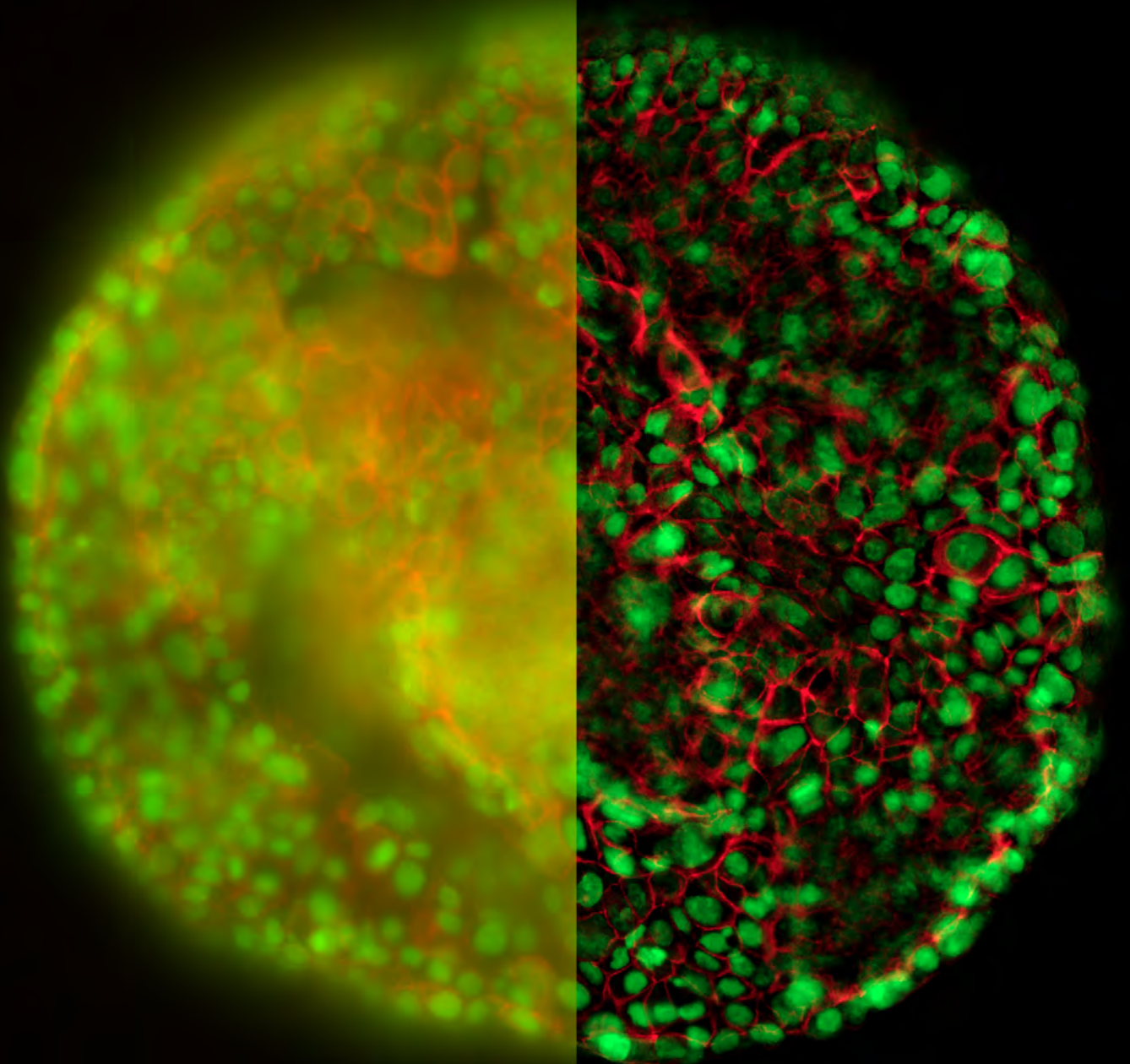


From Eye to Insight

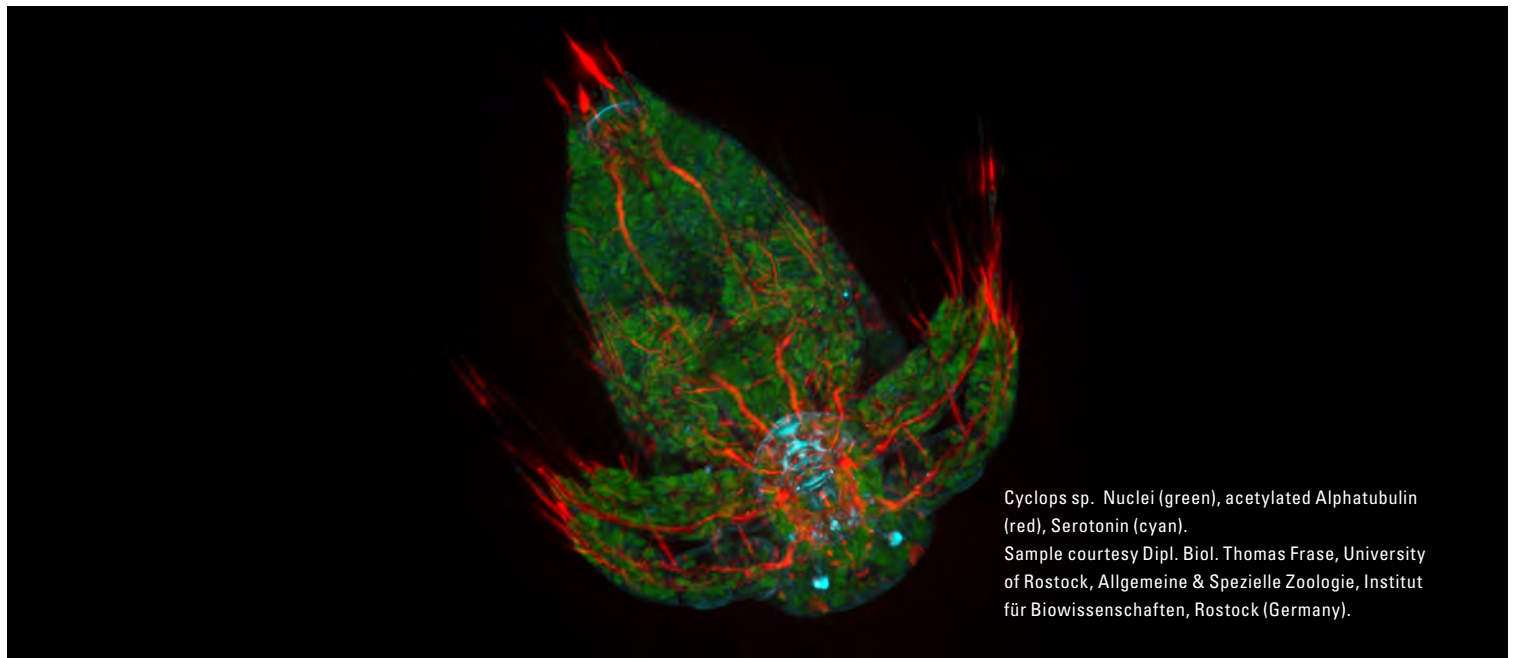


THUNDER Imaging Systems

Decode 3D Biology in Real Time*



* in accordance with ISO/IEC 2382:2015



TAKE ADVANTAGE OF A NEW CLASS OF IMAGING SYSTEMS

Once you see the results from a THUNDER Imager, you will want to retire any standard fluorescence, structured illumination, or spinning disc confocal microscope for many of your 3D biology workflows.

THUNDER Imagers with Computational Clearing define a new class of instruments for high-speed, high-quality imaging of thick 3-dimensional specimens.

See through the haze

THUNDER Imager removes the out-of-focus blur through the new opto-digital method called Computational Clearing.

Now with the new THUNDER Imager, you can have both high-quality 3D images of thick samples and, at the same time, benefit from the speed and sensitivity of a widefield system. Whether single cells, tissues, whole organisms, or 3D cell cultures, THUNDER Imager enables you to decode 3D biology in real time.

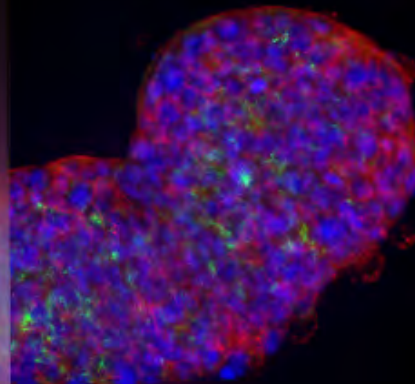
“THUNDER would specially be useful for time-lapse, because it allows very fast scanning of big samples in less than 2 minutes, and provide exceptionally crisp images.”

Dr. Almary Guerra, Max Planck Institute for Heart and Lung Research, Bad Nauheim (Germany)



MIN6 cells grown as pseudoislets (pancreatic beta cells). DAPI (blue), Insulin (Alexa488, green), membrane receptor (Alexa594, red), phalloidin (Alexa647, white).

Sample courtesy Dr. Rémy Bonnavion, MPI for Heart and Lung Research, Bad Nauheim (Germany).





THE THUNDER FAMILY

Advance your live cell imaging to 3D

Combine next generation 3D cell culture models with an imaging system that offers great sensitivity, speed, and image quality to advance your live cell imaging to a whole new level of physiological relevance.

Investigate tissue in a 3D context

Whether you are investigating neurite projections, the architecture of a brain, or a regenerative response, THUNDER Imager provides you a 3D tissue imaging solution that is both powerful and easy to use.

Work effortlessly with model organisms

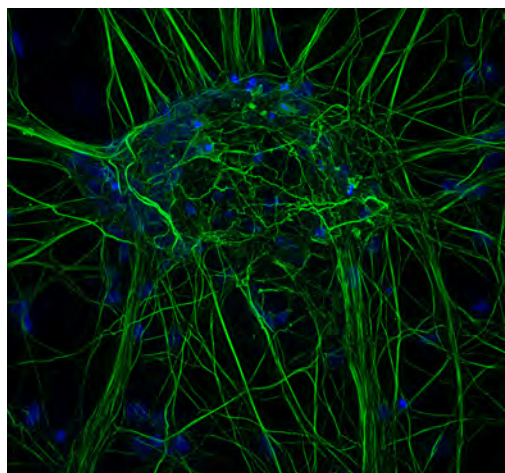
With THUNDER you can image relatively large model organisms, whether fixed or under physiological conditions (living), to gain insight and better understand their physiological and pathophysiological processes quickly.

High performance for 3D biology

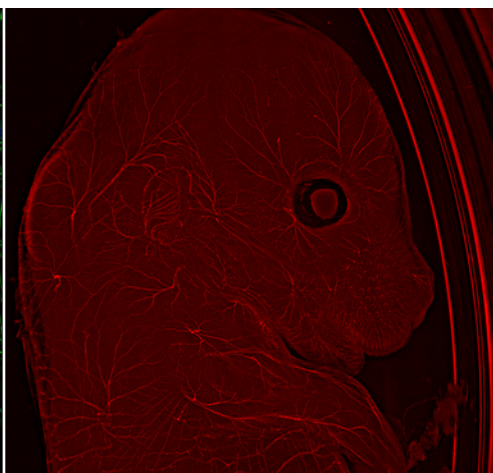
THUNDER imaging systems excel due to:

- > Delivery of benchmark performance and first-rate results for your application
- > Real-time removal of out-of-focus blur, thanks to Computational Clearing
- > Ease-of-use, speed, and sensitivity, just like with widefield imaging

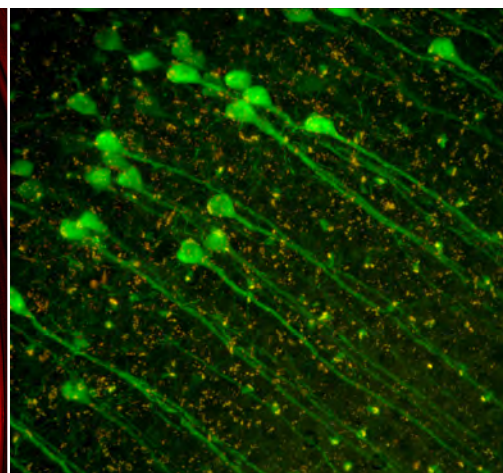
THUNDER Imager 3D Live Cell



THUNDER Imager Model Organism



THUNDER Imager 3D Tissue



THE THUNDER TECHNOLOGY

THUNDER is an opto-digital technology that uses the new Computational Clearing method to generate high resolution and high contrast images. It produces brilliant results for large image stacks, as well as single images taken deep in your sample.

THUNDER, a Leica technology, automatically takes all relevant optical parameters into account. It achieves haze-free results in real time.

Computational Clearing

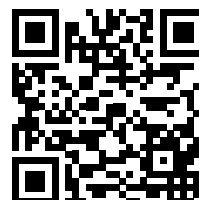
Computational Clearing efficiently differentiates between signal and background by taking the size of the targeted specimen features into account. This approach makes image details immediately visible which formerly were not accessible. Acquire one image and you have stunning results displayed instantly on the screen.

Depending on the type of application, the base method can be combined with deconvolution using the Leica decision mask technique. It is fully automated and works independently without manual user input. The technique delivers high quality images at very fast speed.

Benefit from:

- > Brilliant results in seconds
- > Instant display of haze-free images during acquisition – no need to wait until the experiment is finished
- > Achieve image quality with thick samples, formerly only possible with confocal systems
- > Remove out-of-focus blur effectively, even from single-plane acquisitions
- > No need to calibrate or adjust moving hardware components

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THUNDER Imager 3D Live Cell, 3D Cell Culture & 3D Assay

Decode 3D Biology in Real Time*

Cultured Cortical Neurons. Green: beta-III-tubulin; blue: Nuclei. Image stack of 59 planes of a volume of 21µm was acquired using a THUNDER Imager 3D Cell Culture. Sample courtesy FAN GmbH, Magdeburg(Germany).

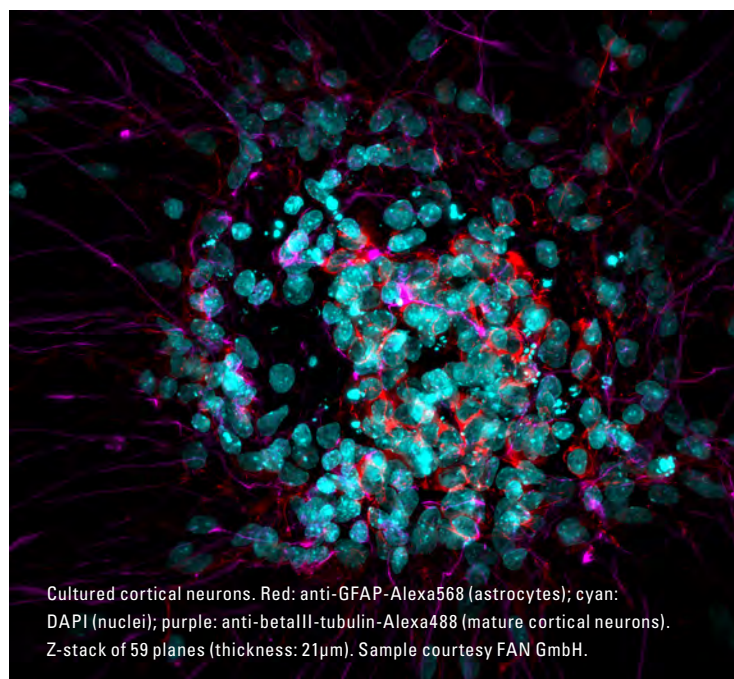
THUNDER Imagers offer you a solution for advanced 3D cell culture assays, whether you work with stem cells, spheroids, or organoids.

THUNDER Imagers remove the out-of-focus blur that comes with three-dimensional samples through Computational Clearing, an exclusive new breakthrough technology. You still benefit from the imaging speed, sensitivity, and ease-of-use common to widefield microscopes.

With a THUNDER Imager for 3D Live Cell & 3D Cell Culture, you have these advantages:

- > High throughput for better statistics and efficiency
- > High imaging performance from an easy-to-use instrument
- > Optimal physiological conditions for meaningful results

The THUNDER Imager 3D Live Cell, 3D Cell Culture & 3D Assay are part of the THUNDER family of imaging systems.



Cultured cortical neurons. Red: anti-GFAP-Alexa568 (astrocytes); cyan: DAPI (nuclei); purple: anti-betaIII-tubulin-Alexa488 (mature cortical neurons). Z-stack of 59 planes (thickness: 21µm). Sample courtesy FAN GmbH.



Advance your live cell imaging to a whole new level optimized for specimens of physiological relevance

THUNDER Imager is designed to meet the needs of tomorrow's 3D cell culture applications. Work effortlessly with modern sample carrier formats, such as 8-chamber slides or 96-well plates. Generate more data in less time to boost the statistical power of your assay. Get closer to observing the real physiology of your 3D specimens by minimizing light exposure and obtaining brilliant images, while enjoying great ease-of-use.

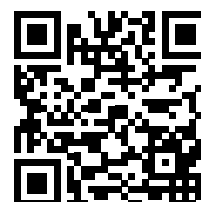
With a THUNDER Imager 3D Live Cell, 3D Cell Culture & 3D Assay you take full advantage of:

- > High-speed positioning with the Quantum stage and Synapse real-time control (Quantum Stage only available with 3DCC/3DLC)
- > High-speed illumination with a multi-line LED light source (Multiline LED light source optional for 3D Assay)
- > High-sensitivity thanks to sCMOS technology and Leica optics
- > Efficient removal of out-of-focus blur even from single plane acquisitions
- > Great ease-of-use, less training time
- > Compatible with multi-well carriers for automated water immersion (optional) to attain better sensitivity and resolution

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THUNDER Imager Tissue

Decode 3D Biology in Real Time*

YFP mouse brain slices stained with GFAP-A647. Imaged with a THUNDER Imager 3D Tissue.
Courtesy Dr. Hong Xu, University of Pennsylvania, Philadelphia (USA).

The THUNDER Imager Tissue is a new instrument for real time fluorescent imaging of 3D tissue sections typically used for neuroscience and histology research.

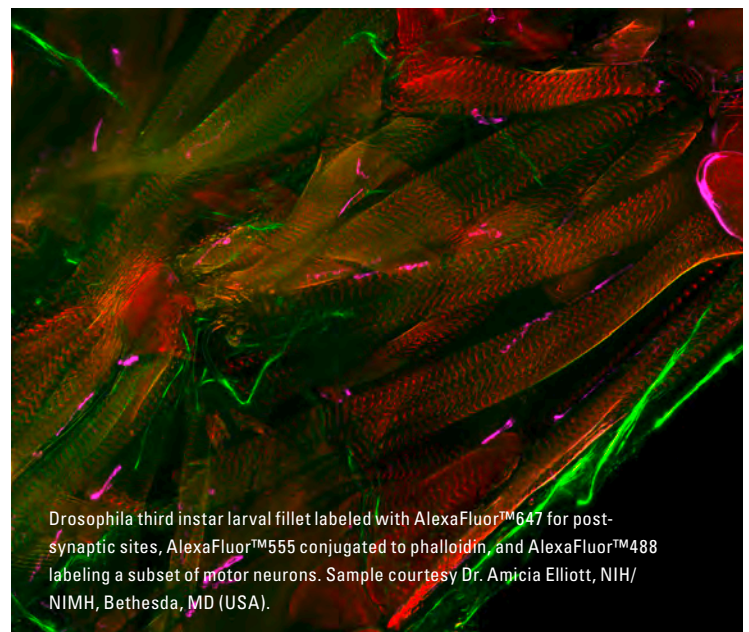
THUNDER Imagers remove the out-of-focus blur that comes with three-dimensional samples through Computational Clearing, an exclusive new breakthrough technology. You still benefit from the imaging speed, maximum fluorescence efficiency, and ease of use common to widefield microscopes.

With a THUNDER Imager Tissue, you have these advantages:

- > Rapid acquisition of blur-free images showing ultrafine morphology, even deep within thick sections
- > Fast overviews of whole tissue sections
- > Image and analyze challenging tissue sections with an easy workflow

The THUNDER Imager Tissue is part of the THUNDER family of imaging systems.

* in accordance with ISO/IEC 2382:2015



Drosophila third instar larval fillet labeled with AlexaFluor™647 for post-synaptic sites, AlexaFluor™555 conjugated to phalloidin, and AlexaFluor™488 labeling a subset of motor neurons. Sample courtesy Dr. Amicia Elliott, NIH/NIMH, Bethesda, MD (USA).



Image your whole specimen in a breathtakingly short time

Image the whole specimen in one shot with THUNDER Imager Tissue. You can acquire outstanding images of thick specimens showing the finest cellular structures. Achieve greater productivity with THUNDER Imager.

Easily collect clear, detailed images of larger tissue sections. Using a THUNDER Imager Tissue together with the LAS X Navigator software, you get a blur-free overview of your complete tissue sample. Such high-resolution overviews allow you to quickly navigate your specimen and choose regions of interest.

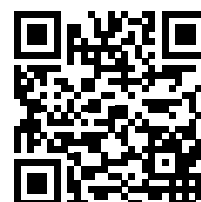
With THUNDER Imager Tissue, you take full advantage of:

- > Brilliant results in seconds
- > Instant display of haze-free images during acquisition - no need to wait until the experiment is finished
- > Achieve image quality with thick samples, formerly only possible with confocal systems
- > Make your life easier with intelligent automation
- > No need to calibrate or adjust moving hardware components

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THUNDER Imager Model Organism

Decode 3D Biology in Real Time*

In this mouse WT sample (E14 dpc), neurofilaments have been labeled in red to evaluate nerve growth. Sample courtesy of Dr. Yves Lutz, Imaging Center of the IGBMC (France).

The THUNDER Imager Model Organism is your solution for the 3D exploration of whole organisms used for developmental or molecular biology research.

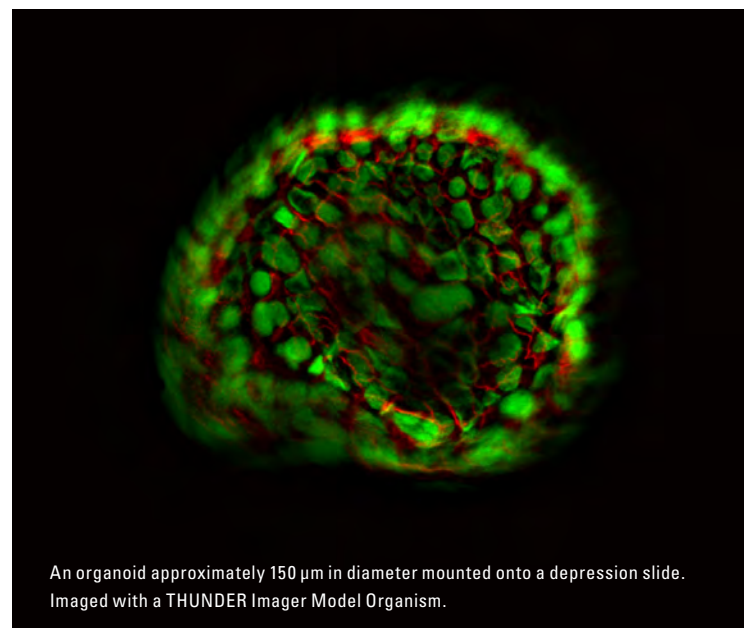
THUNDER Imager removes the out-of-focus blur that comes with three-dimensional samples through Computational Clearing, an exclusive new breakthrough technology. You still benefit from the imaging speed, maximum fluorescence efficiency, and ease-of-use common to widefield microscopes.

With THUNDER Imager Model Organism, you have these advantages:

- > Rapid acquisition of blur-free images showing fine details, even from 500 μm deep within thick organisms
- > Keep even large model organisms under excellent physiological conditions during imaging
- > Simplify your organism handling for a more efficient imaging and analysis workflow

The THUNDER Imager Model Organism is part of the THUNDER family of imaging systems.

* in accordance with ISO/IEC 2382:2015



An organoid approximately 150 μm in diameter mounted onto a depression slide. Imaged with a THUNDER Imager Model Organism.



Blur-free images with fine details

Get the most information from your precious model organisms and reveal stunning details. Take advantage of the leap forward in image quality with THUNDER imager systems compared to conventional stereo microscopes. THUNDER removes the non-relevant background, while interesting details are preserved.

The THUNDER Imager Model Organism allows you to obtain great results for applications like:

- > Characterization of model organism transgenic lines (developmental biology)
- > Detailed observation of model organisms in real time (developmental biology, cardiology)
- > Investigating development of neuronal networks (neuroscience)

With THUNDER Imager Model Organism, you take full advantage of:

- > Brilliant results in seconds
- > Instant display of haze free images during acquisition - no need to wait until the experiment is finished
- > Removal of out-of-focus blur efficiently even from single plane acquisitions
- > No need to calibrate or to adjust moving hardware components

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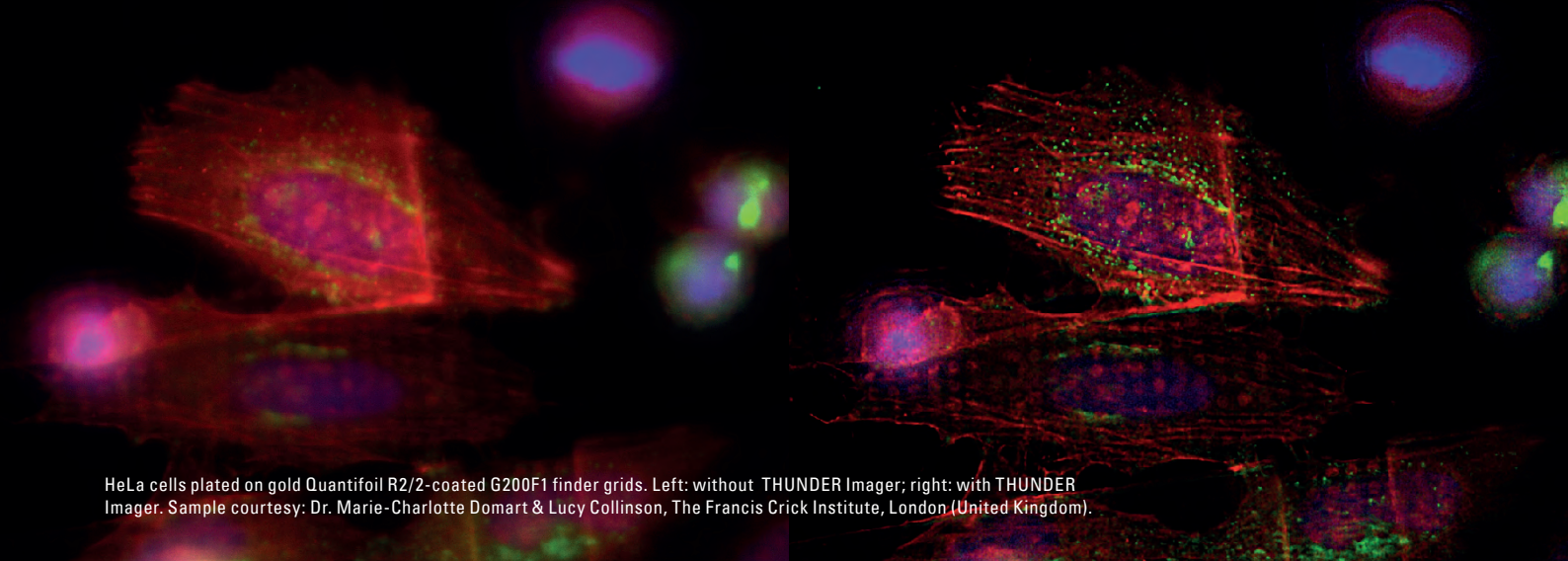
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THUNDER Imager EM Cryo CLEM

In-depth understanding of cellular structural biology



HeLa cells plated on gold Quantifoil R2/2-coated G200F1 finder grids. Left: without THUNDER Imager; right: with THUNDER Imager. Sample courtesy: Dr. Marie-Charlotte Domart & Lucy Collinson, The Francis Crick Institute, London (United Kingdom).

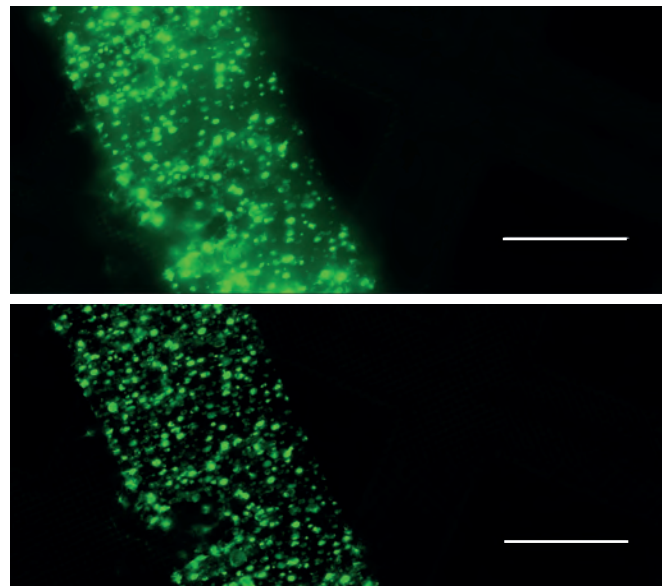
Get crisp, haze-free images with our cryo light microscope THUNDER Imager EM Cryo CLEM. Precisely identify cellular structures of interest thanks to opto-digital THUNDER technology.

For optimal visualization of cellular structures, the THUNDER Imager EM Cryo CLEM combines a high-resolution cryo objective with the innovative THUNDER technology from Leica Microsystems. You benefit from better identification and visualization of the fine details of cell structures together with the speed and ease-of-use of a widefield microscope.

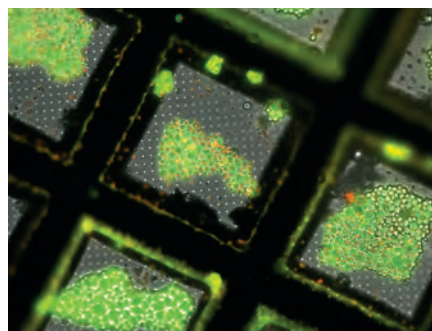
Working with the THUNDER Imager EM Cryo CLEM offers the following advantages:

- > Fast, high-resolution imaging and elimination of out-of-focus blur with THUNDER technology
- > Seamless transfer of image data to different EM solutions
- > Optimal cryo conditions maintained throughout the imaging workflow and sample transfer

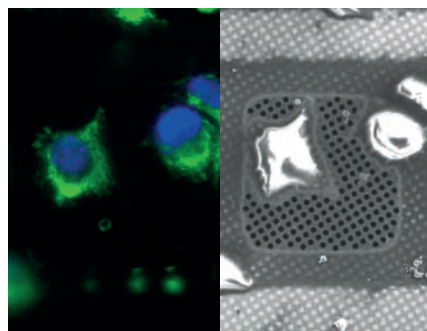
The THUNDER Imager EM Cryo CLEM is part of the THUNDER family of imaging systems.



CEMOVIS cryosection ribbons of yeast cells overexpressing GFP-tagged alpha-synuclein. Scalebar: 50 μ m. Top: without THUNDER, bottom: with THUNDER. Courtesy: Ashraf Al-Amoudi, C-CINA, Biozentrum, University Basel, Switzerland.



Cells of *S. cerevisiae* expressing the nucleolar marker NOP56::mars (red) and showing pronounced autofluorescence of the cell wall (green). Courtesy of Dr. Philipp Erdmann; stem created by F. Wilfling. Max-Planck-Institute for Biochemistry Martinsried, Germany.



A9 cells labeled with Alexa Fluor 488 Phalloidin marking fibrous actin (F-actin) and DAPI (blue) visualizing the nucleus. The exact same cell marked in the light microscope (left panel) can be retrieved in the FIB-SEM by coordinate transfer.



Loading of a grid cartridge into the THUNDER Imager EM Cryo CLEM using the transfer shuttle

Clear identification & imaging of your region of interest

For optimal visualization of cellular structures, the THUNDER Imager EM Cryo CLEM combines a high-resolution cryo objective with THUNDER technology. THUNDER employs the innovative Leica method of Computational Clearing for removal of the out-of-focus blur that can occur with widefield observation.

Easy retrieval with coordinate transfer

The integrated software guides you through your imaging workflow, then exports the original image data and associated coordinates with just one click. You can immediately relocate the cellular target region in your preferred electron microscope and begin your investigation of the specimen ultrastructure.

Cryo conditions maintained

To maximize the probability of a successful experimental outcome, the unique cartridge system and closed cryo stage ensure your specimen remains vitrified. This system minimizes the potential for contamination during the loading and transfer process and even during long-term image recordings.

Choose the appropriate workflow to your biological study

The THUNDER Imager EM Cryo CLEM is a flexible multi-purpose solution that can be implemented into different electron microscope workflows. Choose your preferred workflow for analysis of protein structures within their native cellular environment:

- > Analysis of vitrified sections (CEMOVIS)
- > Integrated targeted on-grid lamellae preparation with the Aquilos cryo-FIB SEM (Thermo Fisher Scientific) and cryo tomography
- > Targeted on-grid lamellae with our vacuum transfer system EM VCT500 to other FIB-SEM suppliers

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