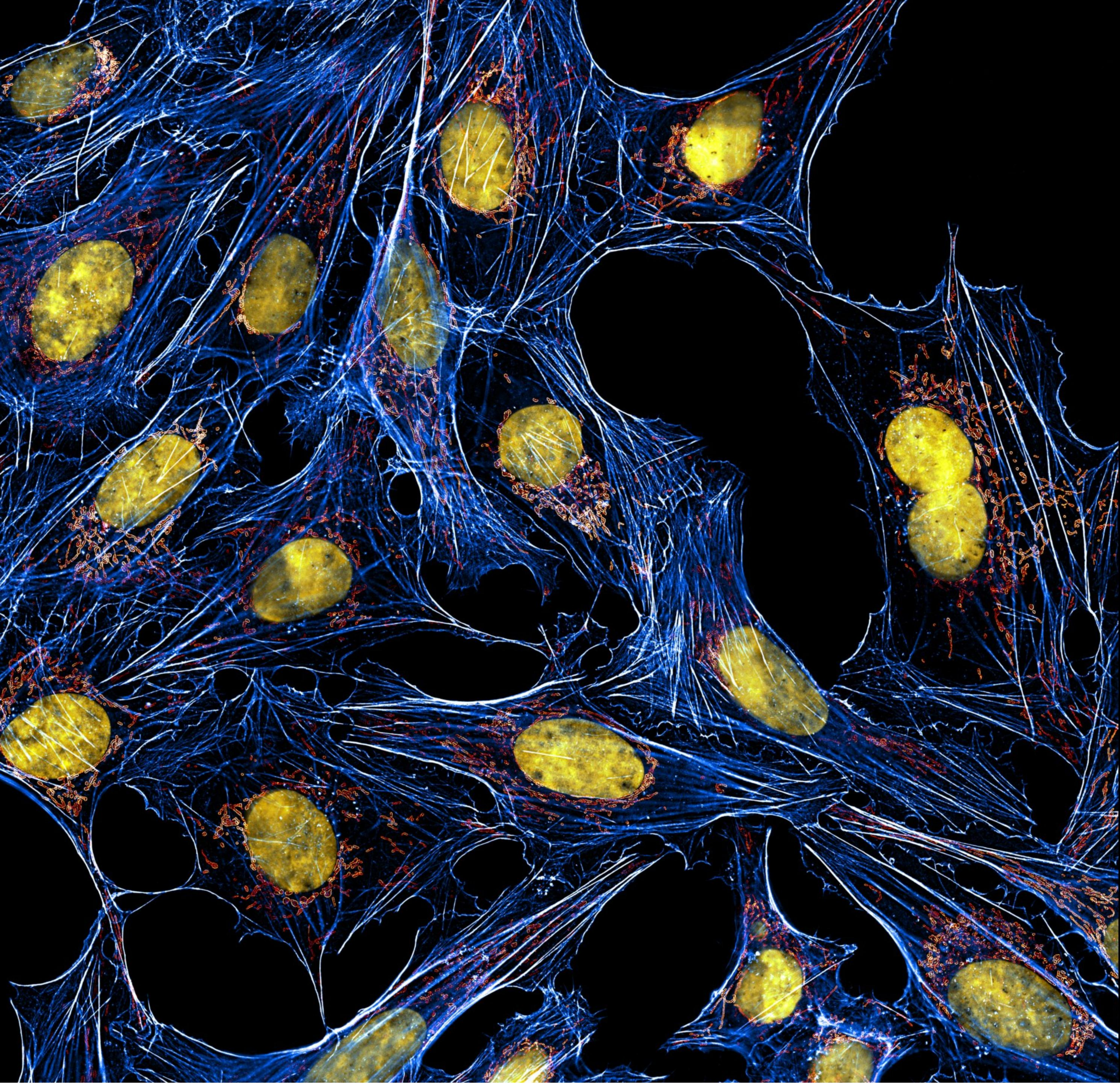
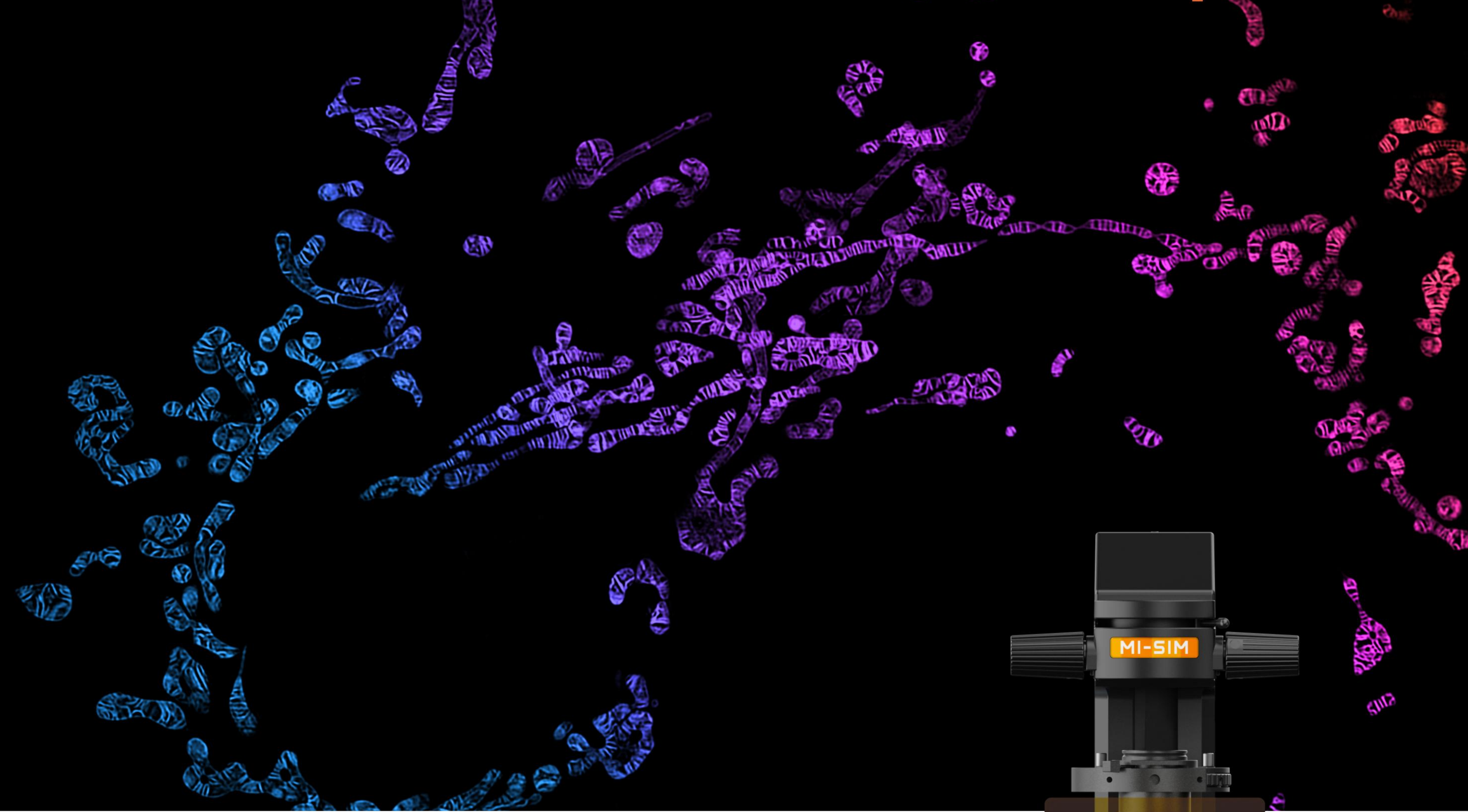


CSR Biotech
Transforming Tools Changing Lives

MI-SIM

Machine Intelligent Structured Illumination Microscope



Transforming Tools
Changing Lives

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MI-SIM brochure ENG VXXQ.02.02 released on Dec. 10, 2024

MI-SIM

Our Core Technology Platform

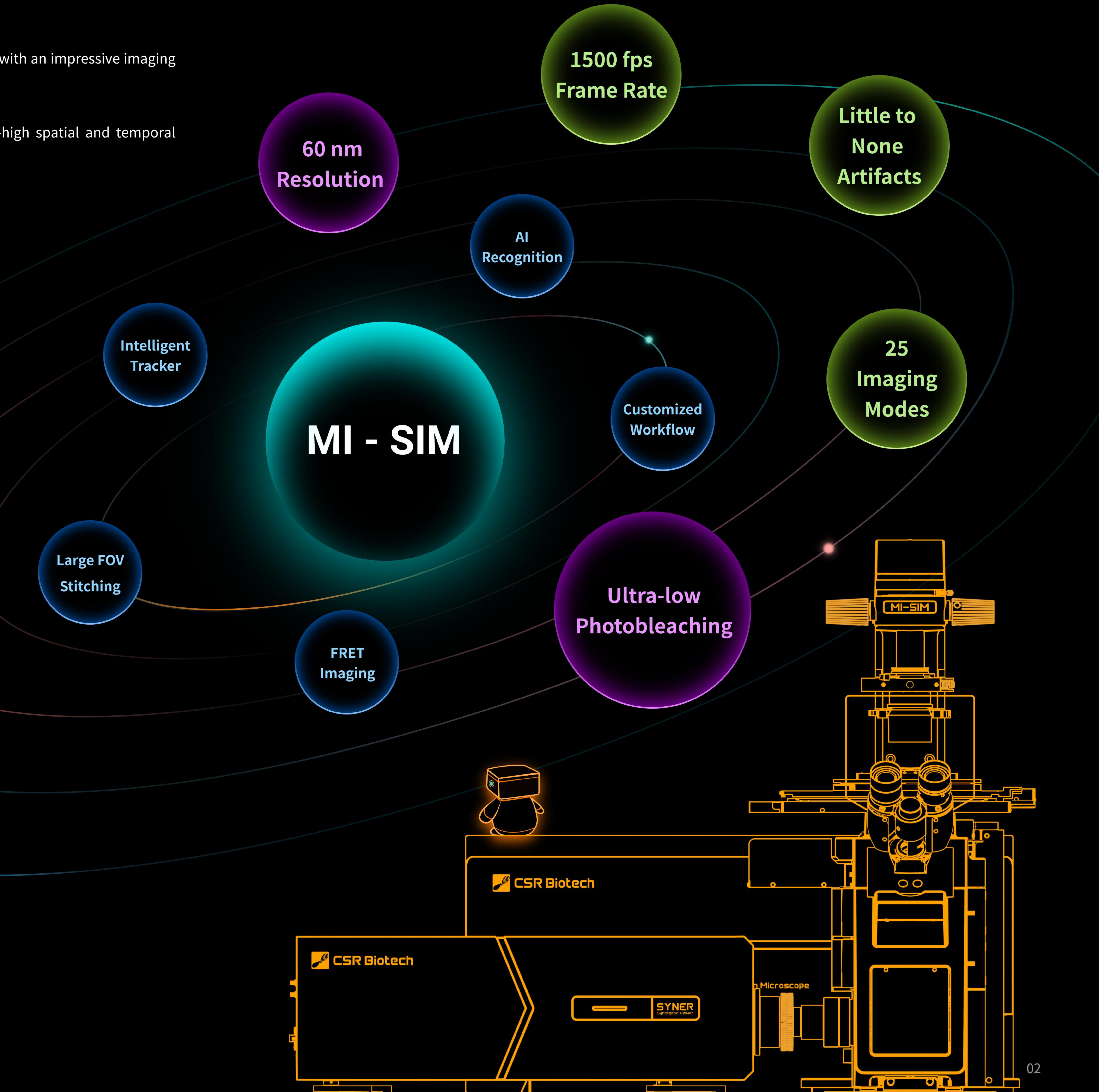
Our super resolution microscope, with exceptional spatial resolution, surpassing 60 nm with an impressive imaging speed of up to 1500 fps.

MI-SIM is a high performance user-centric system designed to be future-proof.

A system to assist comprehensive dynamic observations of live cell, delivering ultra-high spatial and temporal resolution.

FEATURES

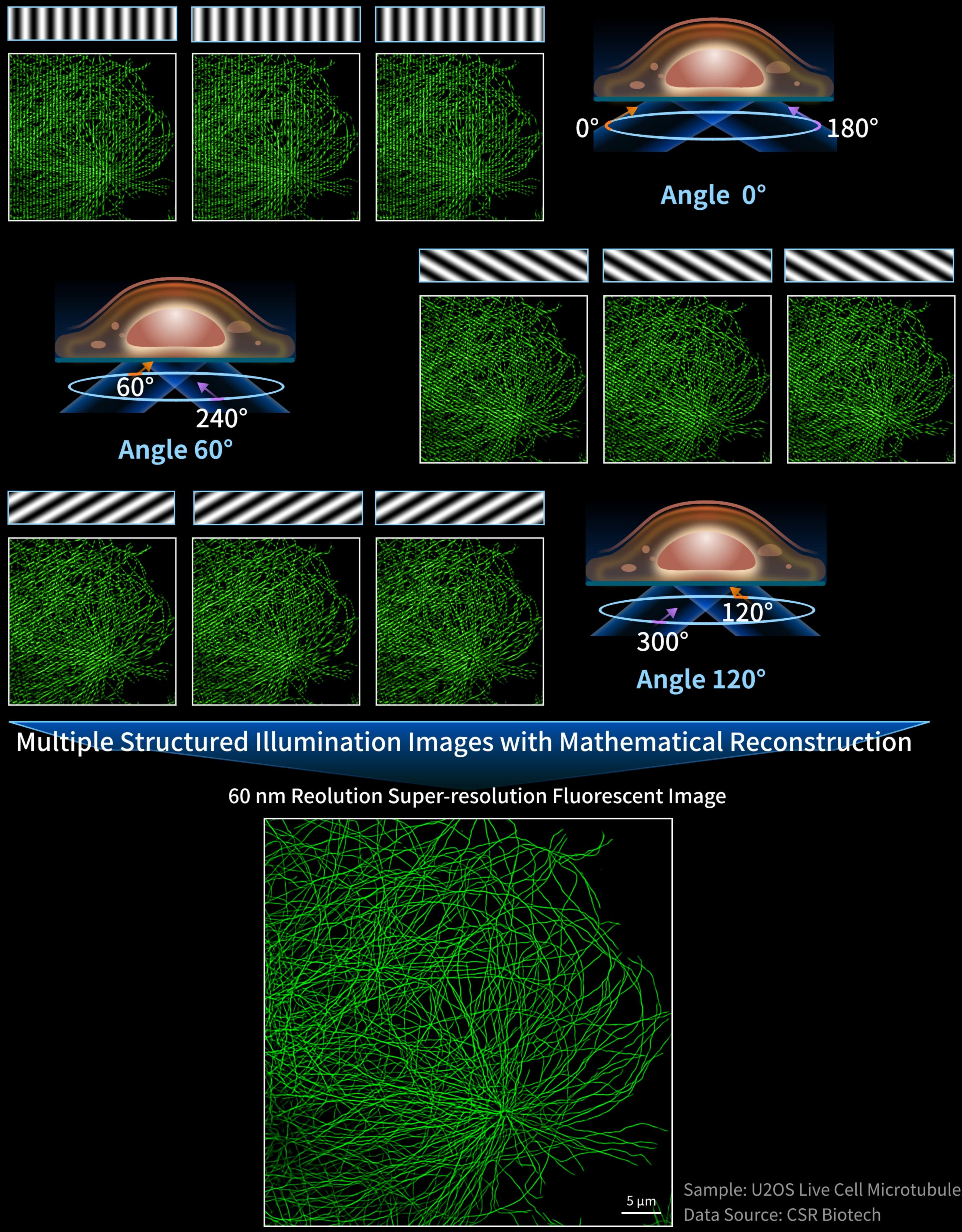
- **24 Hz Real-time Super-resolution Imaging:**
  Elevate imaging success and boost experimental efficiency
- **60 nm Super Resolution:**
  Visualize every marker and its distribution within live cell
- **Little To None Artifacts:**
  Optimized mathematical and physical models, ensuring higher fidelity, and accurate reconstructions
- **1500 fps Frame Rate:**
  Harness the power to capture dynamic interactions and processes within live cell
- **150×150 µm FOV with 100× Objective:**
  Observe cell and organelle interactions across various scales
- **Ultra-low Photobleaching:**
  Enable overnight live-cell imaging while simultaneously capturing, saving, and processing data
- **Real-time XYZ Intelligent Tracking:**
  Option for long-term imaging, eliminating 2D shift and 3D defocus induced by cellular motion
- **Up to 25 Imaging Modes:**
  Tailored to match various sample types including bright field, widefield, TIRF, 2D-SIM, TIRF-SIM, and 3D-SIM



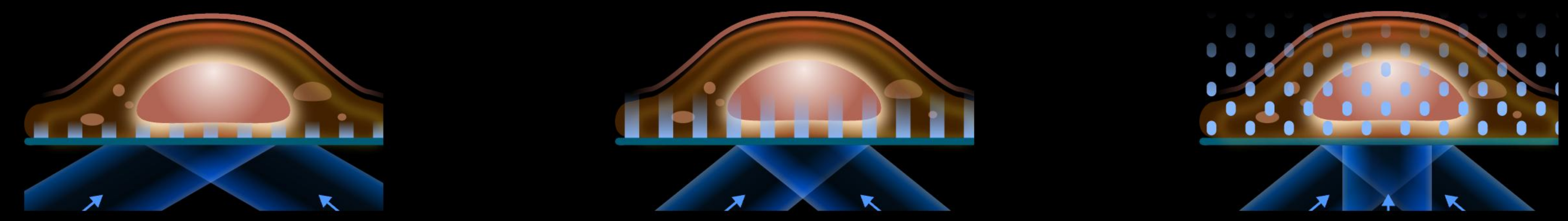
CORE TECHNOLGY

Overview of SIM Super-Resolution Imaging Mechanism

- Dual-beam interference generates structured illumination patterns on the sample
- The illumination pattern is applied in three orientations, with phase shifts of 0, T/3 and 2T/3
- Captures high-frequency components of fluorescence images that are otherwise inaccessible with conventional imaging.



Sample: U2OS Live Cell Microtubules
Data Source: CSR Biotech



TIRF-SIM
Membrane proteins imaging
Near-membrane organelles imaging

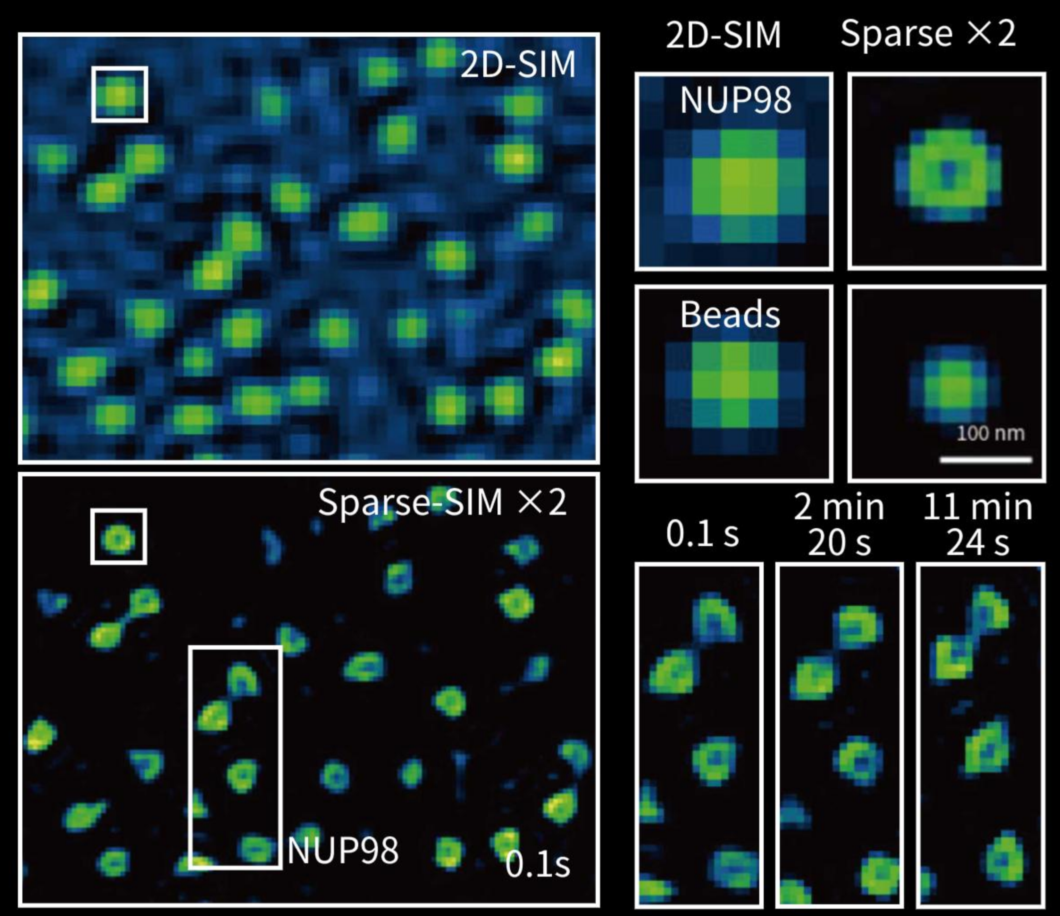
2D-SIM
Dynamic of organelles imaging
2D-SIM Stack
Thick samples rapid 3D imaging

3D-SIM Stack
High axial resolution 3D imaging
3D-SIM Slice
3D distribution-dense imaging

New Method

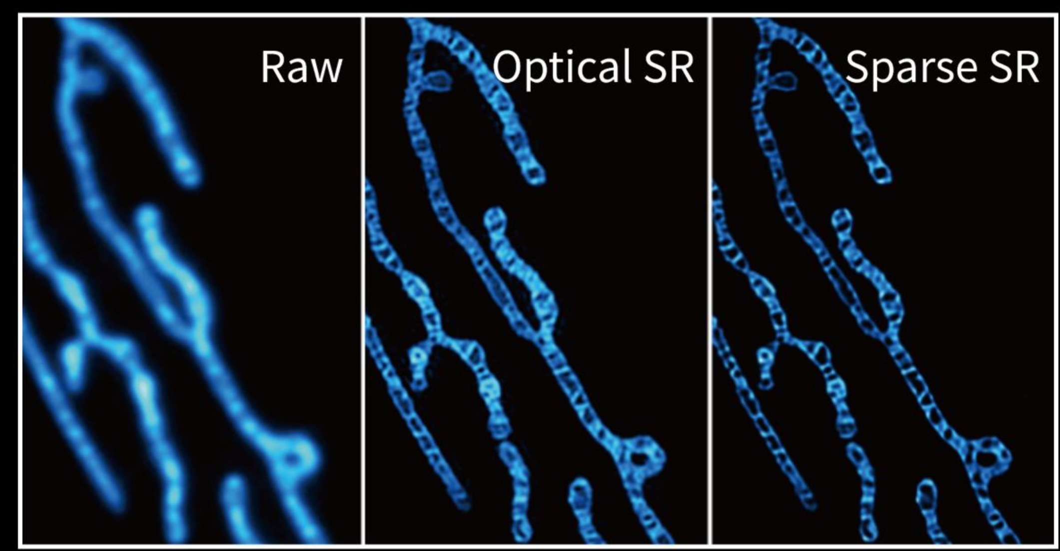
To enhance the effective resolution obtained through our Hessian-SIM, we've leveraged prior knowledge about the sparsity and continuity of biological structures. This has led to the development of a novel deconvolution algorithm that nearly doubles the resolution of super-resolution (SR) microscopes. Our approach, termed Sparse Structured Illumination Microscopy (Sparse-SIM), achieves an approximate resolution of 60 nm at frame rates up to 564 Hz. This advancement allows for the detailed resolution of complex structures, such as tiny vesicular fusion pores, ring-shaped nuclear pores created by nuclear pore complexes, and the relative movements of the inner and outer mitochondrial membranes in live cells.

Our system recommends automatically optimal parameters based on sample type, spatio-temporal structure, and image signal-to-noise ratio (SNR), simplifying parameter adjustment and experimentation for users.



Computational Advancements

Optimized through image algorithm enhancements, CPU improvements, and GPU acceleration, we've significantly increased the super-resolution reconstruction speed by 2 to 3 orders of magnitude. This enables fast access to high-quality data, with acquisition speeds of ⩾60 fps for large-field super-resolution data. Efficiency is further improved with batch reconstruction.



- Xiaoshuai Huang, Junchao Fan, Liuju Li, Haosen Liu, Runlong Wu, Yi Wu, Lisi Wei, Heng Mao, Amit Lal, Peng Xi, Liqiang Tang, Yunfeng Zhang, Yanmei Liu, Shan Tan* & Liangyi Chen*. Fast, long-term, super-resolution imaging with Hessian structured illumination microscopy. Nature Biotechnology, 2018.
- Weisong Zhao, Shiqun Zhao, Liuju Li, Xiaoshuai Huang, Shijia Xing, Yulin Zhang, Guohua Qiu, Zhenqian Han, Yingxu Shang, De-en Sun, Chunyan Shan, Runlong Wu, Shuwen Zhang, Riwang, Chen, Jian Xiao, Yanquan Mo, Jianyong Wang, Wi Ji，Xing Chen, Baoquan Ding, Yanmei Liu, Heng Mao, Baoliang Song, Jiubin Tan, Jian Liu, Haoyu Li*, Liangyi Chen.* Sparse deconvolution improves the resolution of live-cell super-resolution fluorescence microscopy. Nature Biotechnology, 2022.

HIGHLIGHTS

Why MI-SIM Delivers Artifact-Free Imaging: A Technological Breakthrough

The MI-SIM (Machine Intelligent Structured Illumination Microscope) system represents a major leap forward in super-resolution imaging, achieving unparalleled speed and resolution with minimal to no artifacts. This achievement is built on a foundation of groundbreaking, peer-reviewed technological advancements that address the limitations of traditional SIM methods.

Hessian-SIM: Redefining the Physical Model for Higher Fidelity

Our innovative Hessian-SIM technique has redefined the mathematical framework of traditional SIM, ensuring strict adherence to physical principles and delivering superior fidelity in image reconstructions:

- Optimized Physical Model (Fig. 1)
  MI-SIM utilizes an advanced structured illumination framework and photon redistribution principles, enabling more accurate and artifact-free reconstructions.

Algorithm: Hessian-SIM

Initialization:

$$g(\mathbf{r}) = ifft\left(\frac{\sum_{m,d} O^*_{md}(\tilde{\mathbf{k}} + m\mathbf{p}_d) S_{md}(\tilde{\mathbf{k}} + m\mathbf{p}_d)}{\sum_{m,d} \left| O_{md}(\tilde{\mathbf{k}} + m\mathbf{p}_d) \right|^2 + \alpha^2} A(\tilde{\mathbf{k}}) \right)$$

$$f^{(1)} = g$$

Iteration:

For $k = 1 : N_k$ **(Minimization step)**

Step 1: **Update** $f^{(k+1)}$ using Eq.(13);

Step 2: **Update** $d^{(k+1)}$ using Eq.(15)

Step 3: **Update** $b^{(k+1)}$ using Eq.(16)

Stopping criterion: If $\left\| f^{(k+1)} - f^{(k)} \right\|_2^2 / \left\| f^{(k)} \right\|_2^2 \le T_1$, then stop the iteration;

End.

Fig. 1

- Supplementary Evidence (Fig. 2)
  Demonstrates MI-SIM's ability to maintain linearity with TIRF microscopy, ensuring data fidelity.

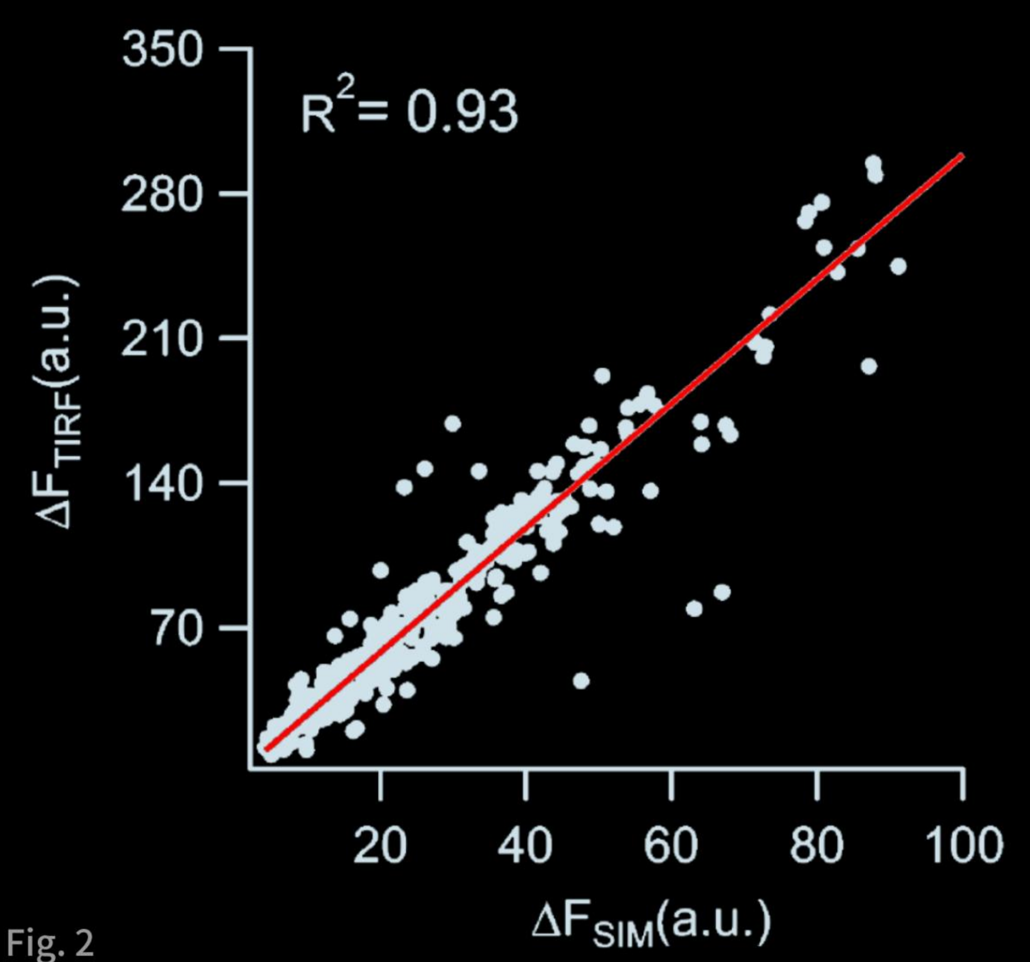


Fig. 2

High-Fidelity Data Processing with FINER Technology

The MI-SIM system integrates FINER Technology, which leverages Sparse Deconvolution to achieve high-fidelity image processing:

- Sparse Deconvolution Technology
  Incorporates continuity and sparsity priors into the mathematical model (Fig. 3), ensuring accurate data reconstruction and artifact suppression.

Algorithm | Sparse deconvolution.

Input: time-lapse/volumetric image stack **f**

STEP 0.

if background estimation:

Background estimation using the procedure in **Supplementary Note 4.3**.

else:

b = 0.

Output: **b**

Input: f, b, A

STEP 1.

if upsampling:

Minimize **Eq. (20)**:

$$\arg\min_{\mathbf{g}} \left\{ \frac{\lambda}{2} \left\| \mathbf{f} - \mathbf{b} - \mathbf{Dg} \right\|_2^2 + \mathrm{R}_{\mathrm{Hessian}}(\mathbf{g}) + \lambda_{L1} \left\| \mathbf{g} \right\|_1 \right\}.$$

else:

Minimize **Eq. (8)**:

$$\arg\min_{\mathbf{g}} \left\{ \frac{\lambda}{2} \left\| \mathbf{f} - \mathbf{b} - \mathbf{g} \right\|_2^2 + \mathrm{R}_{\mathrm{Hessian}}(\mathbf{g}) + \lambda_{L1} \left\| \mathbf{g} \right\|_1 \right\}.$$

STEP 2.

Minimize **Eq. (9)**:

$$\arg\min_{\mathbf{x}} \left\{ \left\| \mathbf{g} - \mathbf{Ax} \right\|_2^2 \right\}.$$

Output: x

Fig. 3

- In the accompanying illustration (Fig. 4) of this original technology, comparing data from single-molecule localization microscopy (SMLM) and Sparse-SIM reveals that Sparse's fidelity is validated by higher-resolution imaging results.

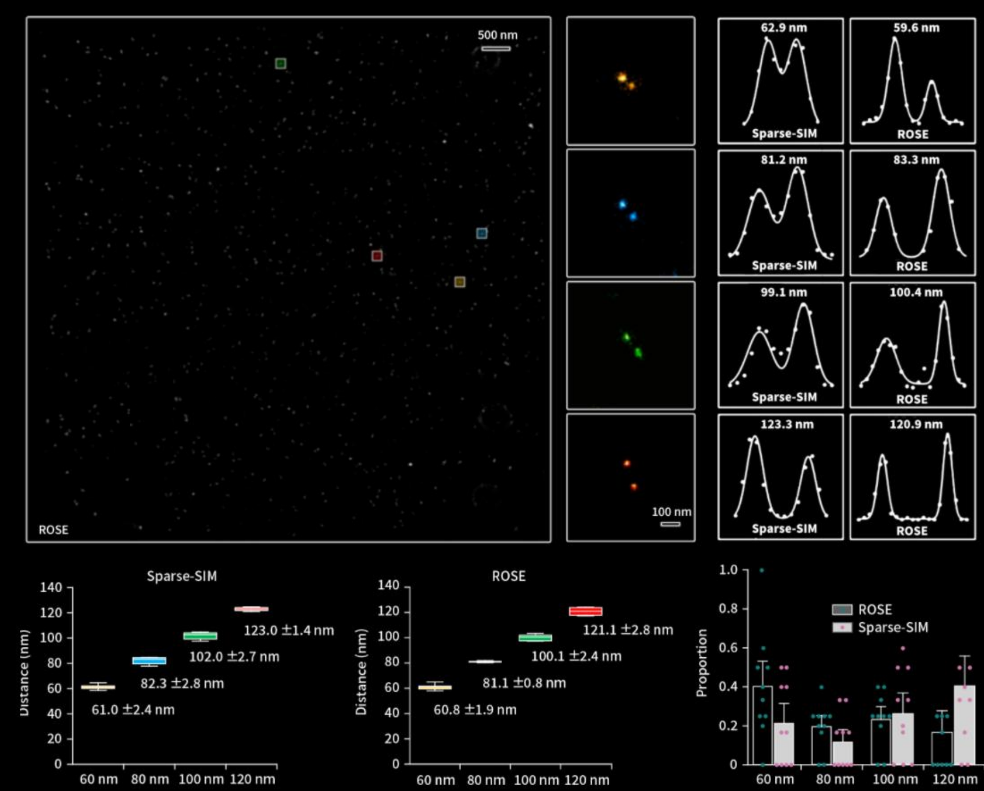


Fig. 4

- In the same field of view, the sample distribution in confocal + Sparse aligns with STED (as shown in the red-boxed region in Fig. 5), demonstrating that Sparse can effectively ensure resolution enhancement without artifacts.

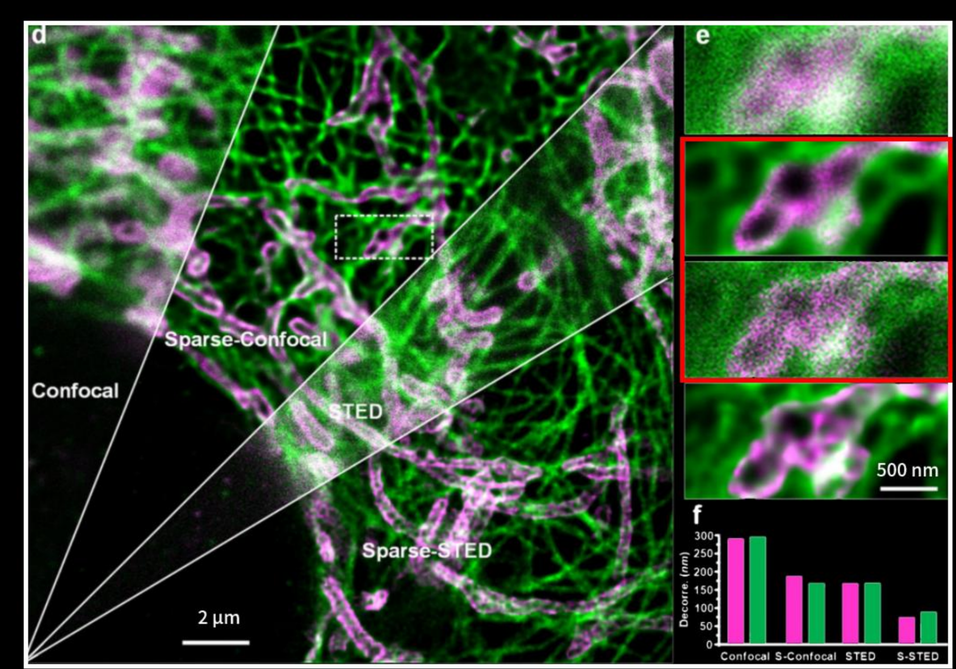
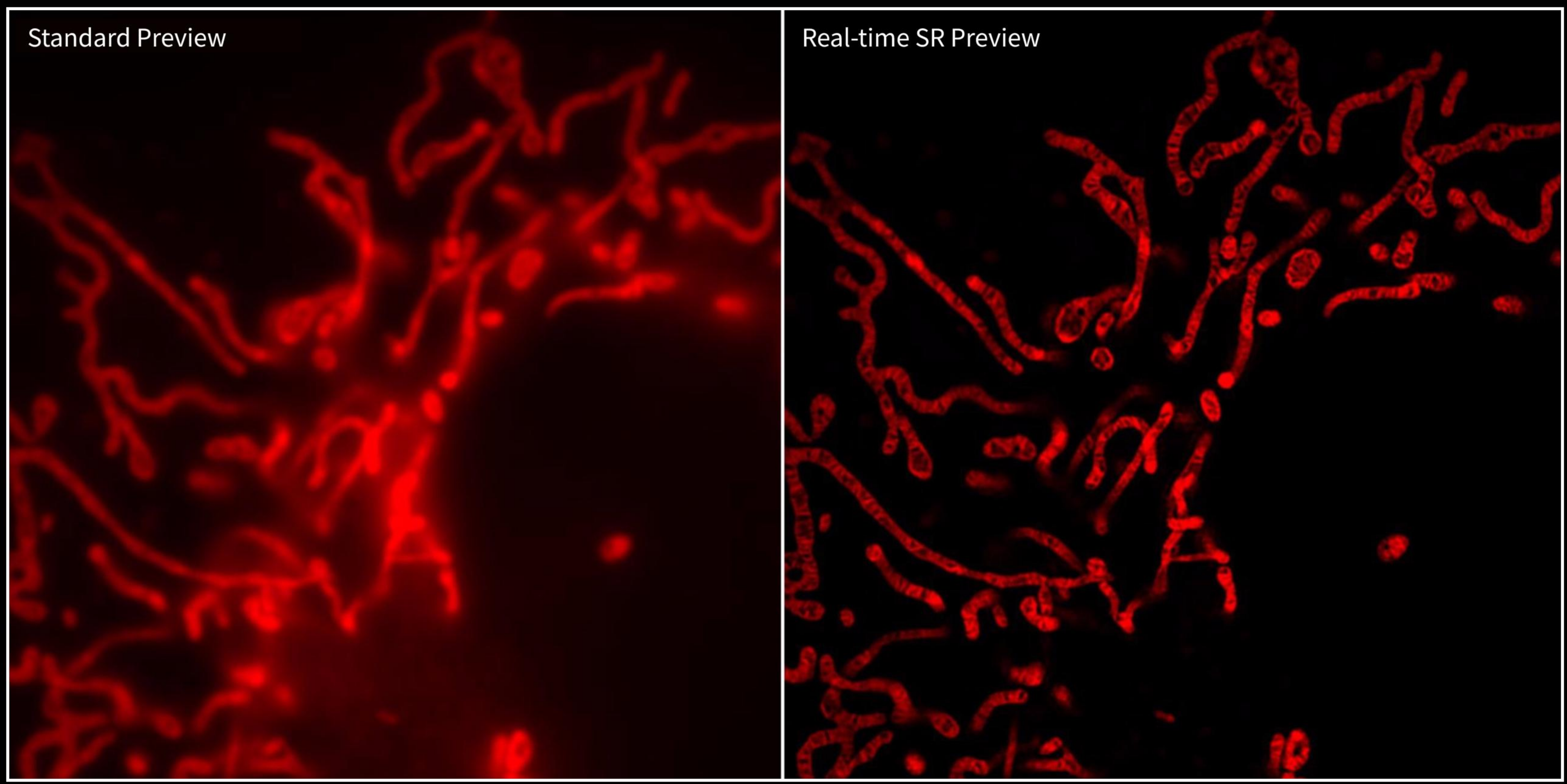


Fig. 5

HIGHLIGHTS

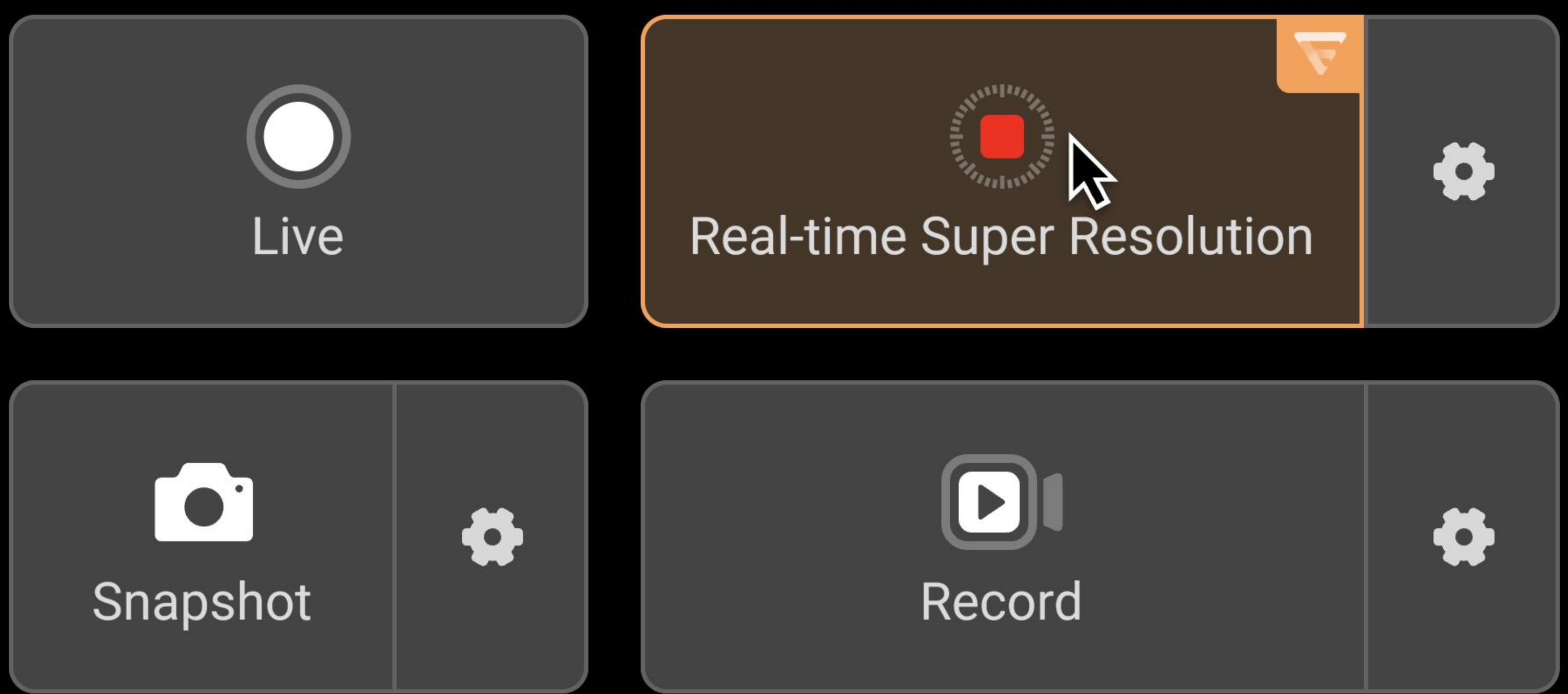
2D/3D Real-time Super Resolution

Previewing at an 85 nm resolution, our system delivers a clear visualization of mitochondrial inner membrane structures, surpassing the resolution of standard preview methods. It boasts real-time reconstruction speeds of 24 Hz, with the capability to reach up to 65 Hz, facilitating the rapid acquisition of targeted samples for imaging. By bringing super-resolution (SR) imaging into the digital era, we significantly enhance imaging efficiency. This progress allows for quick evaluation of image quality and facilitates the prompt adjustment of regions of interest (ROI) and imaging protocols.



Sample: U2OS Live Cell, Inner Mitochondrial Membrane

Data Source: CSR Biotech

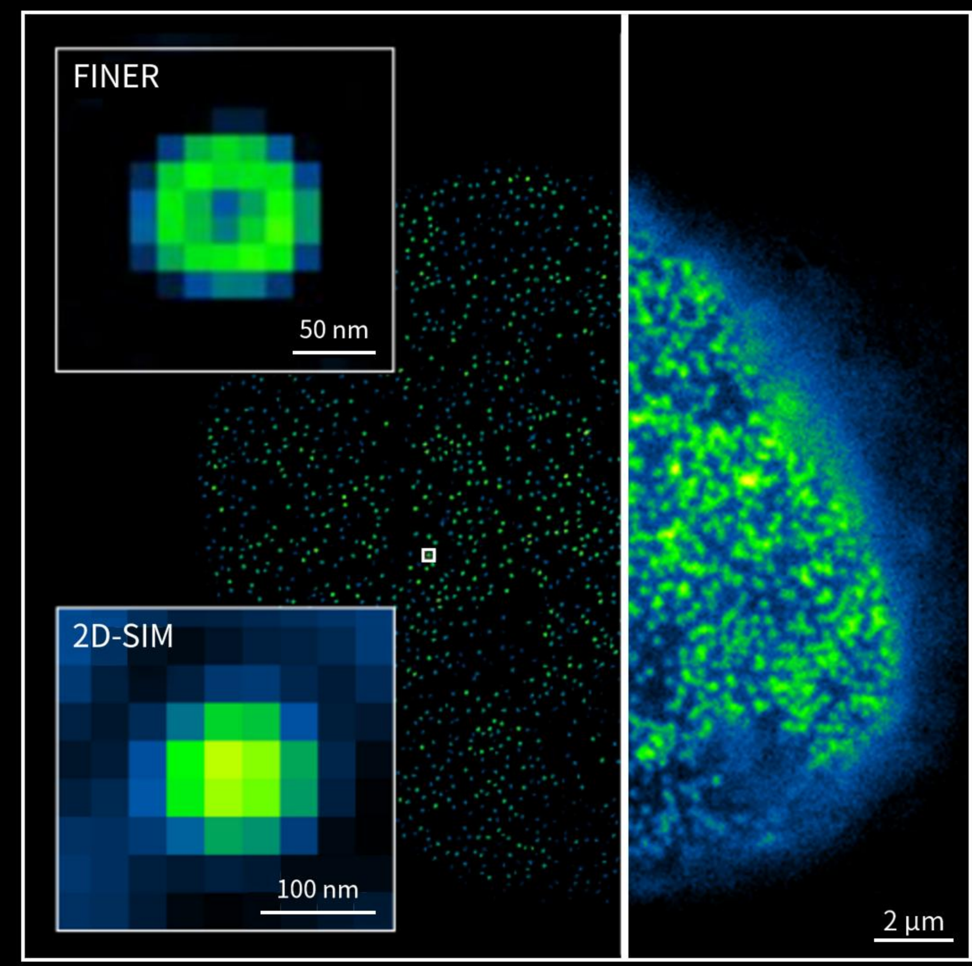


Scan the QR code
to access the real-time
super-resolution preview

60 nm Super Resolution

Marking a pioneering advancement, our system is the first peer-reviewed technology to attain 60 nm resolution at the live cell level through a blend of optical and computational innovations. It facilitates detailed visualization of every marker and its distribution within live cell, enabling the observation of dynamic structures like the nuclear pore protein NUP98's ring structure, which also has a size of 60 nm.

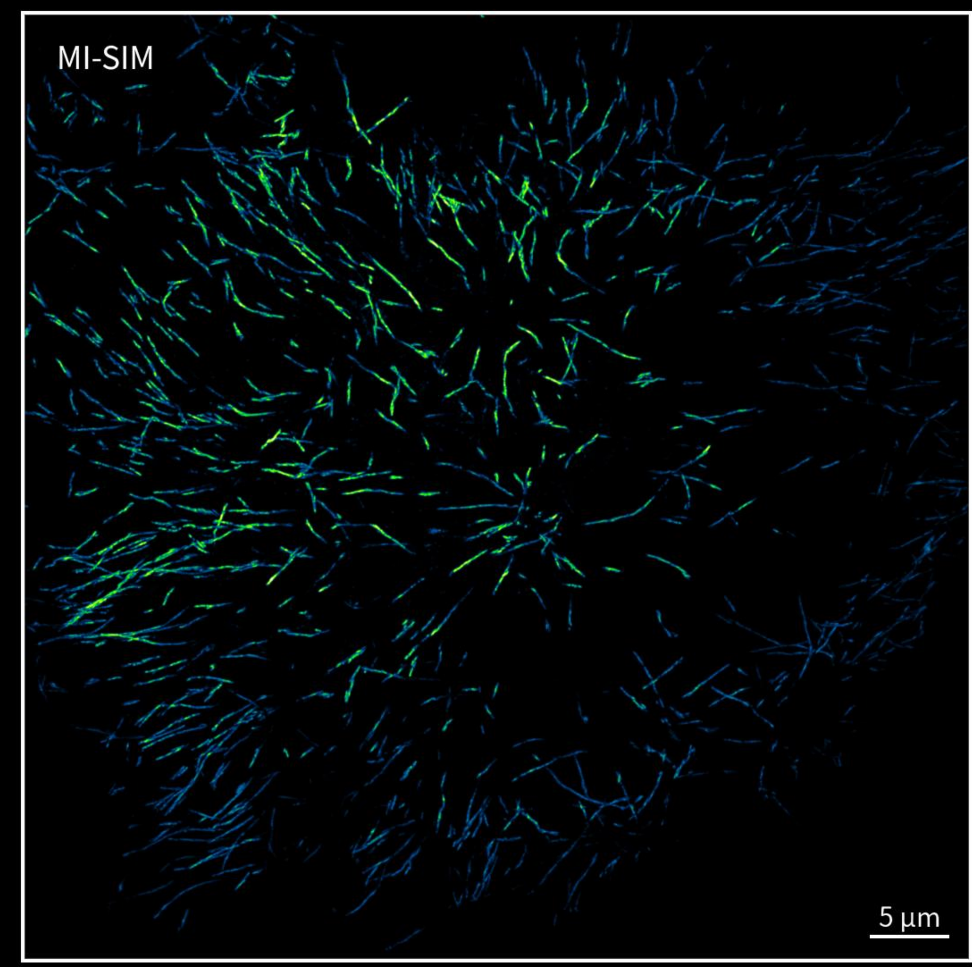
Scan the QR code
to access the application video



Ultra Fast Imaging

Featuring ultra-fast imaging capabilities, the system can achieve speeds of up to 699 fps within a 1024×1024 field of view and can even reach a peak of 1500 fps. This represents a significant leap in cellular biology research, offering a window into the dynamic world of cells such as exploring the intricacies of vesicle secretion channels and intermediate cell processes.

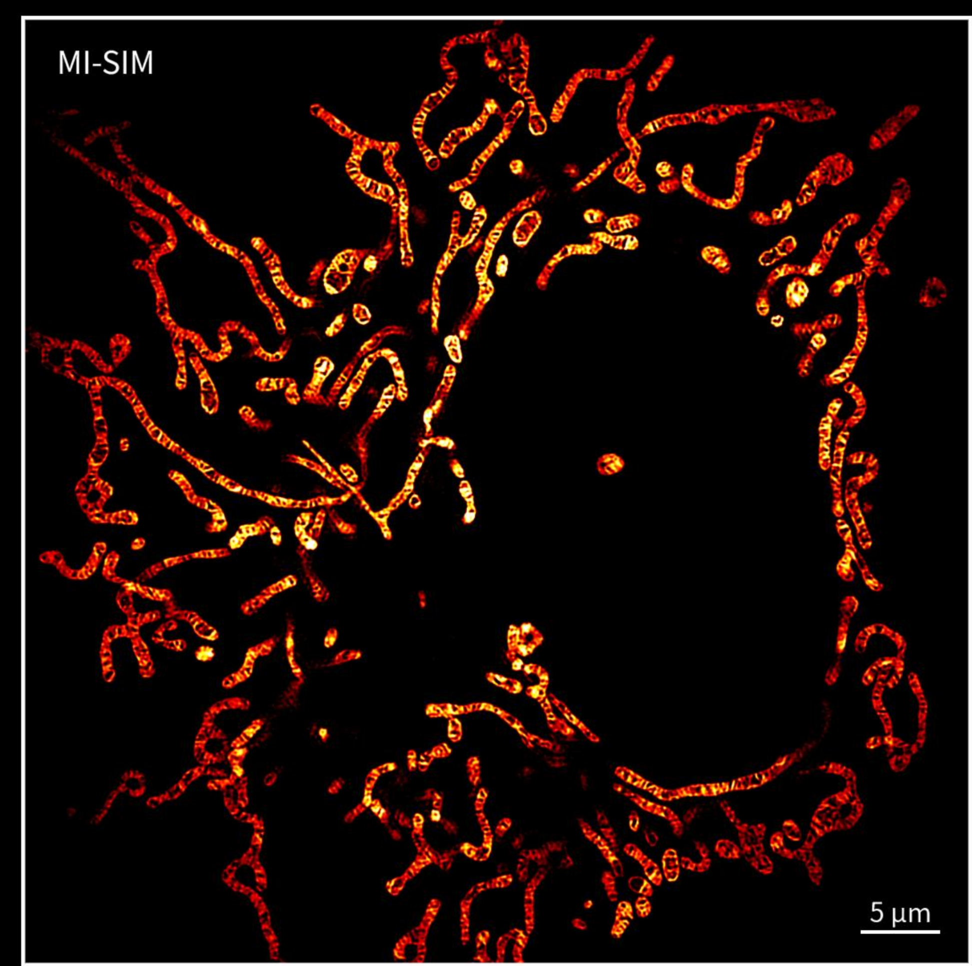
Scan the QR code
to access the application video



Ultra-Low Photobleaching

Incorporating cutting-edge imaging techniques and algorithms to achieve ultra-low photobleaching, this approach enables around-the-clock live cell imaging, allowing for precise and detailed observation of cellular processes over long durations without disrupting the cells' inherent activities or survival. The ultra-low photobleaching of MI-SIM permits the uninterrupted visualization of mitochondria in COS7 cells with 30 minutes, up to amazing 72 hours, a stark contrast to the mere two minutes before mitochondrial rupture and death occur when using traditional confocal imaging techniques.

Scan the QR code
to access the application video



HIGHLIGHTS

Advanced Dual-Camera Imaging with SYNER

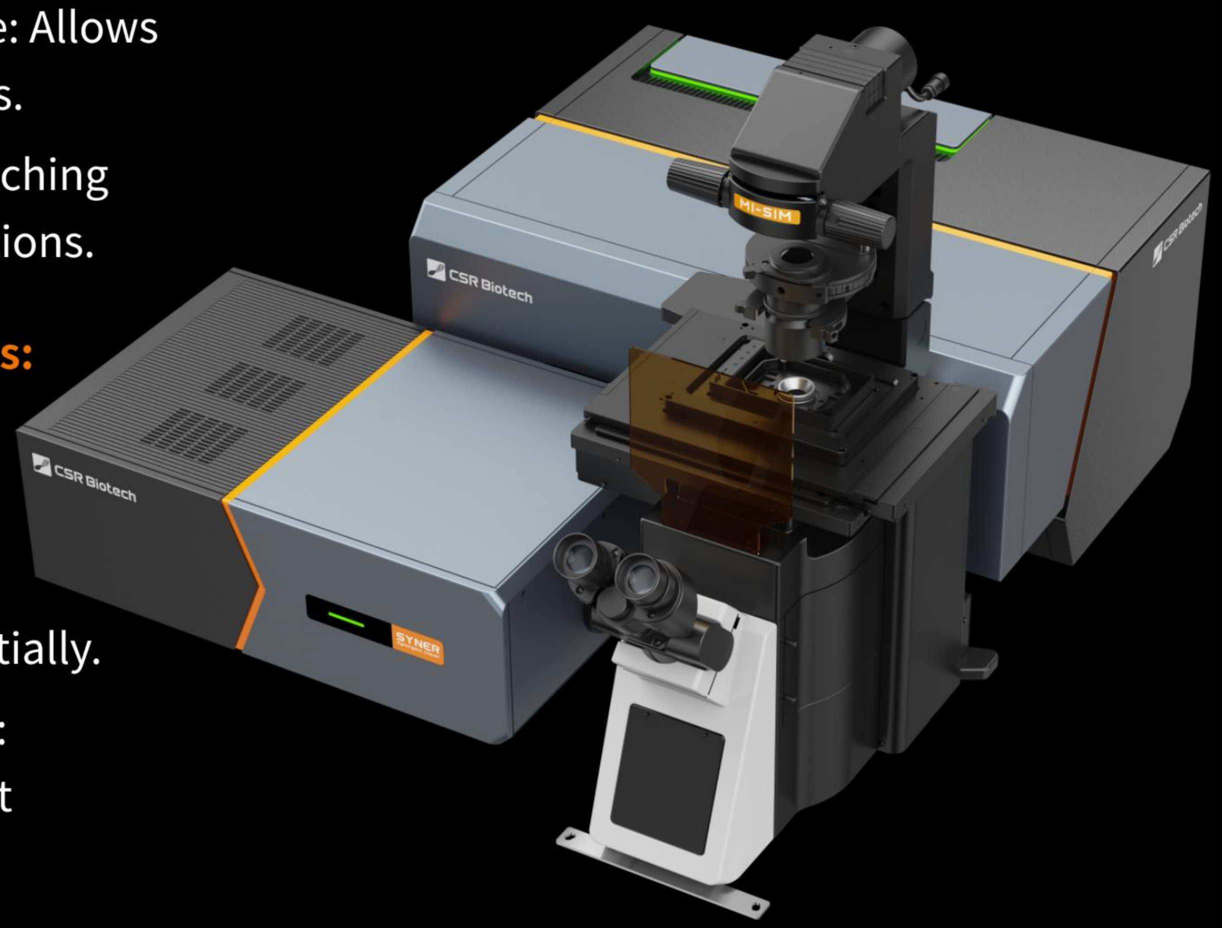
The MI-SIM system features a powerful dual-camera imaging module called SYNER (Synergetic Multi-Viewer), which incorporates a symmetrical beam-splitting imaging system to ensure high consistency in imaging fields of view, geometric parameters, and optical image quality between the two cameras. The robust optical-mechanical design effectively mitigates time-varying disturbances caused by environmental factors such as temperature, humidity, vibration, and system structural stress, maintaining alignment between the two camera optical axes.

SYNER includes:

- Multi Dichroic Mirror (DM) Switching module: Allows seamless switching between imaging modes.
- Independent Dual-Camera Filter Wheel Switching module: Enables flexible channel configurations.

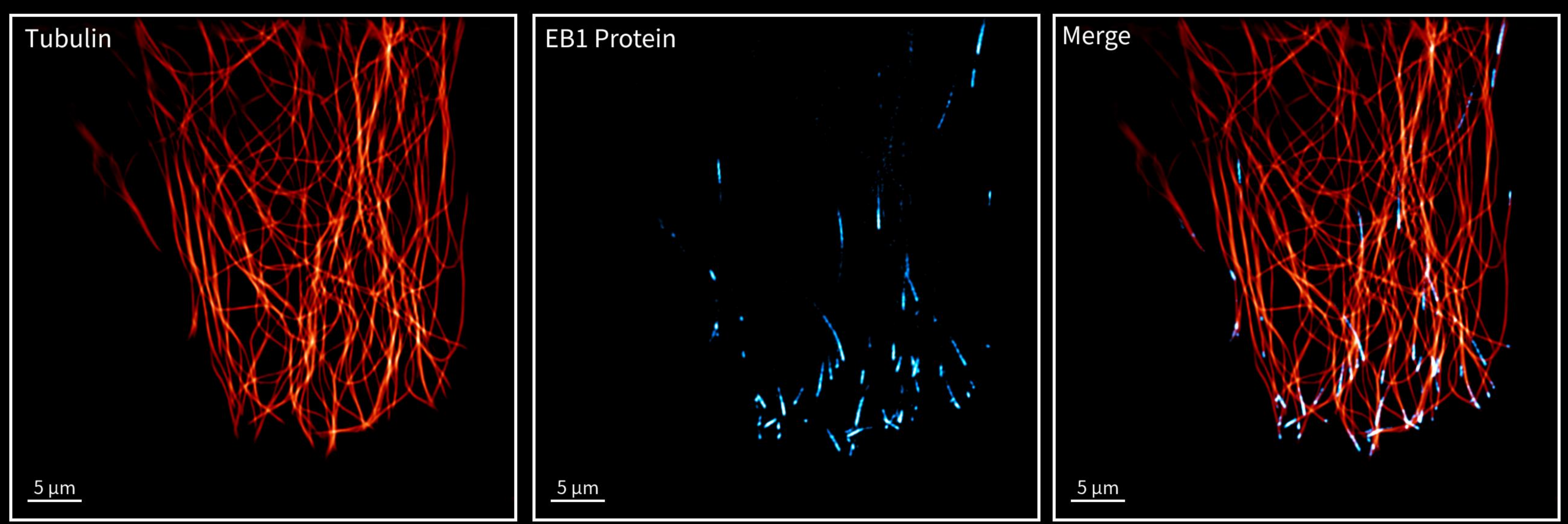
This design supports multiple imaging modes:

- Dual-Channel Synchronous Imaging Mode: For simultaneous multi-channel imaging.
- Multi-Channel Switching Imaging Mode: For capturing different wavelengths sequentially.
- Multi-Channel Asynchronous Imaging Mode: For capturing dynamic processes in different channels at staggered intervals.



Additionally, when the DM is switched to an empty position, the dual-camera module transforms into a single-camera multi-color imaging mode.

With these features, SYNER offers a diverse range of multi-channel imaging modes while retaining full-field imaging capabilities for each camera. It strikes a balance between reducing frame-to-frame acquisition intervals and meeting asynchronous imaging requirements, making it ideal for complex multi-channel super-resolution imaging applications.



Sample: U2OS Live Cell, Microtubules (red), EB1 Protein (blue)
Data Source: CSR Biotech

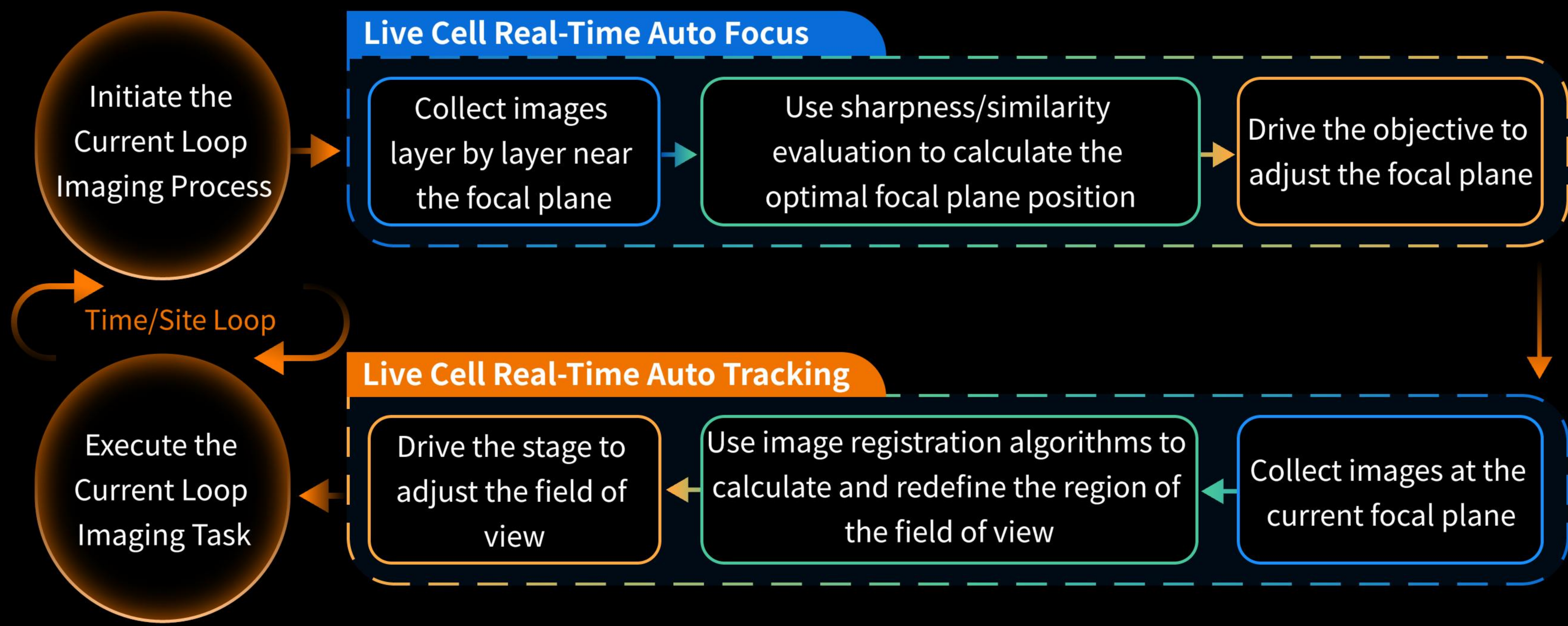
Full-time Intelligent Live-Cell TRACKER

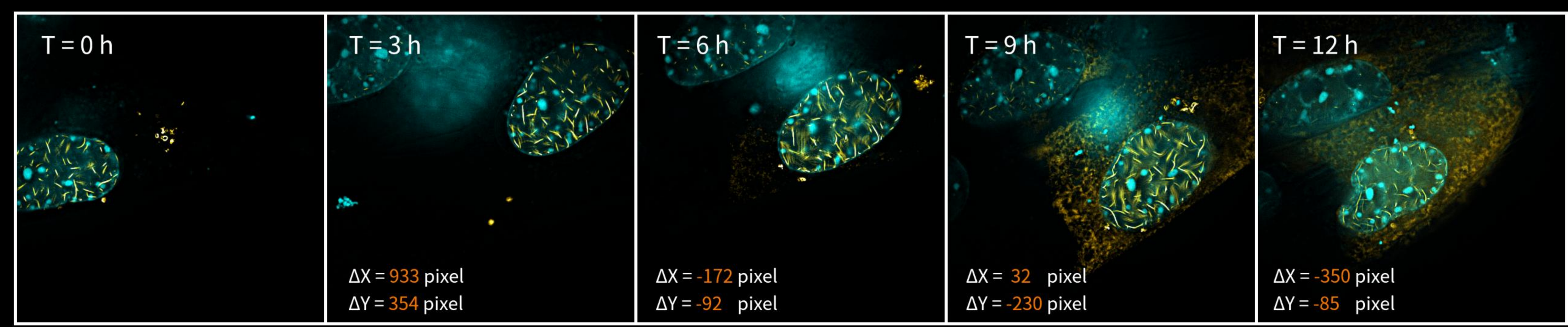
Enhanced Tracking Precision:

TRACKER revolutionizes long-term live cell imaging with its advanced ability to automatically adjust for 3D defocus and 2D shifts, ensuring clear focus and tracking accuracy despite cellular motion and morphological changes.

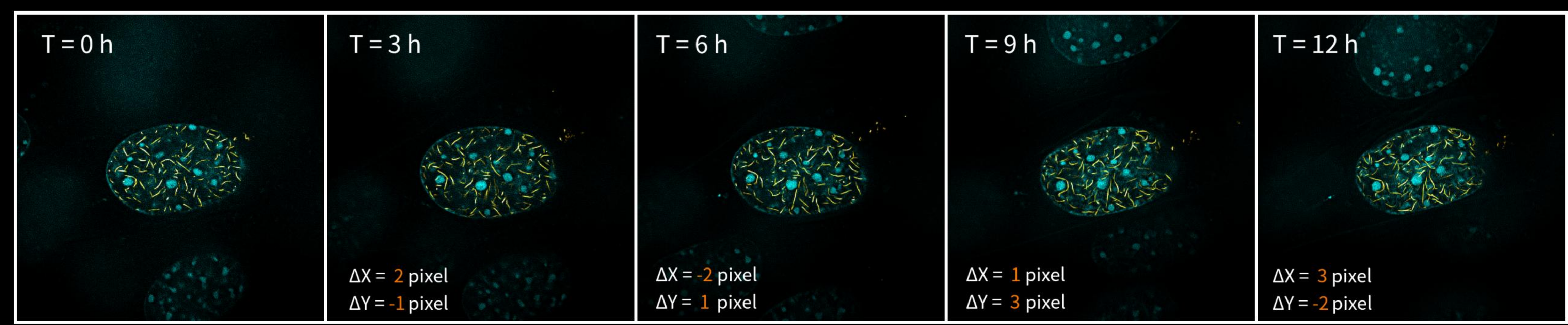
Comprehensive Multi-ROI Observation:

Designed for detailed analysis, TRACKER adeptly monitors multiple regions of interest (ROIs), capturing crucial morphological and quantitative changes in cell growth, phagocytosis, and division for in-depth, long-term cellular studies.





Dynamic of nuclear protein in live cell (without TRACKER)

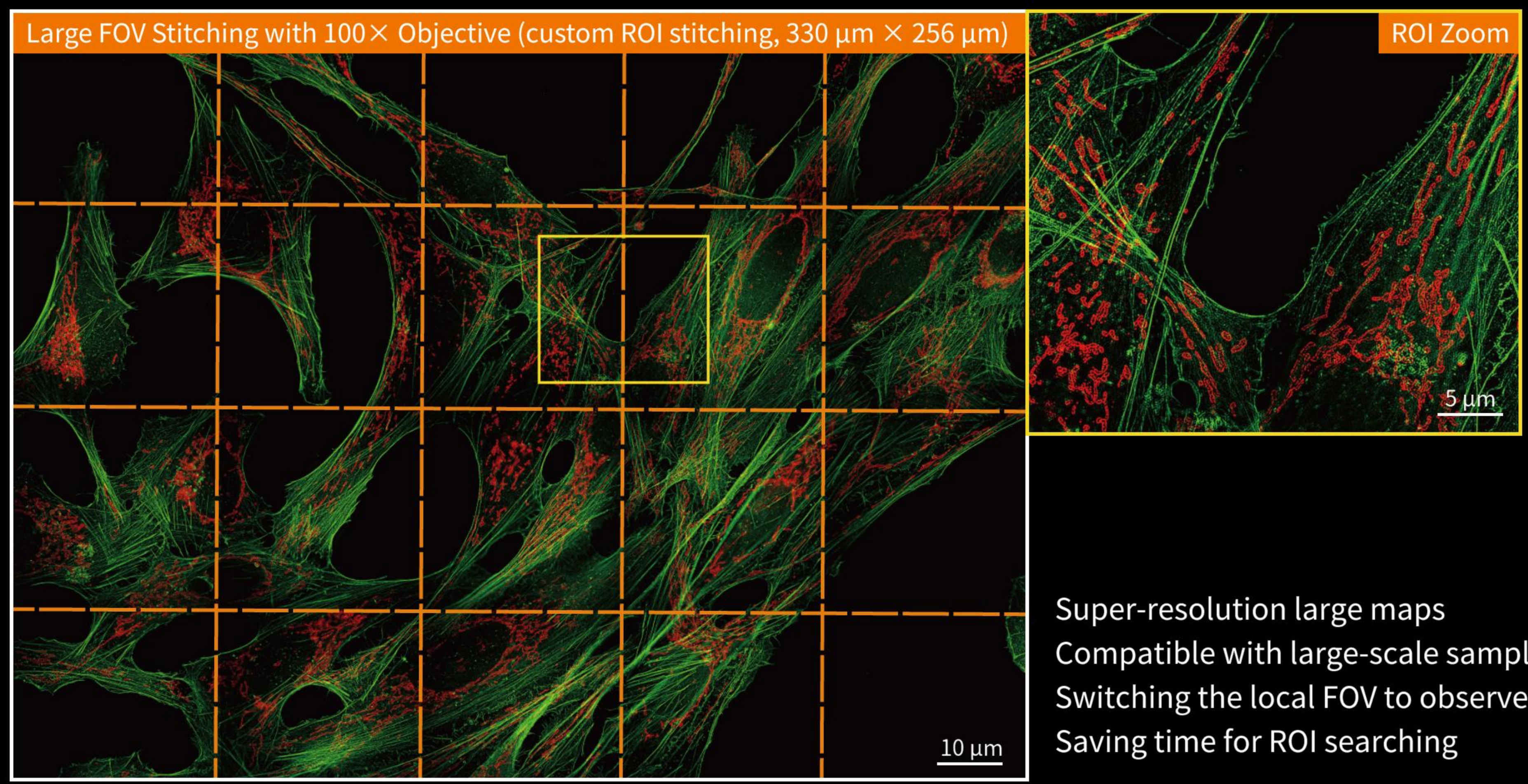


Dynamic of nuclear protein in live cell (with TRACKER)

HIGHLIGHTS

Large FOV Intelligent Image Stitching

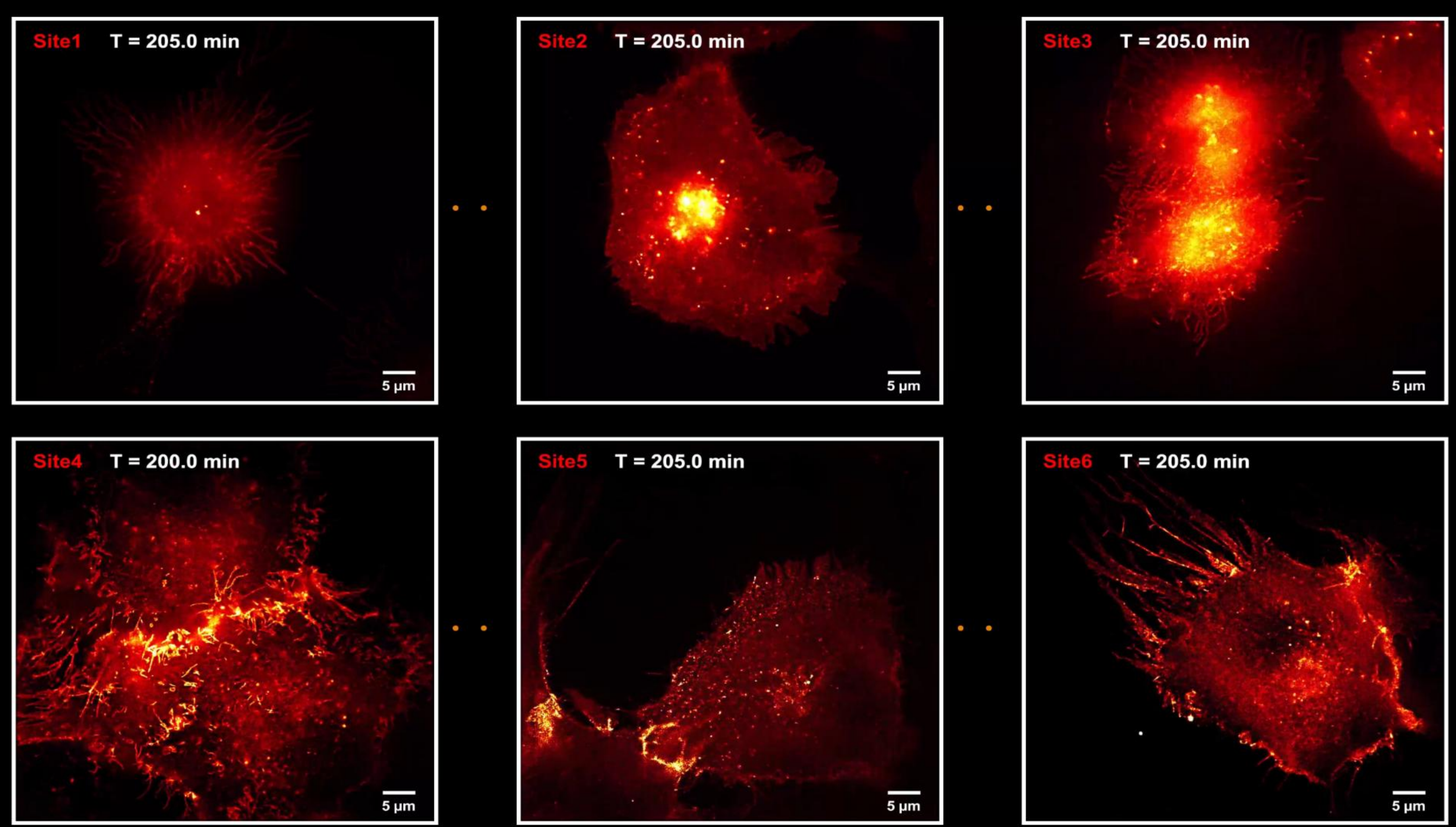
- Provide large-field imaging for dishes, multi-well plates, tissue slice, etc.
- Intelligent FOV dissection and stitching in response to cell morphology and number variations
- Large FOV strategy with position stitching, image stitching, grayscale correction and geometric correction
- High-speed GPU computation supports the concurrent acquisition and stitching of images, resulting in a large-field image once finishing the acquisition



Super-resolution large maps
Compatible with large-scale samples
Switching the local FOV to observe the ROI of fine structures
Saving time for ROI searching

High Throughput Multi-site Imaging

- Intelligent tracking strategies support robust multi-site long-term imaging
- Intelligently regulation in imaging condition for changing with cell status and events to reduce invalid data
- MI-SIM supports unscheduled multi-site long-term imaging with real-time storage
- Integrate intelligent stitching imaging and live cell tracking for high throughput super-resolution

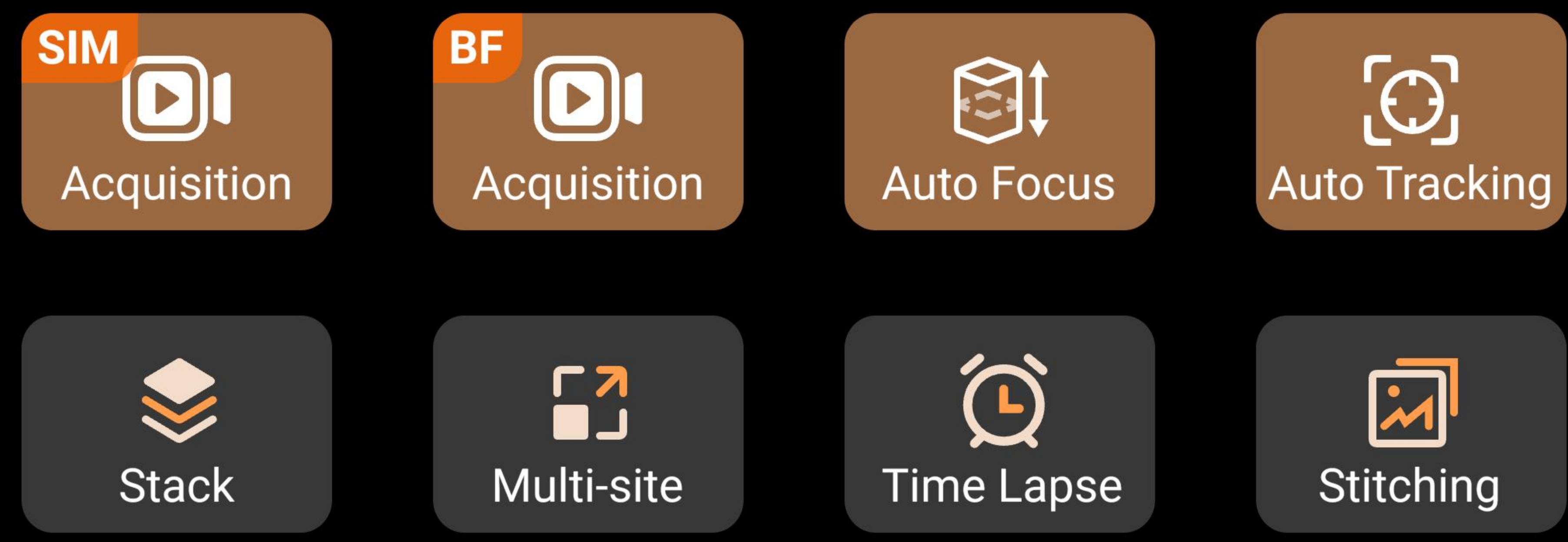


Scan the QR code
to access the application video

Multi-site imaging with TRACKER enables long-term monitoring of migration

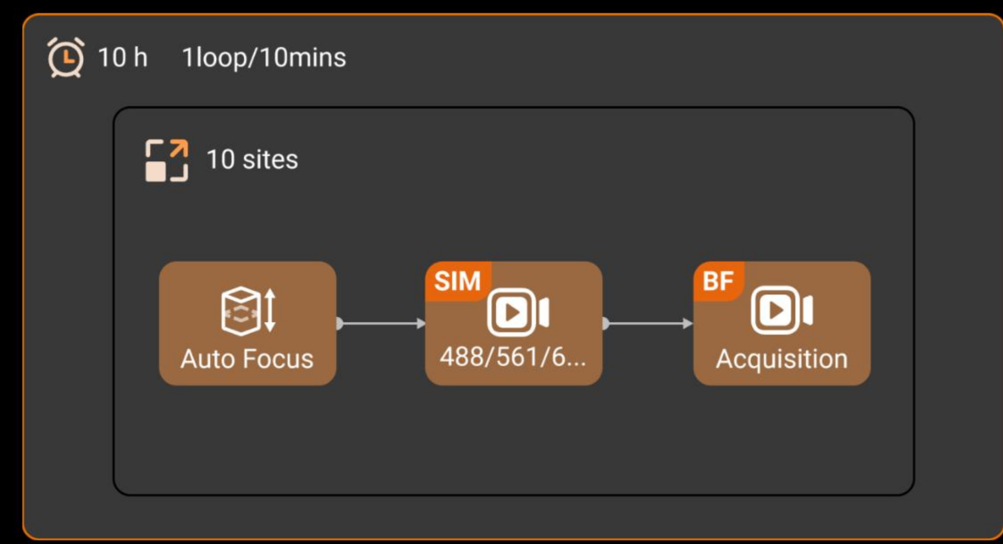
USER-DEFINED IMAGING WORKFLOW

Designed with various independent imaging unit modules, which can be assembled to create customized high-dimensional, complex imaging workflows. The assembly of these modules allows users to easily create their own tailored imaging workflows based on their experimental plans, pre experience, and previous parameter selections.



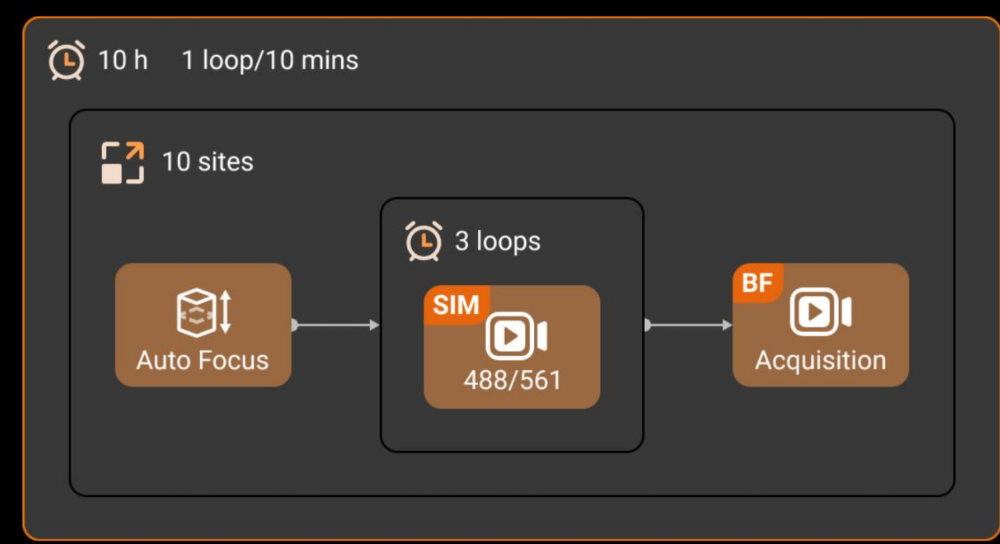
SIM + Brightfield Long-Term Imaging

- Applications: Dual-Modality + Multi-Channel + Multi-site + Long-Term Continuous Imaging with Auto Focus enabled



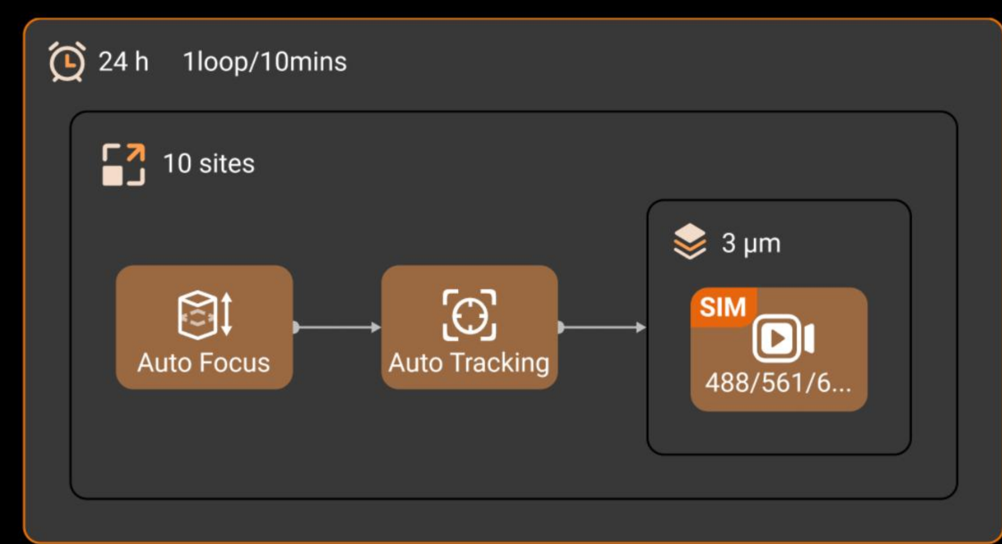
SIM + Brightfield Asynchronous Imaging

- Applications: Dual-Modality with different loops + Multi-Channel + Multi-site + Long-Term Continuous Imaging with Auto Focus enabled



High-Throughput Real-Time Tracking Imaging

- Applications: Multi-Channel + Multi-Layer + Multi-site + Long-Term Continuous Imaging, with Auto Focus and Intelligent Tracking enabled



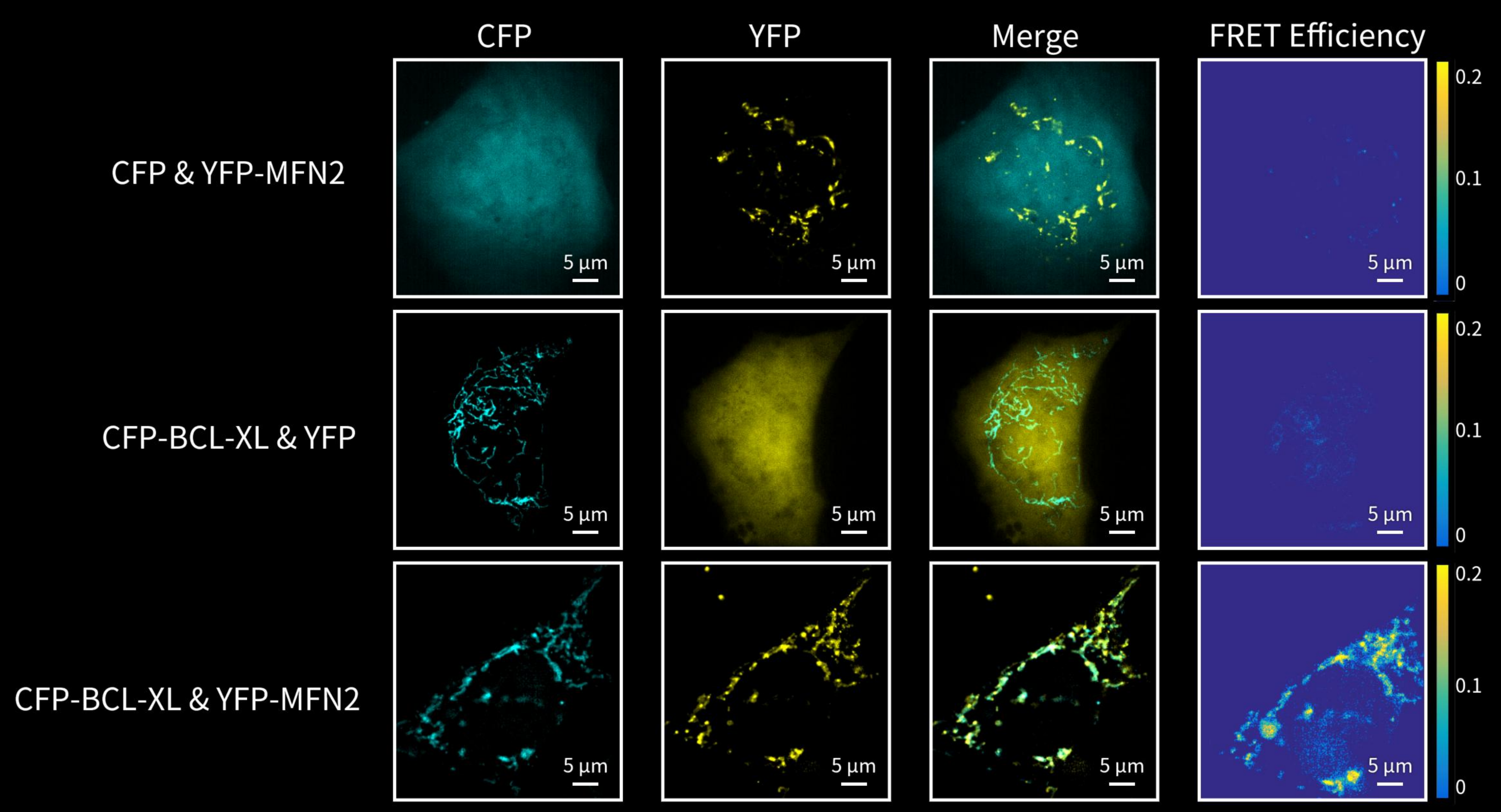
SYNER-FRET

SYNER-FRET is based on the MI-SIM dual-camera system, allowing synchronized or asynchronous imaging to support SYNER-FRET. It offers:

- Flexible configurations for CFP-YFP or GFP-RFP dual channels (445-515 nm and 488-561 nm) to meet different FRET imaging needs
- High-resolution FRET imaging for analyzing protein-protein interactions and achieving precise quantification of FRET efficiency
- Capability to simultaneously capture donor and acceptor signals in one step, reducing imaging errors
- Enhanced spatial and temporal resolution, allowing highly imaging efficience

Application: CFP-BCL-XL & YFP-MFN2

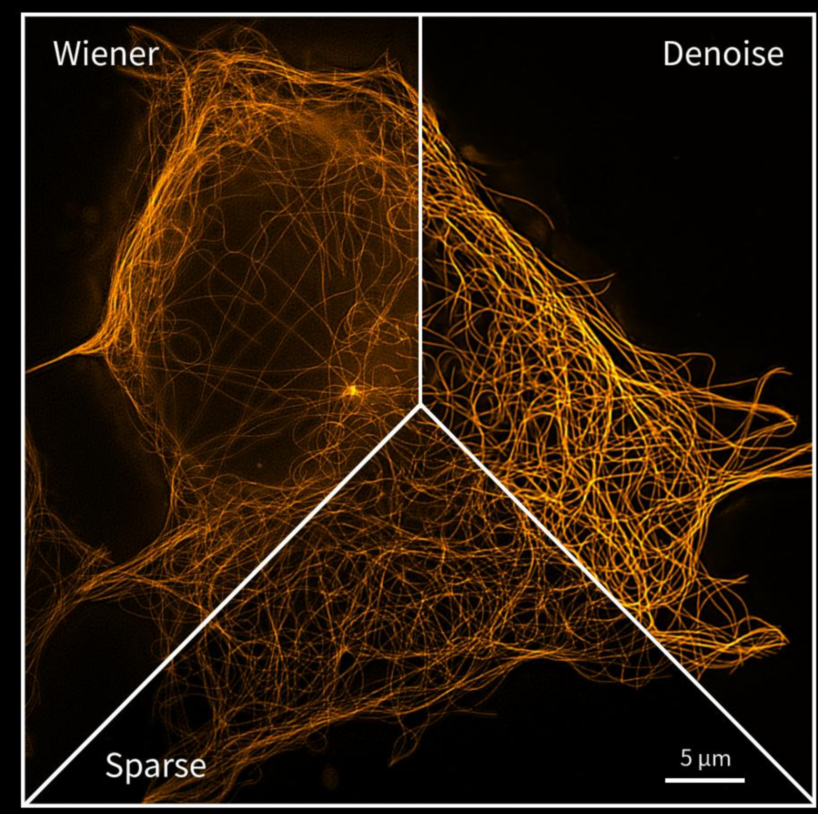
This example explored interactions between BCL-XL and MFN2 proteins. The FRET results revealed that MFN2 localized to mitochondria and BCL-XL was detected to interact dynamically with MFN2. The quantified FRET efficiency further confirmed their spatial proximity, contributing to studies on mitochondrial fusion and apoptosis-related pathways.



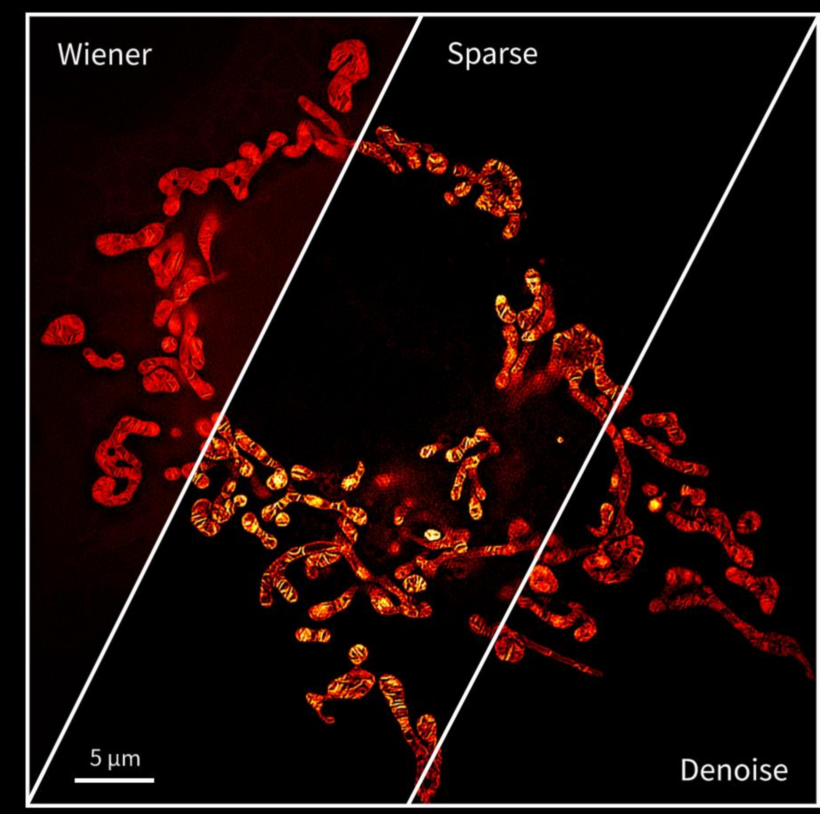
Sample: U2OS Live Cell Donor: CFP-BCL-XL (cyan) Acceptor: YFP-MFN2 (yellow)

Intelligent AI-Denoise Processing

MI-SIM builds models tailored to different cellular structures, imaging modalities, and noise characteristics. Utilize deep learning algorithms to train these models for noise reduction post-deconvolution, further enhance overall image quality and resolution.



Sample: U2OS Live Cell, Microtubule
Data Source: Professor Zhang's group, Huazhong University of Science and Technology



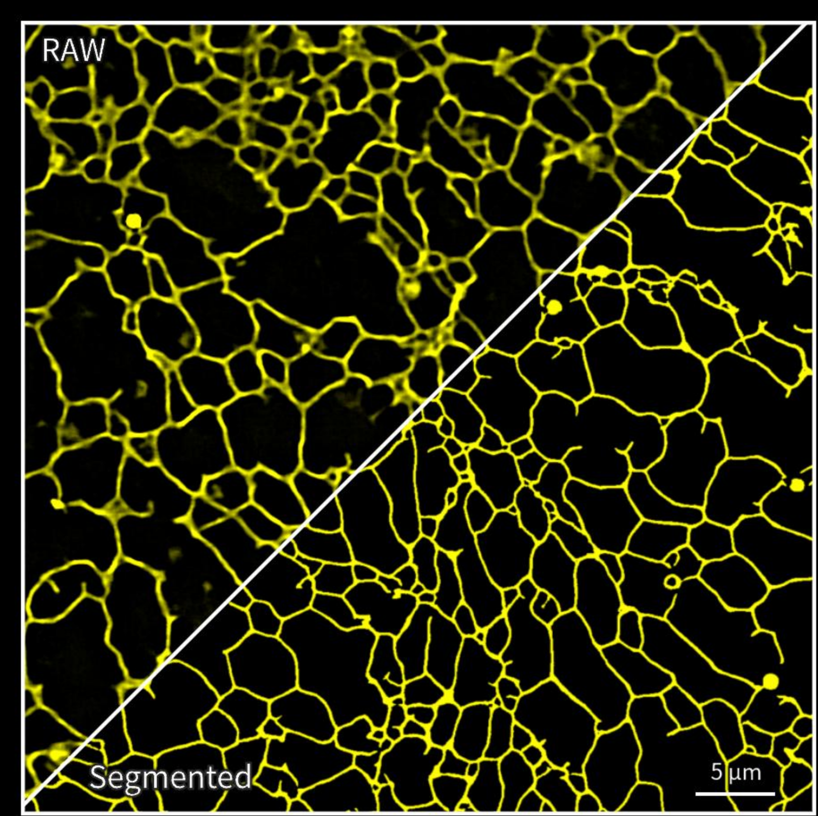
Sample: U2OS Live Cell, Inner Mitochondrial Membrane
Data Source: CSR Biotech

AI Segmentation & Recognition

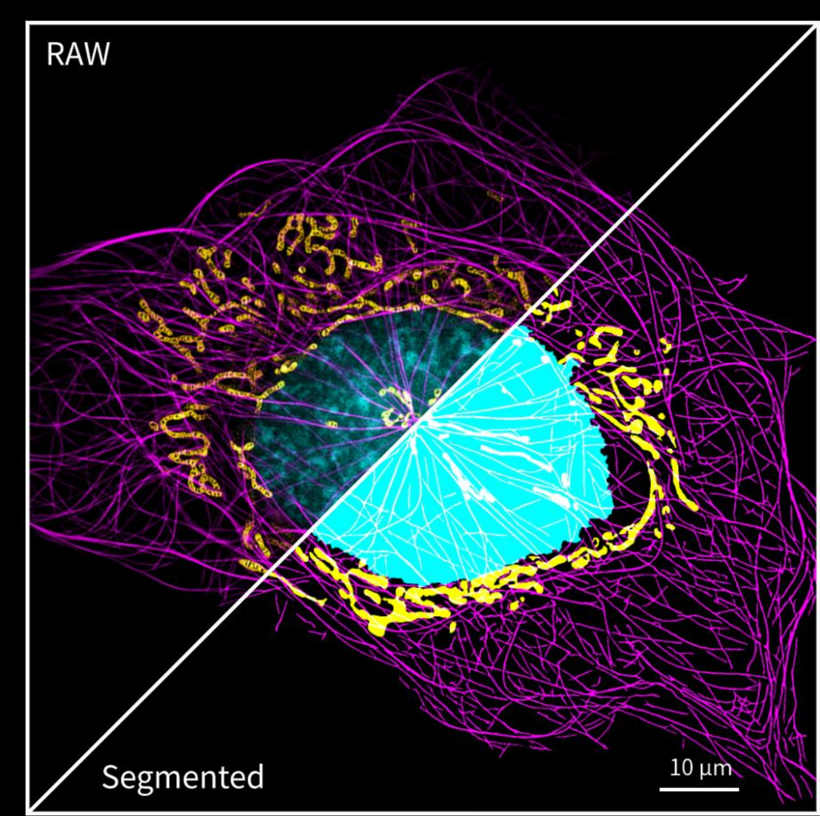
MI-SIM builds image datasets for different cell types, imaging modalities, and biological structures, and train generalized deep learning models for image segmentation to achieve one-click automatic segmentation and identification of target structures.

MI-SIM supports input of multi-dimensional data, including time, space, spatio-temporal sequences, multi-channels, large fields of view, and various imaging modalities.

Examples:
Single-channel segmentation of live-cell endoplasmic reticulum
Multi-channel simultaneous segmentation of various organelles, including mitochondria, microtubules, and nucleus



Sample: U2OS Live Cell, Endoplasmic Reticulum
Data Source: CSR Biotech



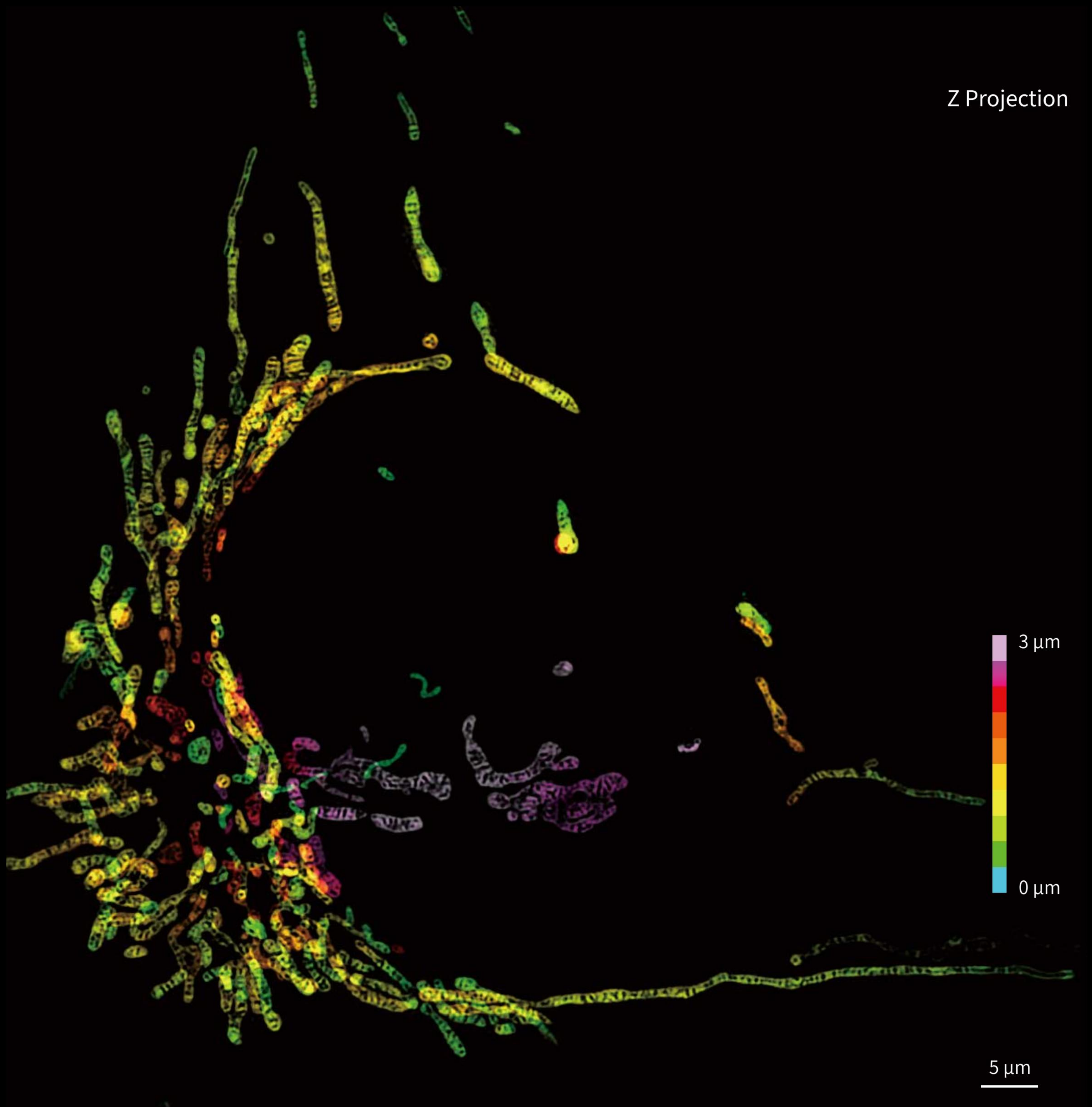
Sample: U2OS Live Cell, Cell Nucleus (cyan), Microtubule (magenta), Inner Mitochondrial Membrane (yellow)
Data Source: CSR Biotech

APPLICATIONS

Our tools are versatile. Whether observing ultrastructures like the cytoskeleton and mitochondria cristae or capturing dynamic changes post-drug stimulation, MI-SIM is at the forefront. Monitoring live cell statuses and organelle interactions is much easier with our technology.

Three-dimensional Mitochondrial Structure

Three-dimensional super-resolution allows the inner membrane structure of mitochondria in live cell to be clearly visualised.

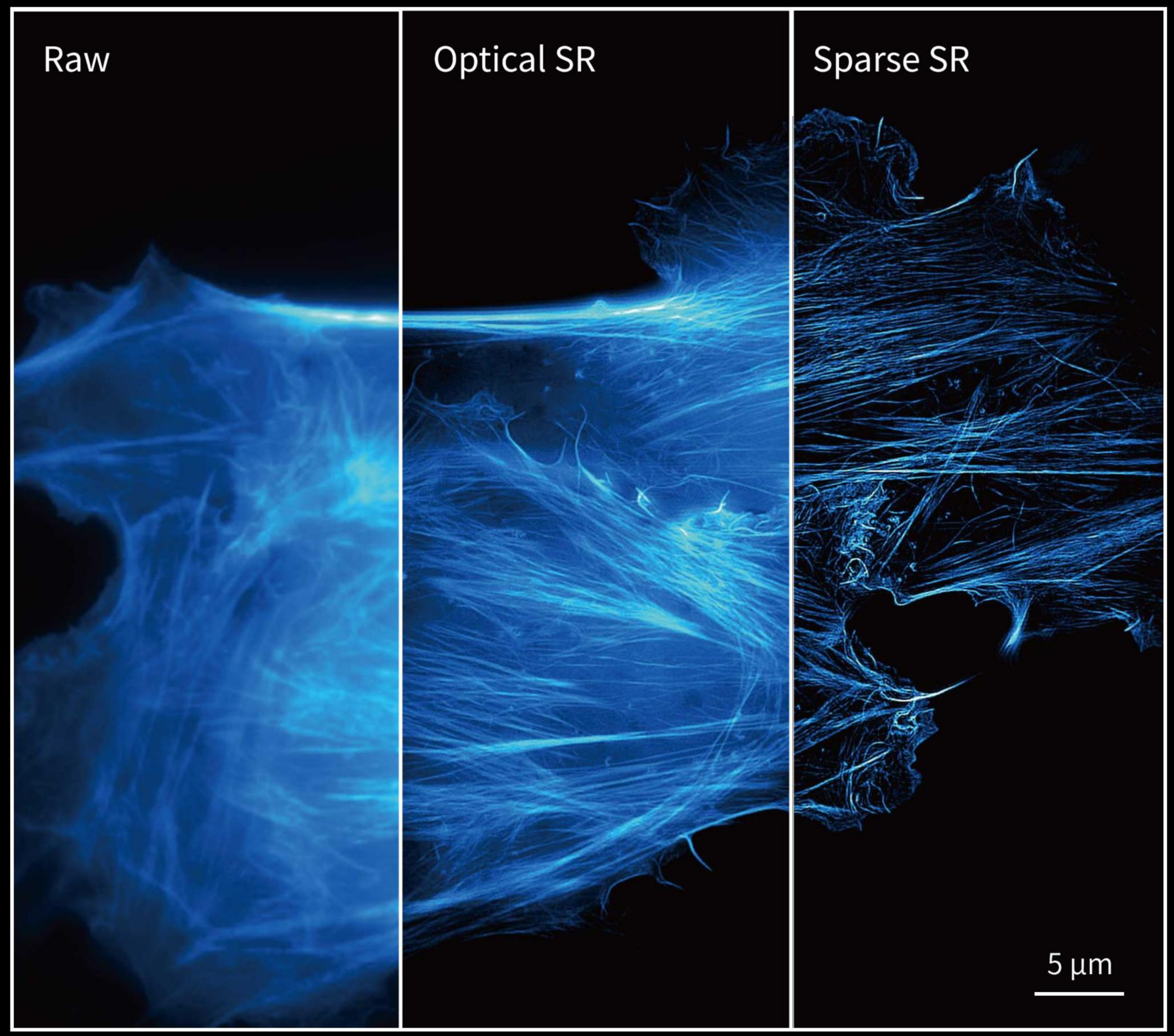


Microtebule of *C. elegans* Muscle Cells

MI-SIM deep super-resolution capability to acquire microtubule protein structure in *C. elegans* muscle cells.

Microfilament of U2OS

Super-resolution imaging with Sparse deconvolution provides 60 nm resolution, representing a significant improvement over optical super resolution, to reveal finer detail of the microfilament.



APPLICATIONS

Ultrastructure of the synaptonemal complex

With 60 nm resolution achieved in live cells, it is possible to observe the intermediate space of the synaptonemal complex.

Enabled by:

- 60 nm super-resolution in live cell
- Long-term imaging of live cell

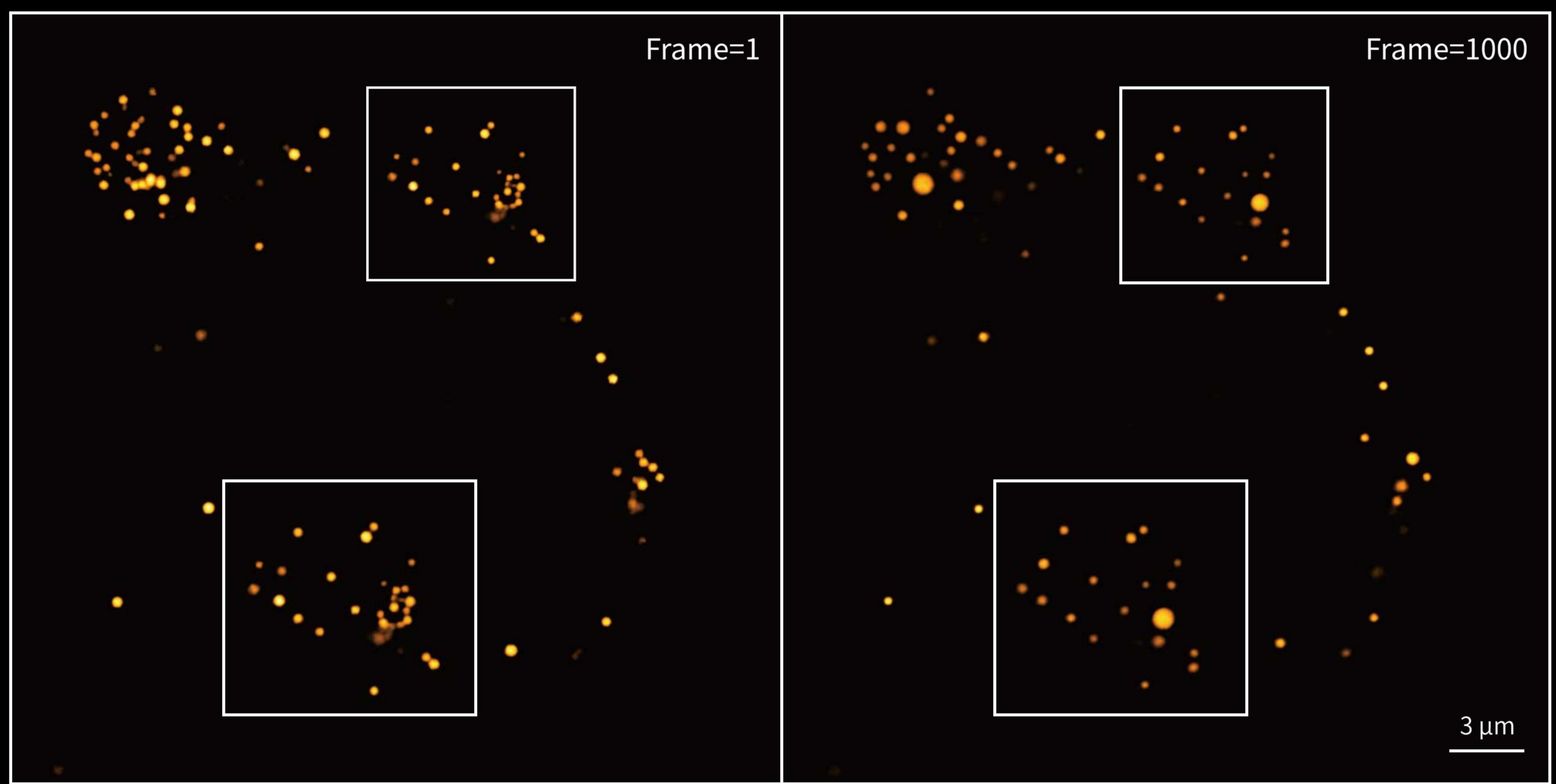
Lipid Droplet Fusion

MI-SIM was used to capture the process of lipid droplet fusion in HeLa cells for 1000 consecutive frames. However, the fluorescence will be bleached after 100 frames with confocal microscope, demonstrating MI-SIM's ultra-low photobleaching capability.

Enabled by:

- Ultra-low photobleaching
- Long-term imaging of live cell

Scan the QR code
to access the application video



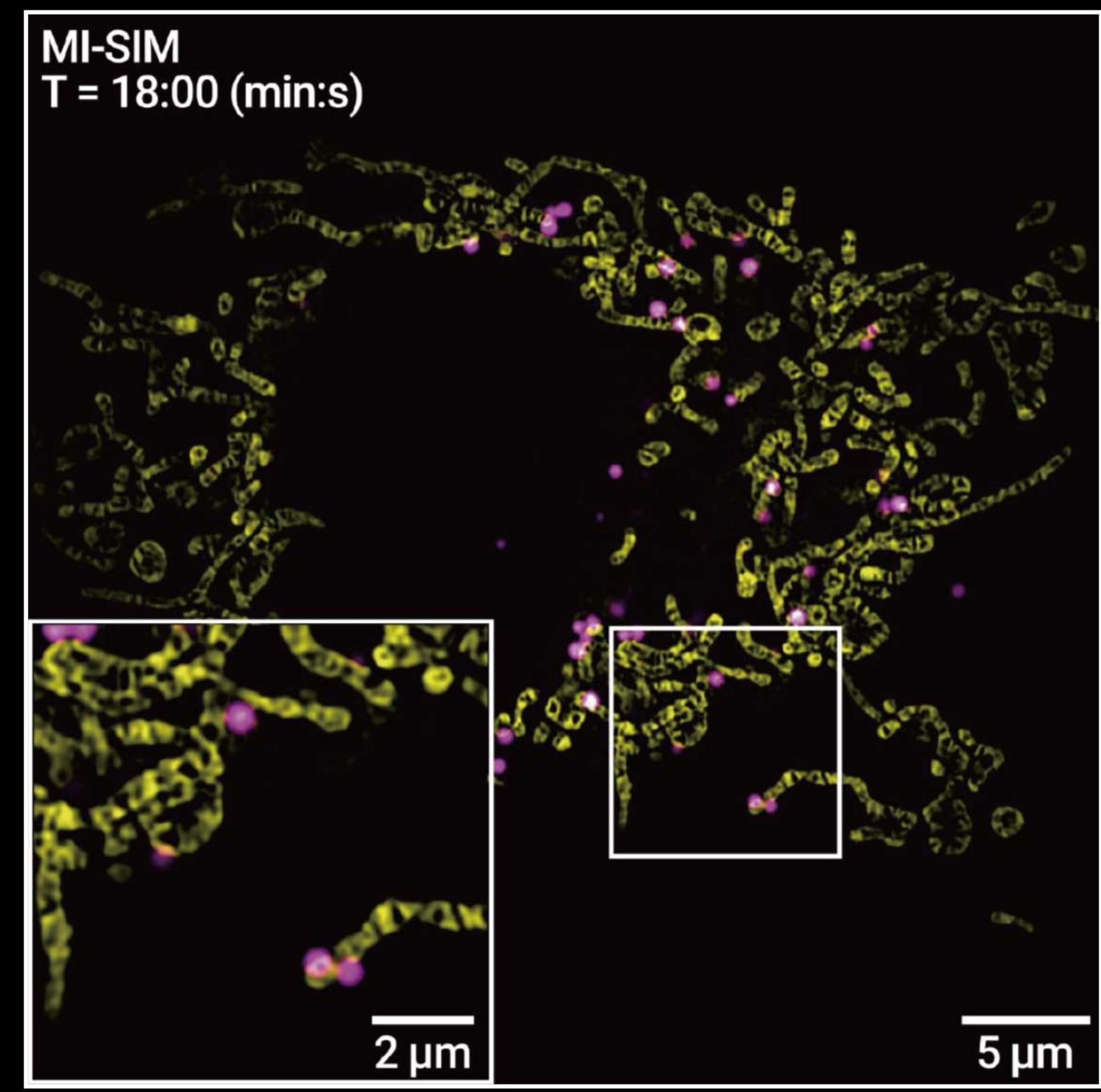
Long-term Imaging of Mitochondria

The ultra-low photobleaching of MI-SIM allows continuous imaging of mitochondria in COS7 cells for over 20 minutes, while mitochondria will rupture and die in about 2 minutes using confocal imaging method.

Enabled by:

- Ultra-low photobleaching
- Long-term imaging of live cell

Scan the QR code
to access the application video



Inner Mitochondrial Membrane (yellow), Lipid Droplet (magenta)

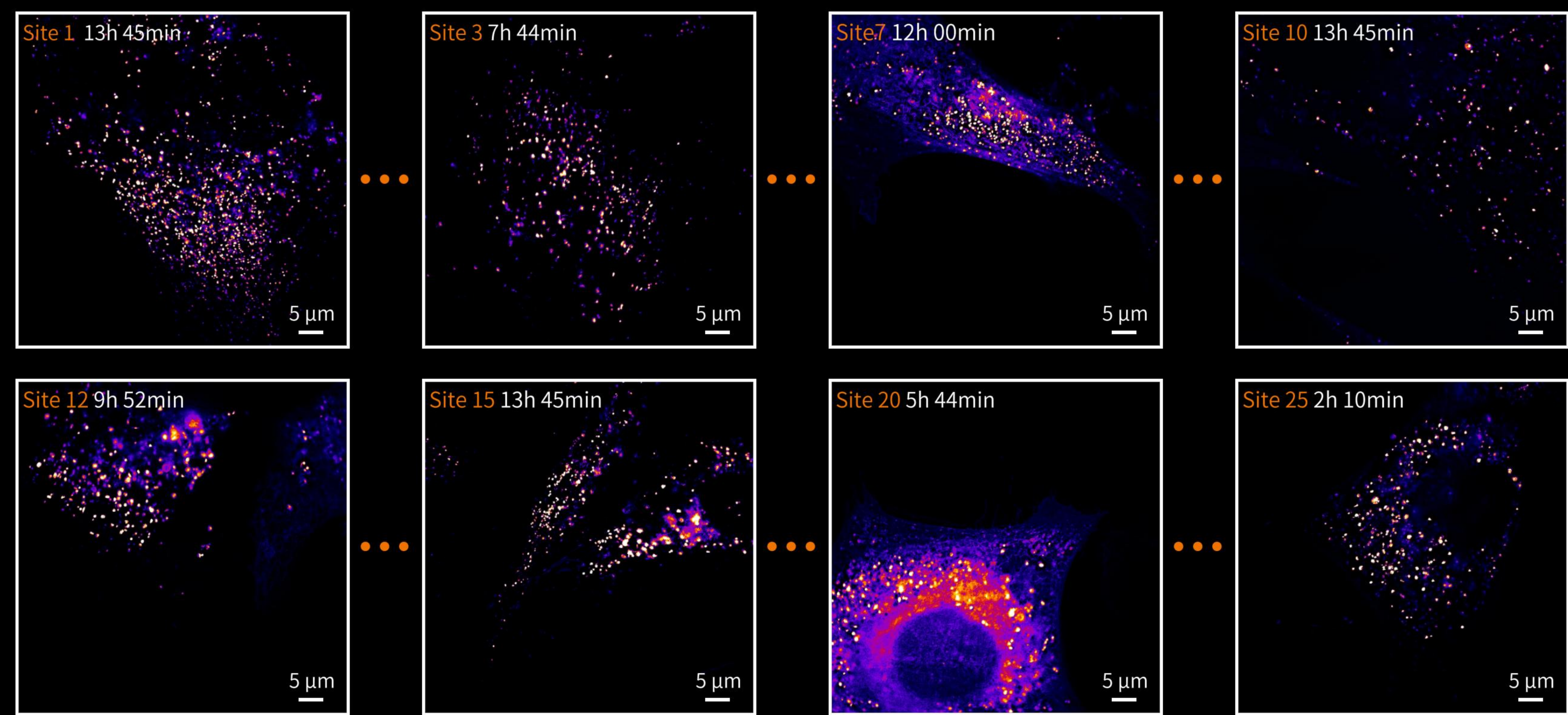
Migration of Bone Marrow Stem Cells

Overnight capture of bone marrow stem cell migration across multiple sites with high-throughput simultaneous imaging. This process, capable of managing multiple data sets in a single imaging session, significantly enhances efficiency.

Enabled by:

- Multi-site, long-term imaging
- Multi-color, simultaneous imaging
- Intelligent tracking

Scan the QR code
to access the application video



APPLICATIONS

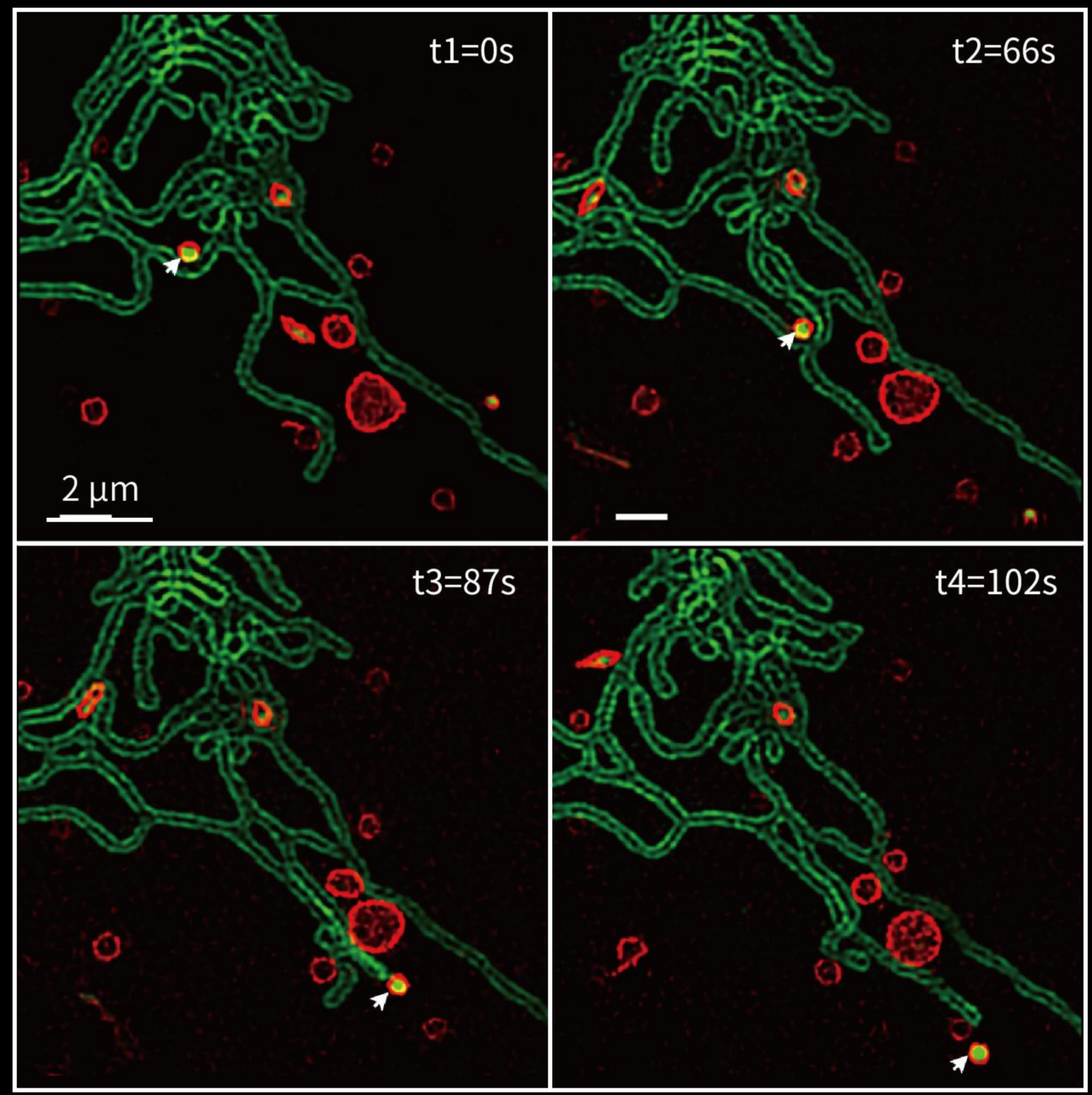
Interactions of Lysosome and Mitochondria

MI-SIM's ultra-low photobleaching and super-resolution clearly captured the dynamic process of lysosome-mediated mitochondrial autophagy in live cell.

Mitochondria (green), lysosome (red)

Enabled by:

- Super-resolution in live cell
- Long-term imaging of live cell
- Ultra-low photobleaching

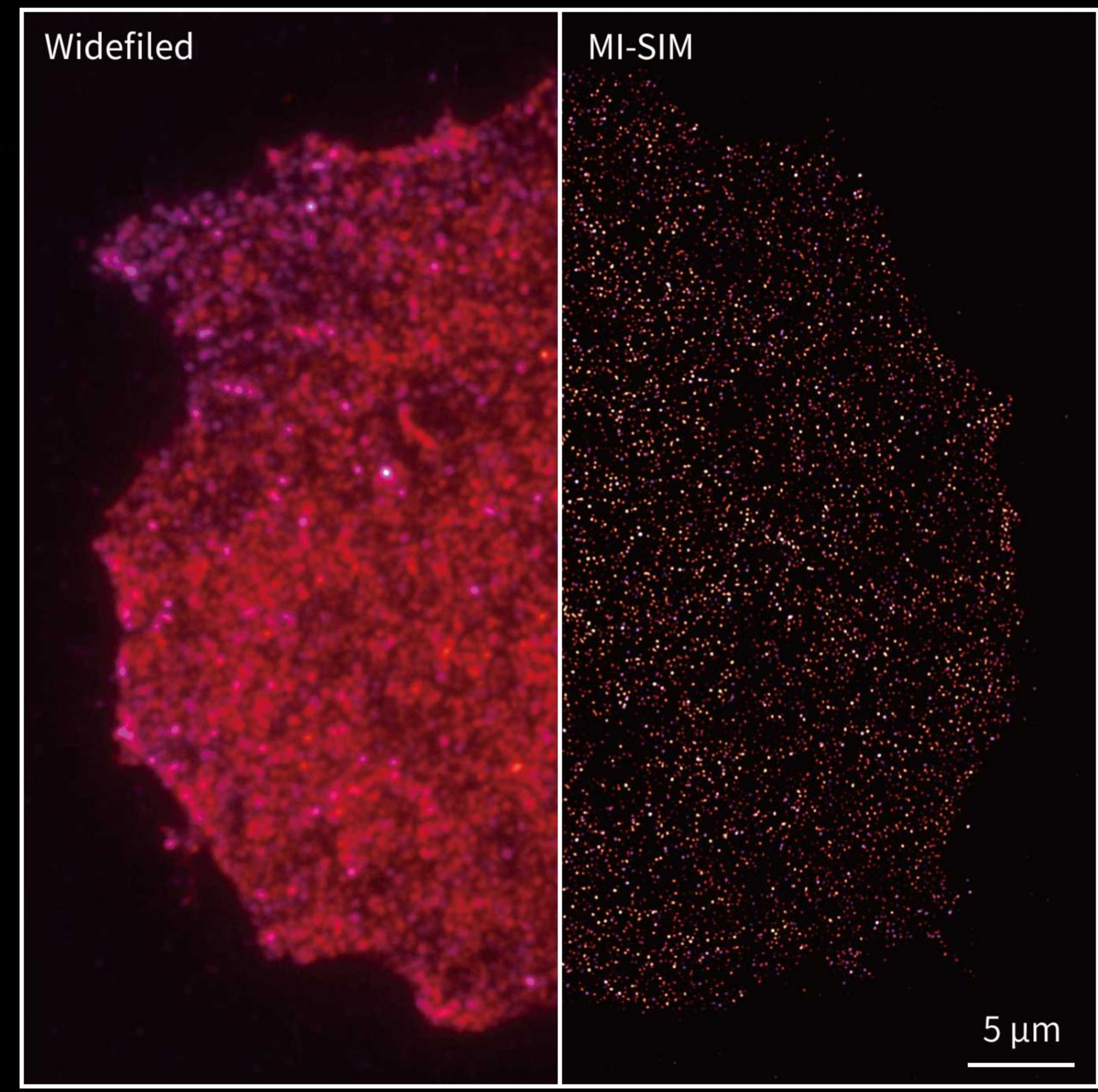


Membrane Protein Localization

Combining ultra-high resolution and background removal, MI-SIM's TIRF-SIM mode can clearly distinguish adhered protein spots and enable further statistics.

Enabled by:

- Large FOV imaging
- Live-cell super resolution
- Various imaging modalities



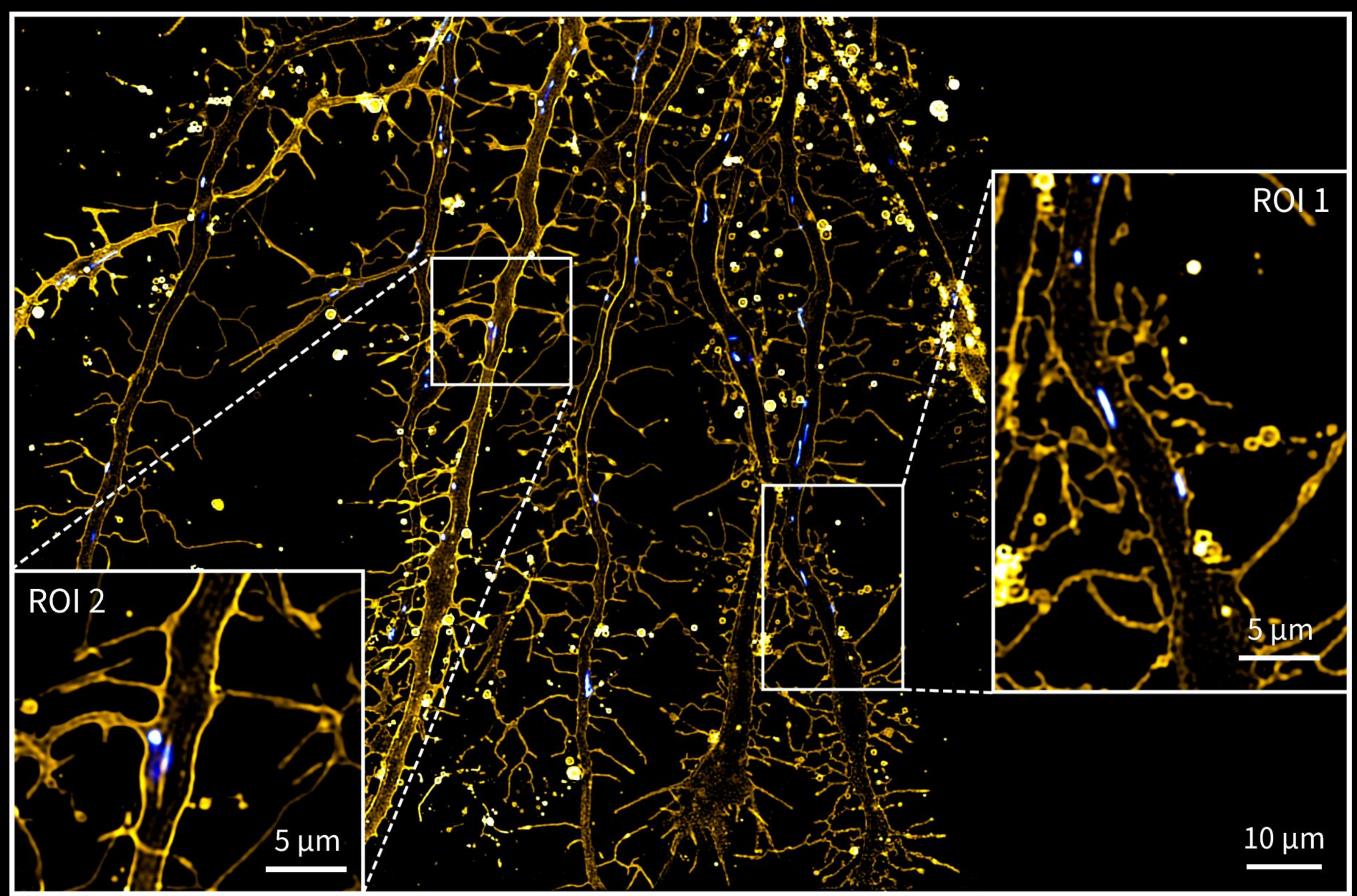
Mitochondrial Movement in Neurons

The large FOV of over 100 µm enables users to study processes, such as mitochondrial movement in neurons, in large areas to capture the complete biological process.

Mitochondria (blue), cell membrane of neuron (orange)

Enabled by:

- Large FOV imaging over 100 µm in one site
- Multi-color, simultaneous imaging



Scan the QR code
to access the application video

Mitochondria of Mouse Sperm

The spring-shaped mitochondria of mouse sperm labeled with AIE dye were imaged using 2D-SIM mode to facilitate the development of new dyes.

Enabled by:

- Ultra-high resolution
- Ultra-low photobleaching
- Various imaging modalities

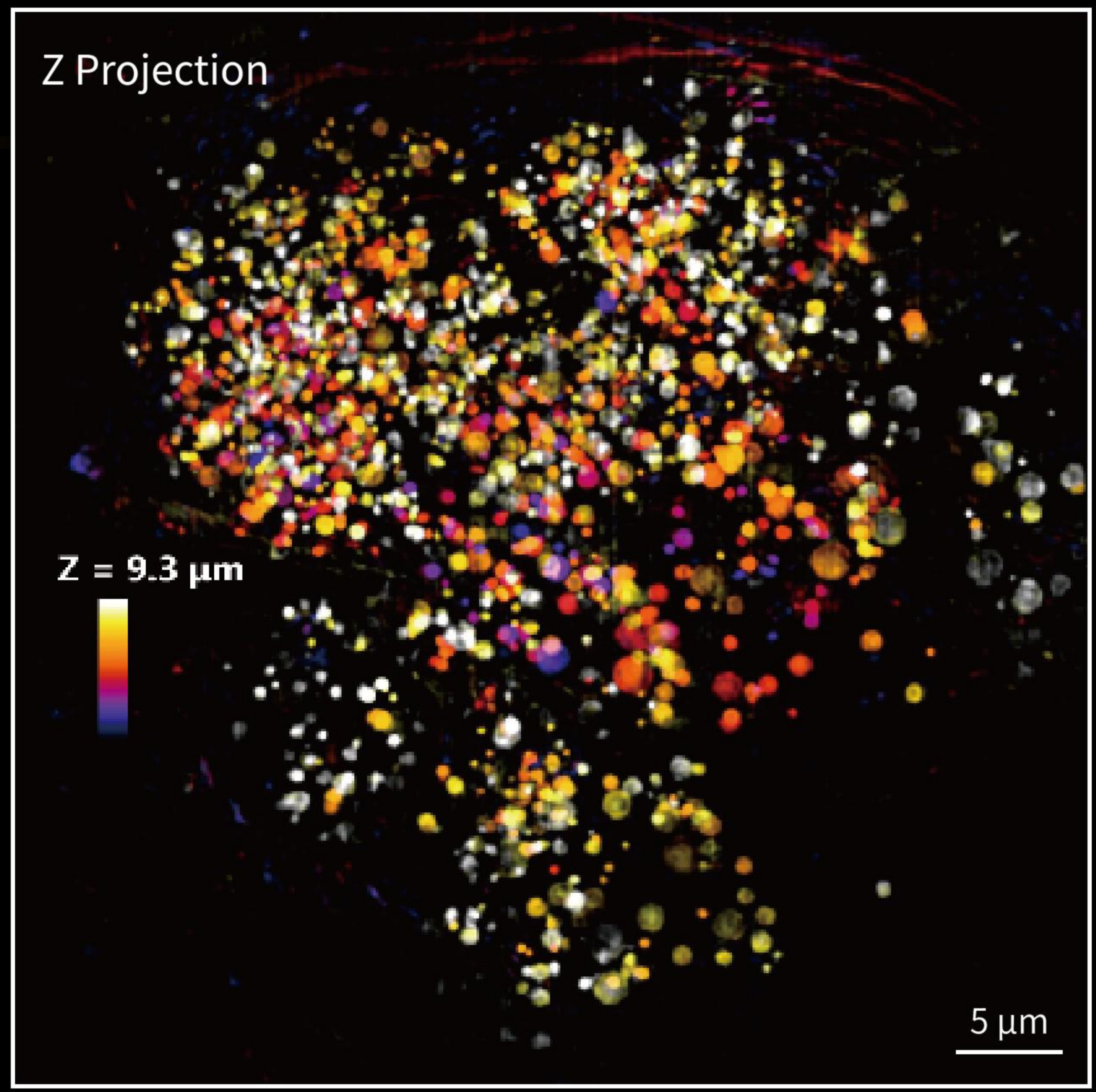
APPLICATIONS

Zebrafish Gonadal Mitochondria

Imaging mitochondria within excised gonad tissue from living zebrafish using 3D techniques reveals the spatial morphological changes of the mitochondria.

Enabled by:

- Deep imaging
- Ultra-high resolution
- Long-term imaging of live cell
- Ultra-fast imaging speed



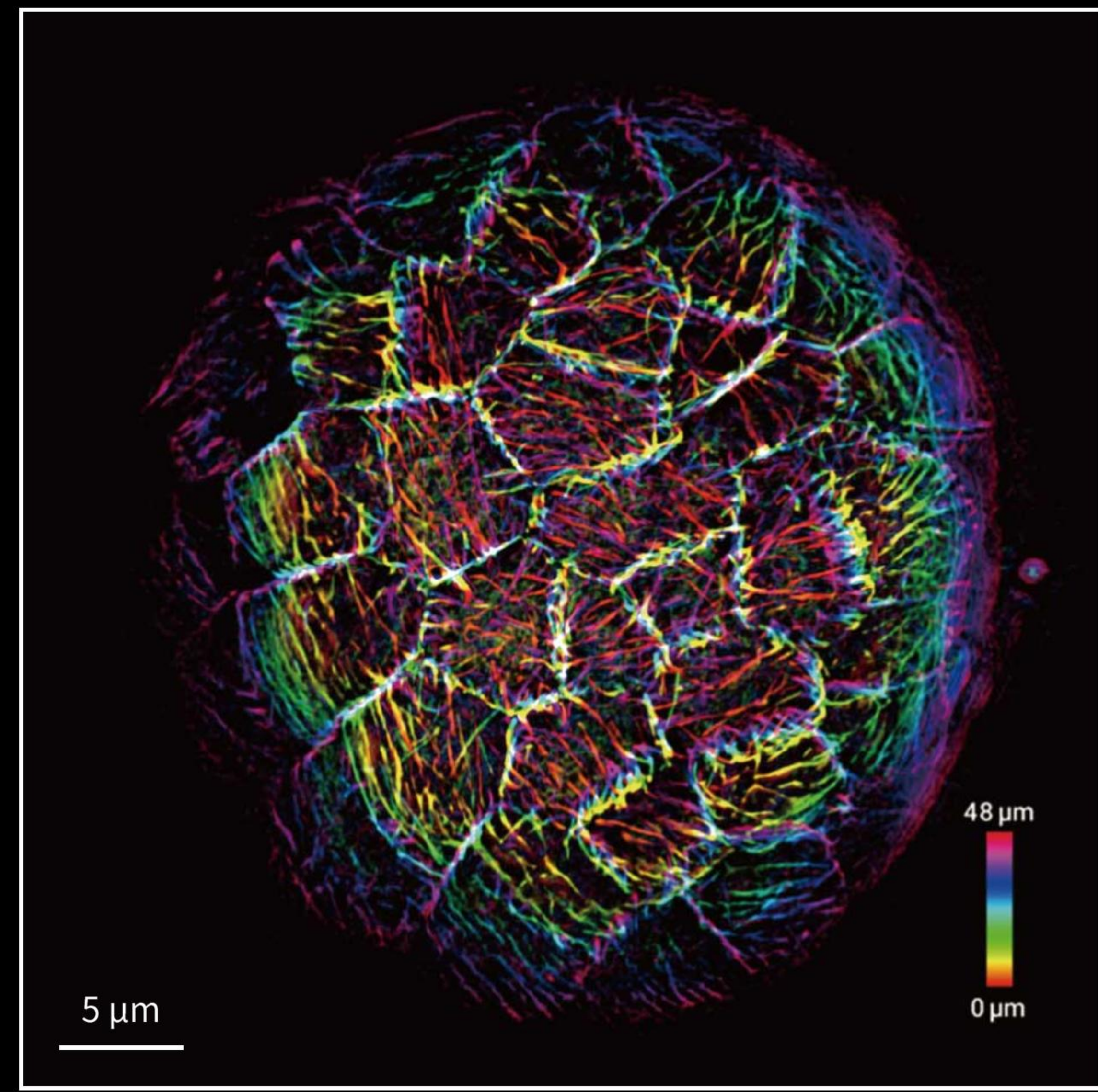
Thickness of Apical Meristematic Tissue Microtubules in Arabidopsis thaliana

In MI-SIM adapted for thick sample imaging, the fine structure of Arabidopsis microtubules can still be resolved at a depth of 48 µm in three-dimensional super-resolution.

Enabled by:

- Deep Imaging
- Super resolution

Scan the QR code
to access the application video

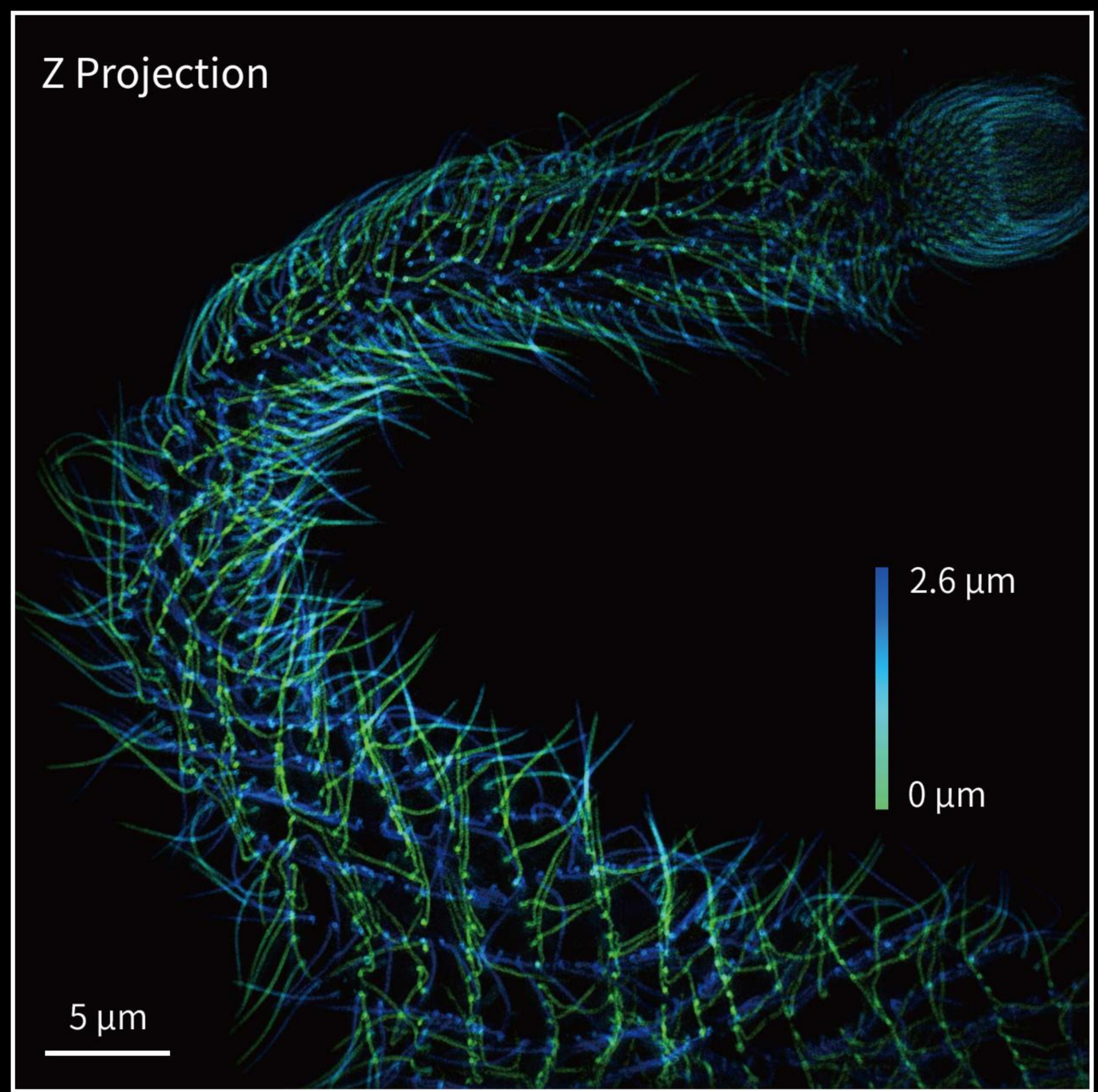


Lacrymaria olor's Microtubules

Lacrymaria olor, a protozoan, is imaged using 3D-SIM to visualize its microtubules. Its unique structure contributes to the development of new elastic plastics.

Enabled by:

- Deep Imaging
- Super resolution



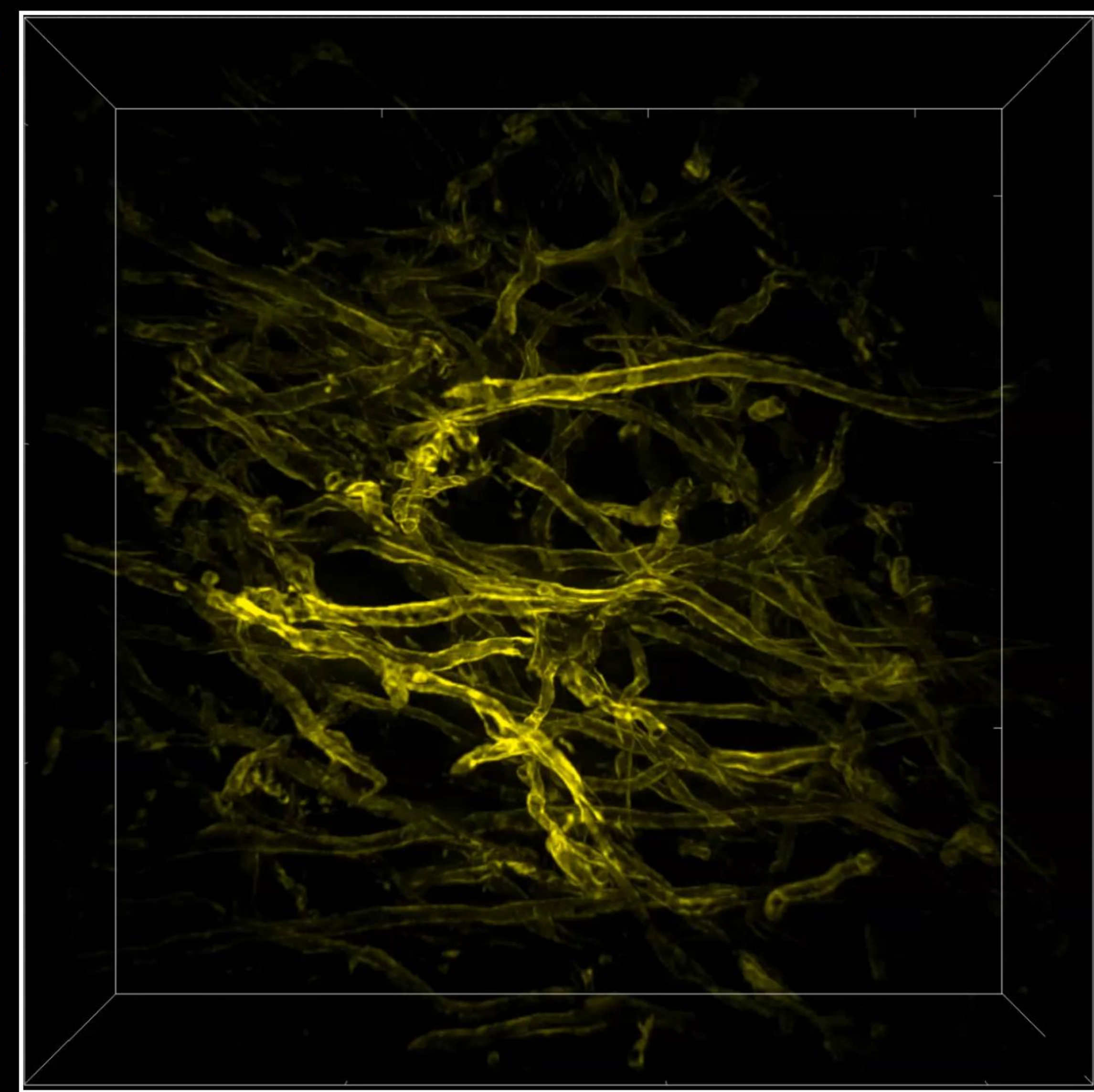
Deep Imaging of Neuronal Myelin

In 3D-SIM mode, the tubular structure of neuronal myelin sheaths within mouse brain tissue is captured with clarity, even at a depth of 30 µm.

Enabled by:

- Deep imaging
- Various imaging modalities

Scan the QR code
to access the application video



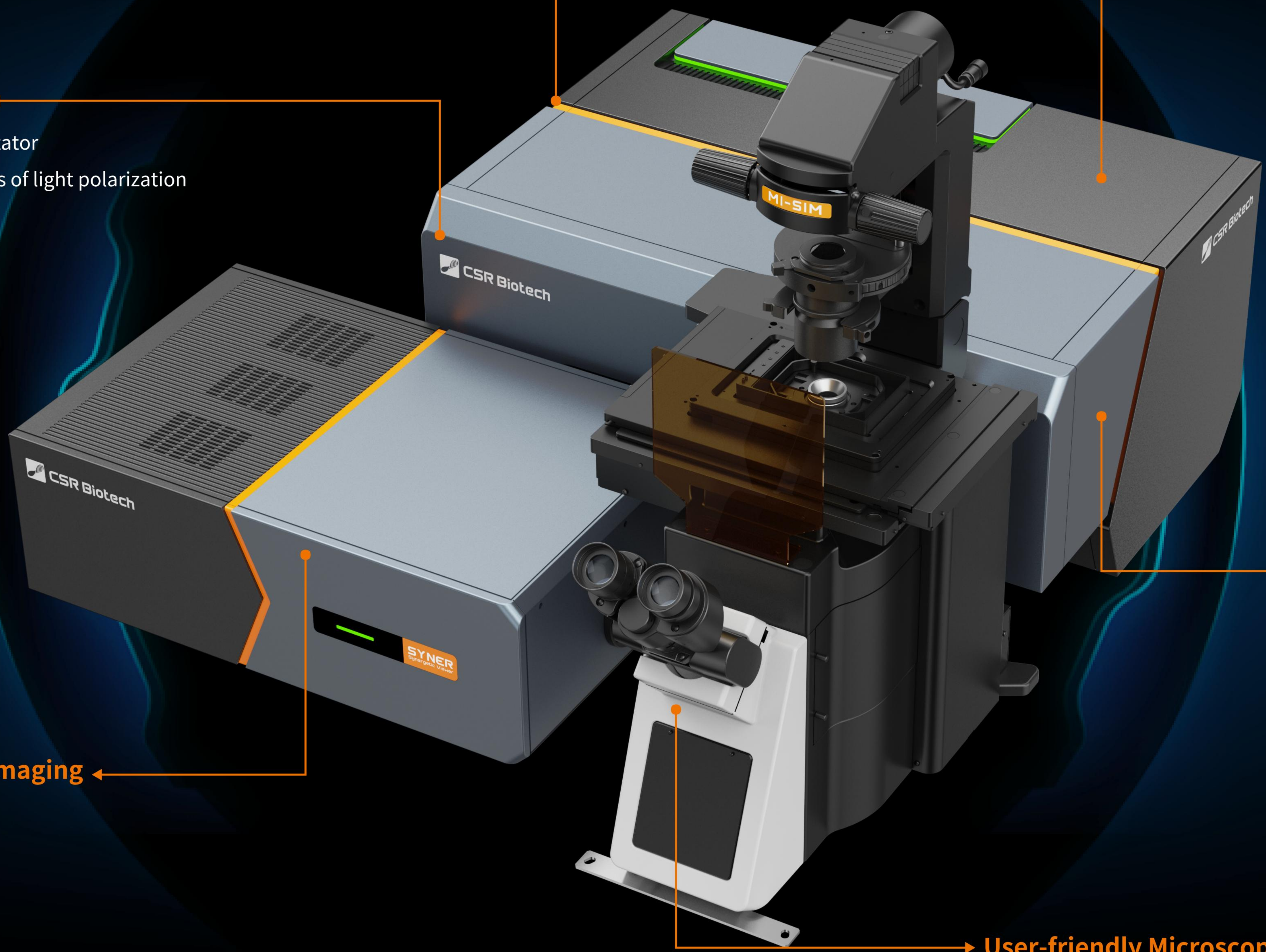
INTEGRATED HIGH-END HARDWARE

Real-time Control Module (RCM)

Replacing conventional NI control system with self-developed
ZYNQ based high-speed control system

Polarization Rotator (PR)

Customized spliced polarization rotator
Real-time deflection in all directions of light polarization



High Dynamic SLM

Dynamic range up to 5.76 kHz
Rapid switching of diverse imaging modes

Integrated System

All-in-one microscope
Intelligent indicator shows system status

Sequence/Simultaneous Multi-Channel Imaging

Filter wheel and multi-camera imaging are available
Multi-channel imaging without fluorescent crosstalk

User-friendly Microscope

Support Evident IX83 or Nikon Ti2-E
The operation can be reached with one click

INTELLIGENT OPERATING SOFTWARE

Imaging Operation Area

Easy setting of multiple conditions

Microscope Control Area

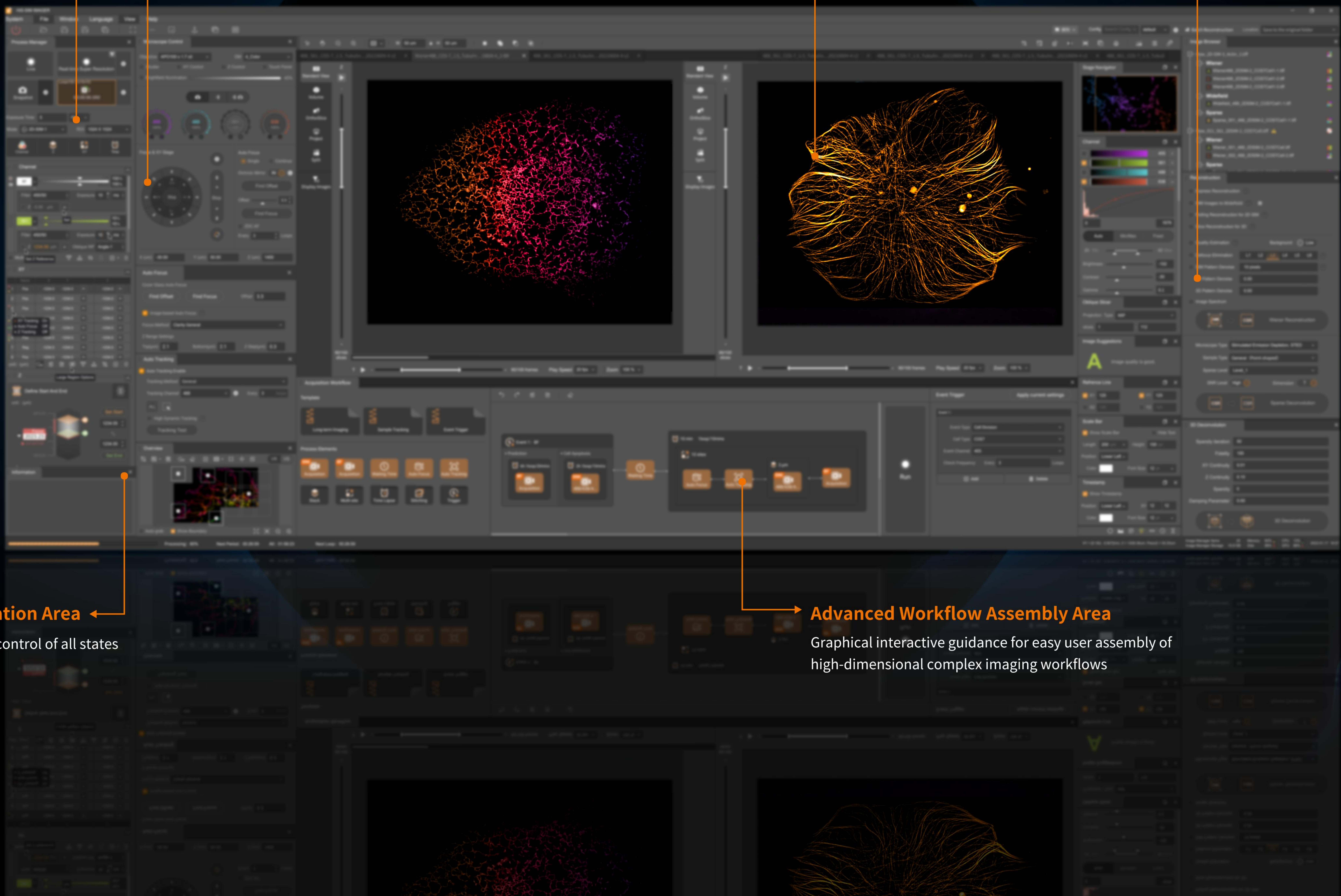
Simplify imaging manipulation

Image Interaction Area

Image preview & acquisition intelligent user interface

Image Reconstruction Area

One-click interaction, avoiding the difficulty of complex parameter selection



Information Area

Full-time control of all states

Advanced Workflow Assembly Area

Graphical interactive guidance for easy user assembly of high-dimensional complex imaging workflows

TECHNOLOGIES

An Overview of the Technologies that MI-SIM is Powered by

Hessian SIM	Dual breakthrough achieving 85 nm live cell imaging with low photobleaching and high speed (Huang, 2018)
Sparse SIM	First-ever 60 nm live cell long-term imaging technology (Zhao, 2022)
Real-time SIM	Provide accurate real-time preview in super resolution mode, enhancing imaging succes
Large-FOV SIM	Merge ultra-high resolution with a vast field of view in one site, and can be extended to seamless image stitching
IMAGER	The all-in-one solution for super-resolution imaging of live cell Simplifying the entire process with user-friendly operation
FINER	Enhance various fluorescent images with improved resolution, SNR, contrast Elevate Image fidelity and background removal
TRACKER	Intelligent XYZ tracking Eliminating focus and field of view deviations caused by biological activities in long-Term imaging
SYNER	Synchronized super-resolution imaging Uniting multiple lenses, channels, and expansive fields of view for high-speed image acquisition

SAMPLE TYPES

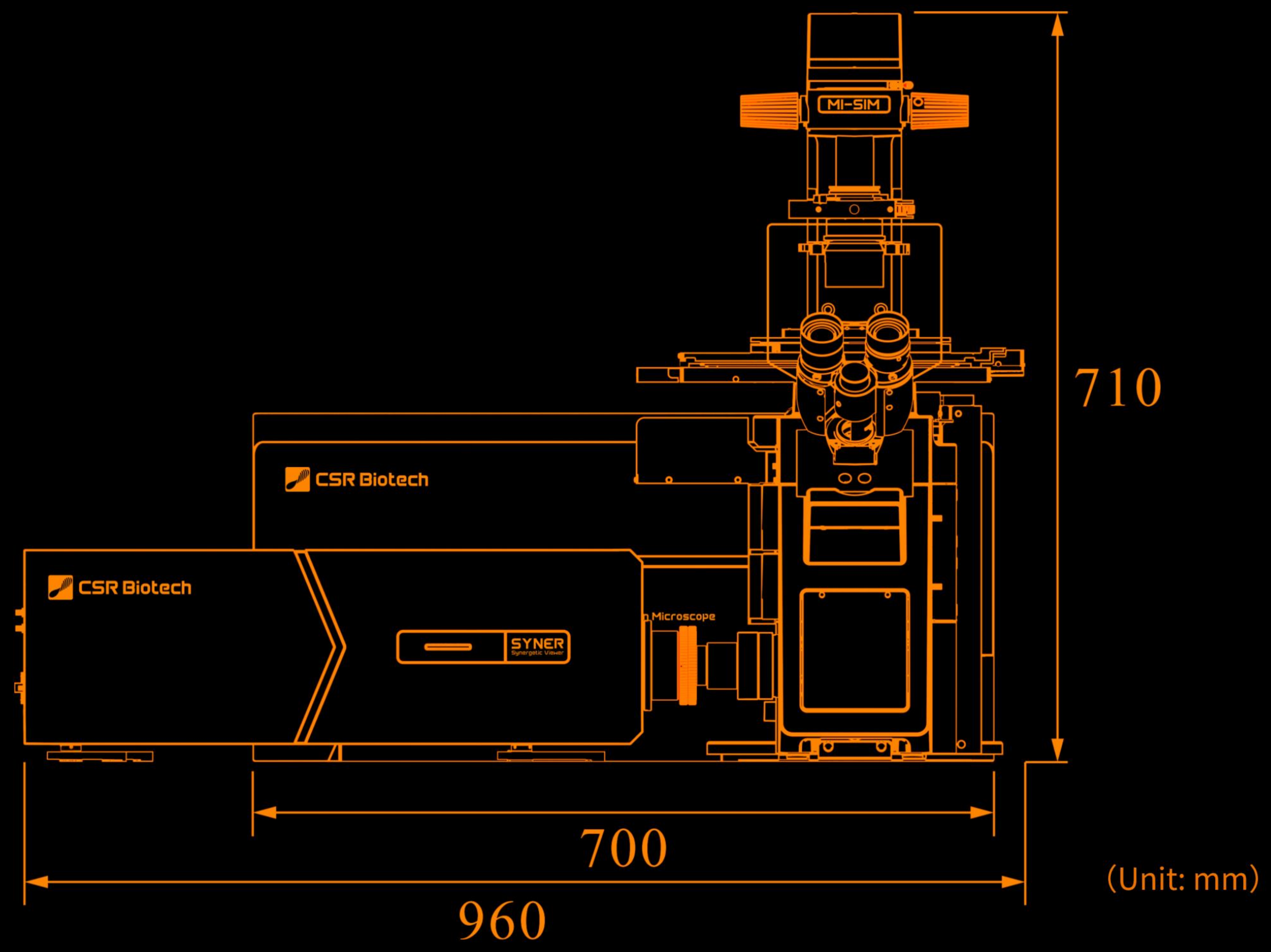
Sample Type	Classification
Animal live cell	Primary cells and cell lines (neuron, cardiomyocytes, live cell stem cells, adipocytes, etc.)
Plant live cell	*Arabidopsis thaliana*, tomato seedlings, corn leaves, etc
Fixed cells	Walled cells, suspended cells, swollen cells, etc.
Tissue slice (Immunohistochemistry)	Paraffin section, frozen section, etc.
Microbe	*E. coli, Streptococcus*, yeast, phytoplankton, zooplankton, etc.
Organoids	Small intestinal epithelial organoids, etc.
Model animal	*Elegans* (neurons, intestinal vesicles, microtubules, mitochondria, etc.), zebrafish embryos, drosophila brain, and others
Other samples	DNA origami, self-developed dyes, luminescent films, auto-fluorescent materials, etc.

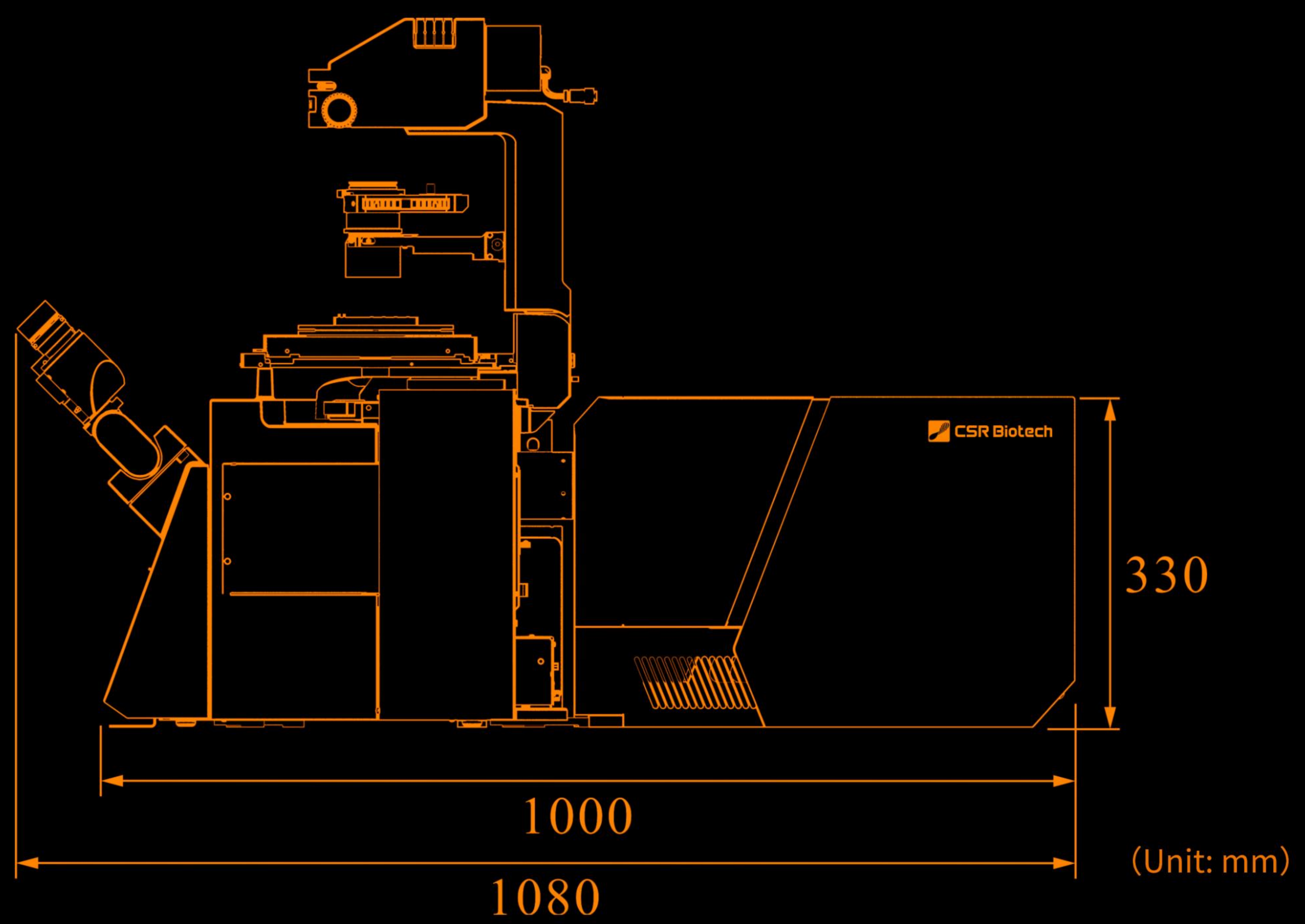
SPECIFICATIONS

Imaging Modes	All 25 modes: Widefield: brightfield, fluorescent widefield, oblique(multi-angle) TIRF: TIRF(multi-angle), TIRF-SIM(multi-angle) 2D SIM: 2D-SIM(multi-angle), 2D-SIM Stack(multi-angle) 3D SIM: 3D-SIM(multi-angle), 3D-SIM Slice(multi-angle)	
Resolution	XY: 60 nm†， 85 nm† Z: 200 nm†， 300 nm†	
Imaging Speed*	**Teledyne Photometrics, Kinetix**	**Hamamatsu, ORCA-Fusion BT Hamamatsu, ORCA-Flash4.0 V3**
	Max. 107 fps @8 bit/4608 × 4608	Max. 25 fps @16 bit/4608 × 4608
	Max. 330 fps @8 bit/2048 × 2048	Max. 49 fps @16 bit/2048 × 2048
	Max. 699 fps @8 bit/1024 × 3320	Max. 79 fps @16 bit/1024 × 3320
	Max. 699 fps @8 bit/512 × 3320	Max. 112 fps @16 bit/512 × 3320
	Max. 1500 fps @8 bit/206 × 2048	Max. 564 fps @16 bit/144 × 2048
Field of View	Max. 150 × 150 µm @100 × objective Max. 250 × 250 µm @60 × objective	
Lasers	Compatible multi-color coupled lasers Standard: 405 nm, 488 nm, 561 nm, 640 nm Optional: 445 nm, 473 nm, 515 nm, 532 nm, 594 nm, 607 nm, 647 nm☆	
Objectives	Apo 100 × /1.5 Oil Optional: Apo 60 × /1.5 Oil Suitable for 20~100 × with immersion of oil, silicone oil, water and air	
Multi-Channel Imaging	High-speed sequence imaging with multi-color wheel Multi-FOV, multi-channel with multi-camera imaging	

† 60 nm and 200 nm correspond to Sparse SR, 85 nm and 300 nm correspond to optical SR
* The super-resolution reconstruction with Rolling can achieve ultimate speed
☆ Compatible with typical fluorescence excitation wavelengths

PRODUCT DIMENSION





ABOUT US

At CSR Biotech, we are dedicated to pushing the boundaries of exploration and medical research, shaping the future of science and medicine.

Our journey began in the interdisciplinary labs of Peking University, where our founding team collaborated with some of the brightest minds in the field of biological imaging and scientific discovery. With an unwavering commitment to advancing scientific knowledge, we officially incorporated the company in 2019.

Today, our headquarters are located in Guangzhou, boasting a team of 100 employees and a 4,000-square-meter facility. Our state-of-the-art infrastructure includes a cell culture operation laboratory, a cell imaging laboratory, a microscopic imaging technology R&D laboratory, and a 10,000-level cleanliness assembly line workshop. Additionally, we are equipped with a high-performance computing cluster tailored for the analysis and management of petabyte-scale live cell data, reflecting our commitment to pioneering advancements in biological research.



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