

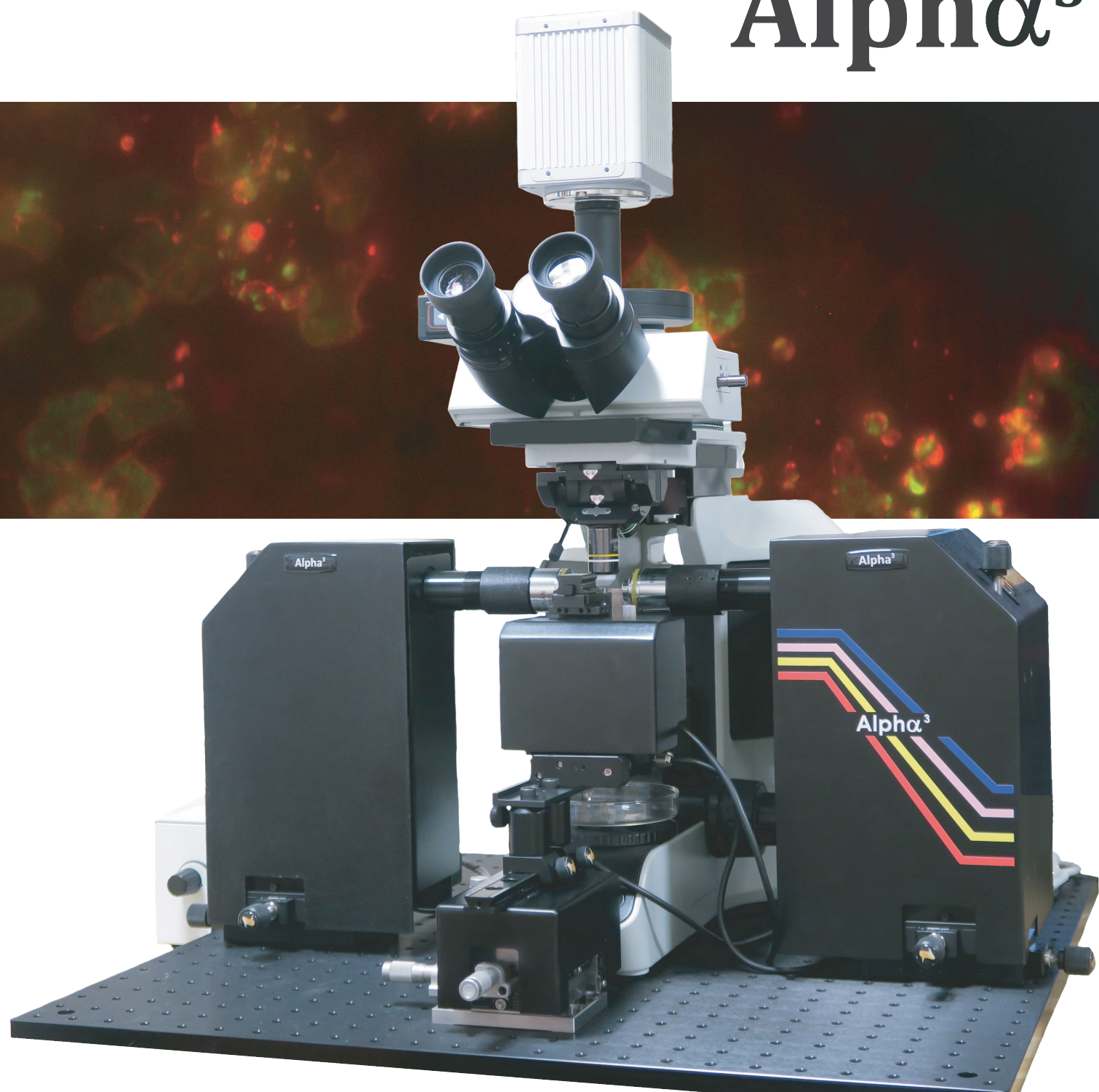
PhaseView

Life Science Instrumentation

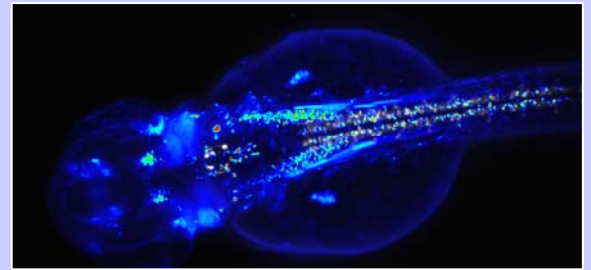
Light Sheet Fluorescence Microscope

New Generation

Alpha³



Modular Light Sheet Microscope



Alpha³ is a new generation of light sheet fluorescence microscope addressing the needs of high temporal resolution along with spatial high resolution to achieve qualitative and quantitative 3D imaging of fixed or live biological specimens.

From *in-vivo* imaging to large cleared samples, the Alpha³ microscope delivers unprecedented image quality while keeping the necessary flexibility and modularity expected for cutting-edge scientific research instruments.



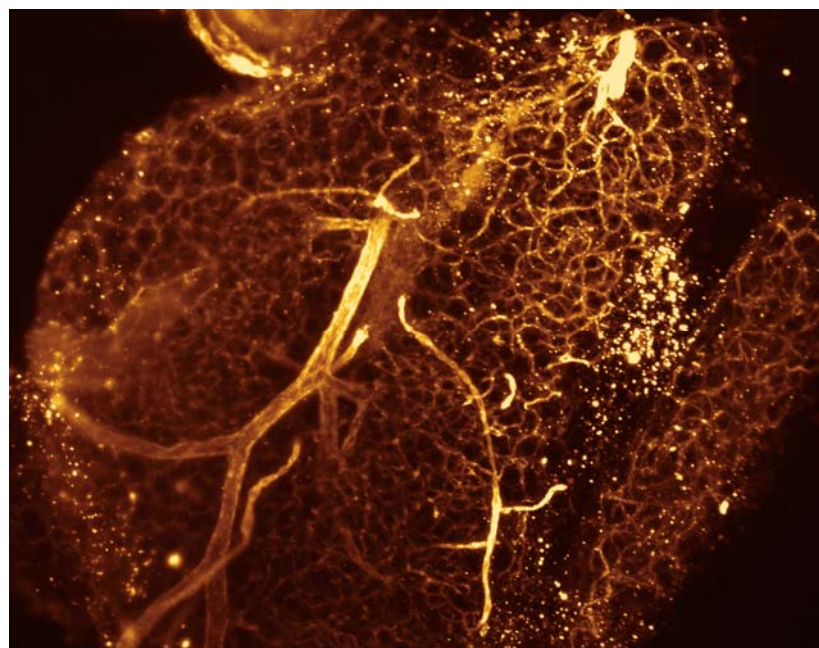
Alpha³ features

- Imaging flexibility, from *in vivo* imaging to large cleared sample imaging
- Macro to micro view imaging, from whole organs at sub-cellular resolution to very small specimens
- Compatible with all clearing solutions: aqueous buffers and organic solvents
- Multiple mounting accessories to accommodate different sample natures and sizes
- Unique live observation using optical eyepieces

Patented Smart Light Sheet Illuminators

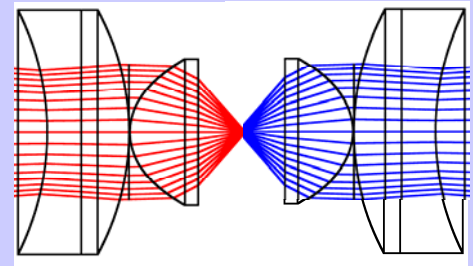
The light sheet system architecture comprises dual illumination units, each integrating multi-directional light sheet, combined with wide-field microscope detection, offering:

- Real-time laser focus sweeping for optimized sharpness over the entire field of view
- Removal of stripe artifacts for absorbing or scattering specimens
- Ultrafast 3D acquisition with remote focal plane scanning
- Flexible imaging system with a broad selection of detection objectives
- Modular microscopy system for multimodal optical microscopy: FLIM, FRET, FRAP, photo ablation ...



Cleared mouse adipose tissue vascular network

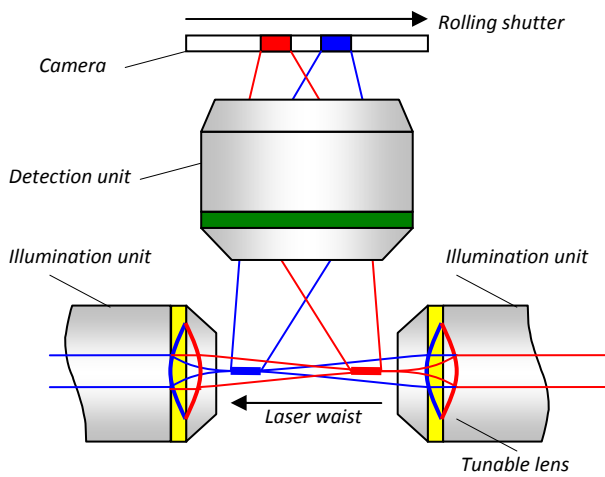
Cutting Edge Light Sheet Technology



The advanced sharp optical sectioning and smart scanning functions drastically alleviate spatial and temporal resolution constraints for 3D image acquisition in light sheet microscopy.

Alpha³ microscope, with its innovative light sheet illuminators and system architecture, broadens the possibilities of life science imaging, providing new quantitative and qualitative imaging capabilities.

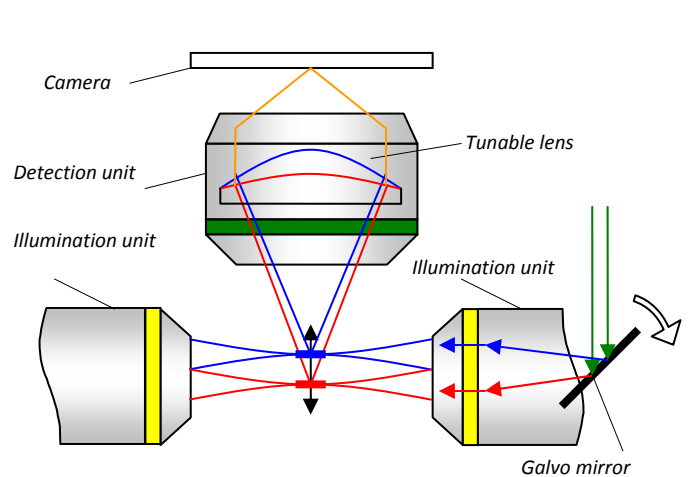
Sharp Optical Sectioning



Real time lateral focus sweeping principle

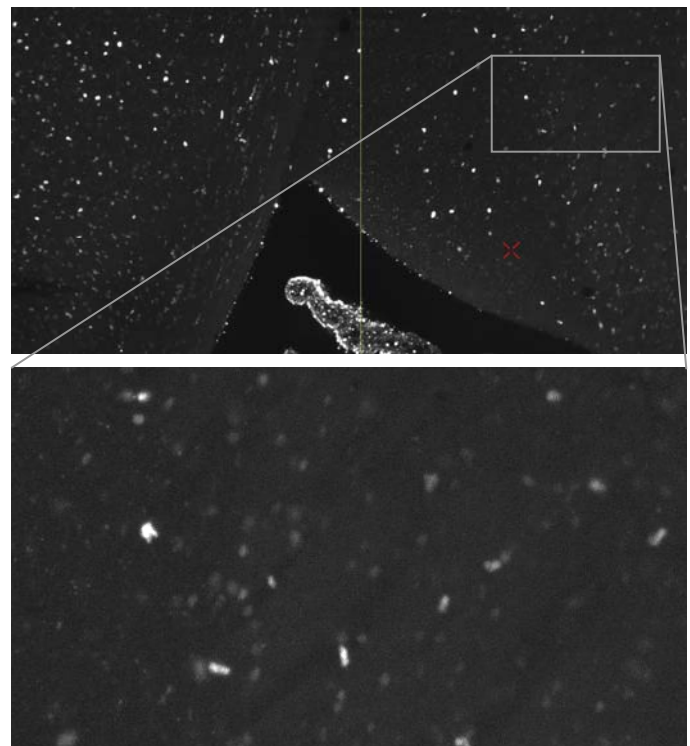
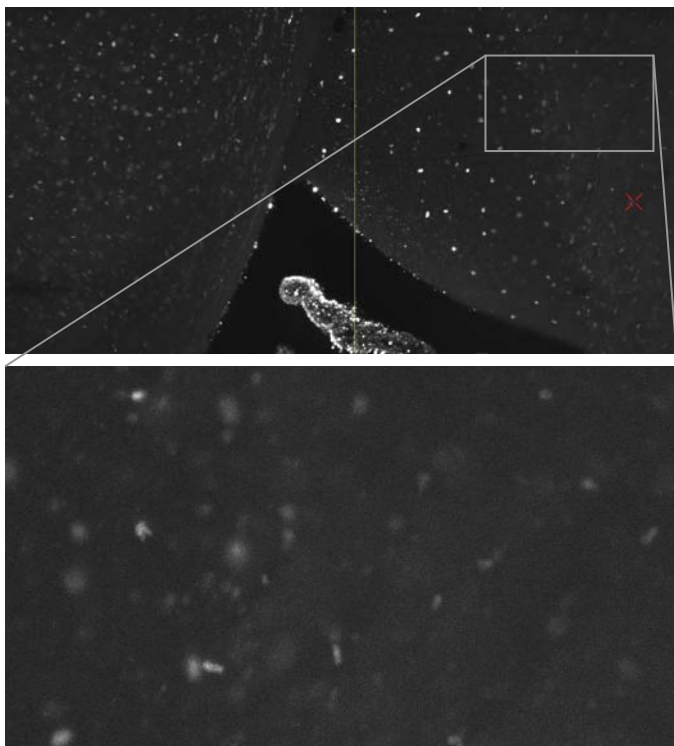
The multidirectional light sheet illuminators perform real time focus sweeping to extend the thinnest focus area over the entire field of view, while improving homogeneity for artefact-free imaging.

Smart 3D Scanning



Remote focal plane scanning principle

The remote focal plane scanning technology combined with the dynamic illumination of light sheet planes allow for ultrafast Z-stacking and perturbation-free acquisition.



Cleared mouse brain image without focus sweeping (left) and with active focus sweeping (right)

Flexible Sample Mounting



The chamber allows for easy sample insertion and observation with air or immersion objectives. As biological specimens are of different nature and size, multiple sample holders are provided to accommodate a large variety of fixed or live samples.

The architecture using a fluorescence microscope stand as a detection unit allows Alpha³ to flexibly adapt to any experiment setting. Complementary imaging capabilities can be easily added for multimodal microscopy.



Alpha³ features

- Multiple accessories provided for sample mounting to accommodate a large variety of specimens
- Chamber and sample holders highly resistant to corrosive media or clearing solutions
- Low volume chamber minimizes evaporation and use of costly clearing solutions
- Easy chamber access, allows addition of various experiment tools
- *In vivo* imaging environmental controls

In Vivo Imaging

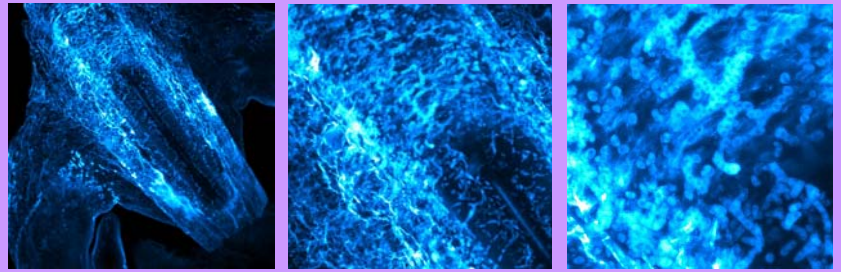
In vivo imaging may require precise temperature and CO₂ control as well as supplies of fresh medium for long term time lapse imaging.

The easily accessible chamber of Alpha³ is pre-equipped to maintain required environmental conditions during specimen imaging. The chamber support is provided with a circulation device that allows temperature control over a range of temperatures (from 15°C to 40°C). Thanks to the QtSPIM software, stacks of image data can be recorded for many hours or days for various applications such as developmental bio processes or stimuli response.



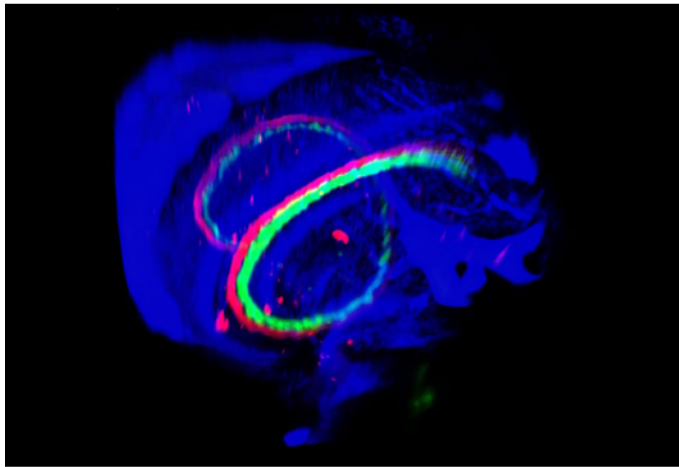
QtSPIM

Acquisition Software



From sample mounting to image acquisition, Alpha³ performs seamless light sheet imaging. The QtSPIM software provides a clear and intuitive interface for collecting X, Y, Z, θ , T, λ images at maximum speed.

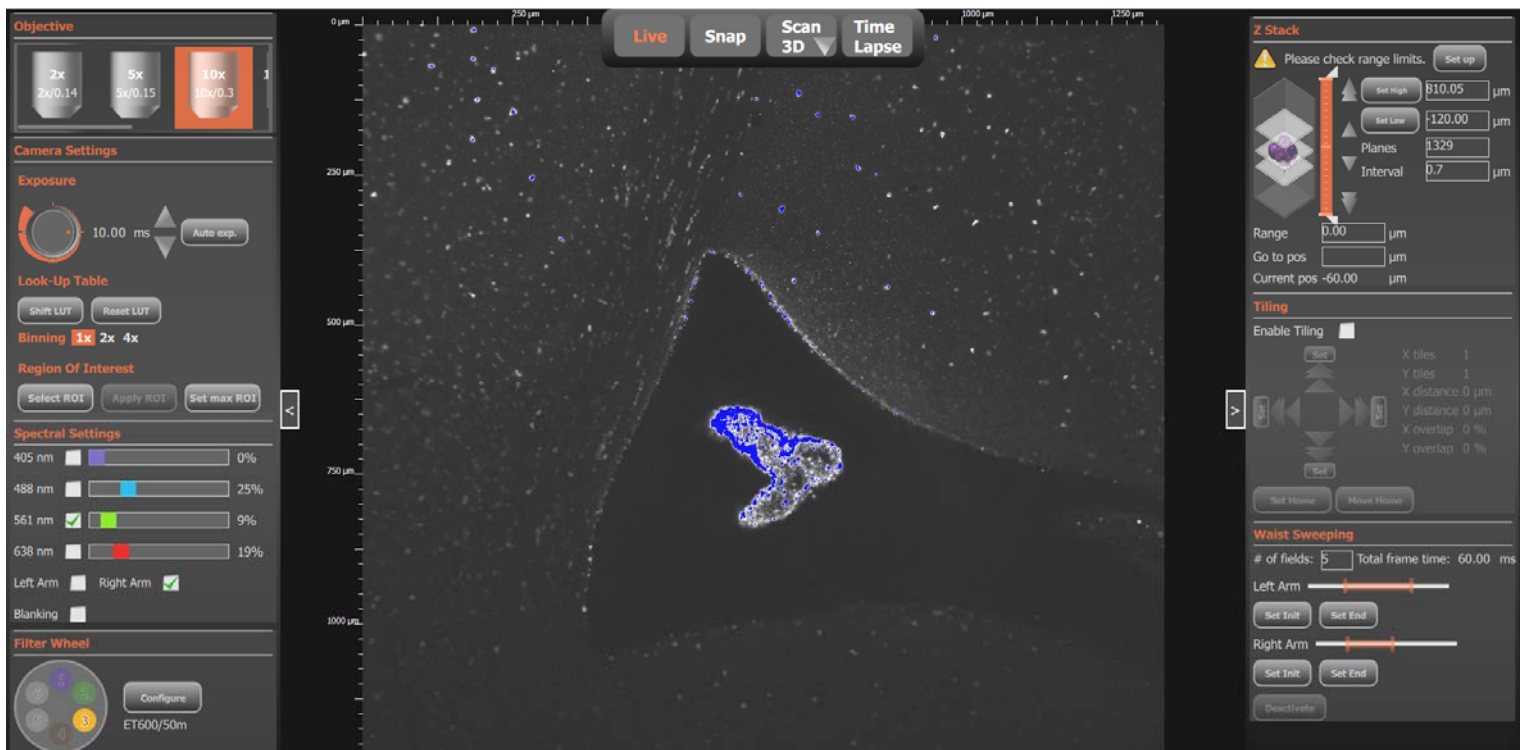
Raw image data, along with their metadata, are saved in 16 bits TIFF format (compatible with open source or commercial software for further 3D display and analysis).



QtSPIM controls all image acquisition parameters. When paired with a workstation grade computer in an optimized configuration, the system is able to perform ultra-fast acquisition.

Alpha³ features

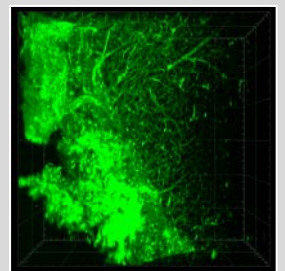
- Seamless X,Y,Z, θ ,T, λ image data acquisition
- Ultra-fast multichannel acquisition via a multi-notch filter, completed by a large selection of emission filters
- Wide-field acquisition with sensitive high QE sCMOS camera
- Wide choice of detection objectives: LWD 2X to 60X air, dipping lenses, clearing objectives with correction collar for RI matching



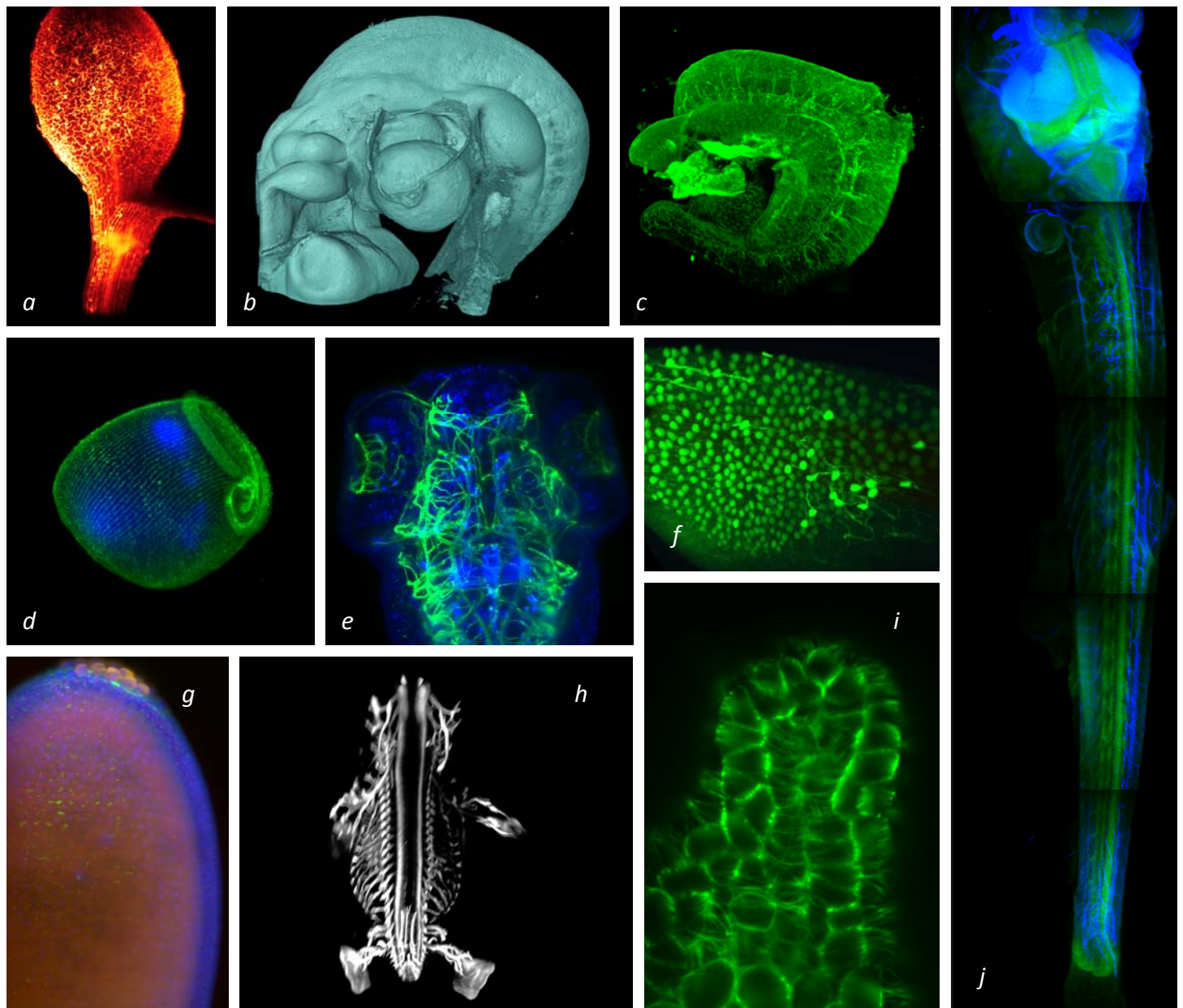
QtSpim user interface

Applications

From *In Vivo* Imaging to Clearing



Typical applications of Alpha³ include in toto imaging of small animal models such as whole mouse embryos, morphogenesis and embryogenesis of model organisms: *C.elegans*, *Drosophila*, Zebra fish, live imaging of cell cultures, functional imaging of neuronal activity, fluorescence imaging of marine organisms or plant developmental biology.



a) *In vivo* *Arabidopsis* leaf, false colours membrane staining at 10x; b) Mouse embryo, iDisco clearing; c) Cleared Mouse Embryo, GFP staining at 10x; d) Fixed *Stentor*, GFP cilia and DAPI poly-nuclei at 10x; e) Cleared Zebrafish larvae head, vascular and neural staining at 20x; f) Cubic 2 Mouse brain, TagRFP neurones at 20x; g) Fixed *drosophila* egg, 3 channels at 20x; h) iDisco Cleared Mouse Embryo, motor neurones and extensions in body at 2x; i) *Arabidopsis* meristeme, GFP in microtubules at 40x; j) Cubic Cleared Zebrafish, nervous system and muscle staining, raw 6 tiles at 20x.

Specifications



Laser source	Laser combiner with up to 4 laser lines: fibered lasers CW / Laser diodes or DPSS Wavelength selection from 405 nm to 785nm, output power from 25 to 250mW
Light sheet	Dual smart illuminators with fibered connection to laser combiner Multi-directional light sheet with real time focus sweeping Chromatic correction 400 nm - 632 nm Minimum light sheet thickness 2 μm , range: 2 μm - 12 μm , width: 2 mm - 15 mm
Chamber & sample holders	Chamber dimensions : width 21 mm, length 70 mm, height 25 mm; volume < 15 ml Chamber highly resistant to various corrosive media, clearing agents, sea water, etc. Sample size from μm to cm range Multiple holders for sample mounting: molds, coverslips, glass supports <i>Optional</i> : temperature and CO2 controls
Volume scanning	Motorized Z-stage: range 15 mm, precision 0.1 μm , acquisition speed 40 fps Optional: motorized XY-stages for tiling: range 15 mm, precision 0.1 μm <i>Optional</i> : ultra fast 3D scanning module (75 images/second)
Detection unit	Fluorescence microscope stand comprising 2-position objective slider, eyepieces, video port, motorized filter wheel and multi-notch filter
Detection objectives	Large selection of long working distance objectives: air, dipping lenses, clearing objectives with correction collar for RI 1.33 - 1.56 Magnification: from 2x to 60x
Image sensor	sCMOS: 2048 x 2048 pixels, format: 13 mm x 13 mm, size: 6.5 μm x 6.5 μm , USB 3.0 / CameraLink Interface
Software	QtSPIM software for Z-stacking, XY-tiling and time lapse acquisition, providing easy export of raw images and metadata to open source or commercial 3rd party software
PC configuration	Desktop i7-7700K 4.2Ghz - 2 x 16Go RAM - GPU GeForce GTX1060-6Go, Hard Disk 4 x 4 To RAID0 - Hard Disk SSD 500Go, QHD Screen 31.5", Windows 10 / 64 bit professional
Dimensions & weight	Microscope breadboard format 600 mm W x 600 mm L x 750 H mm, 27 kg

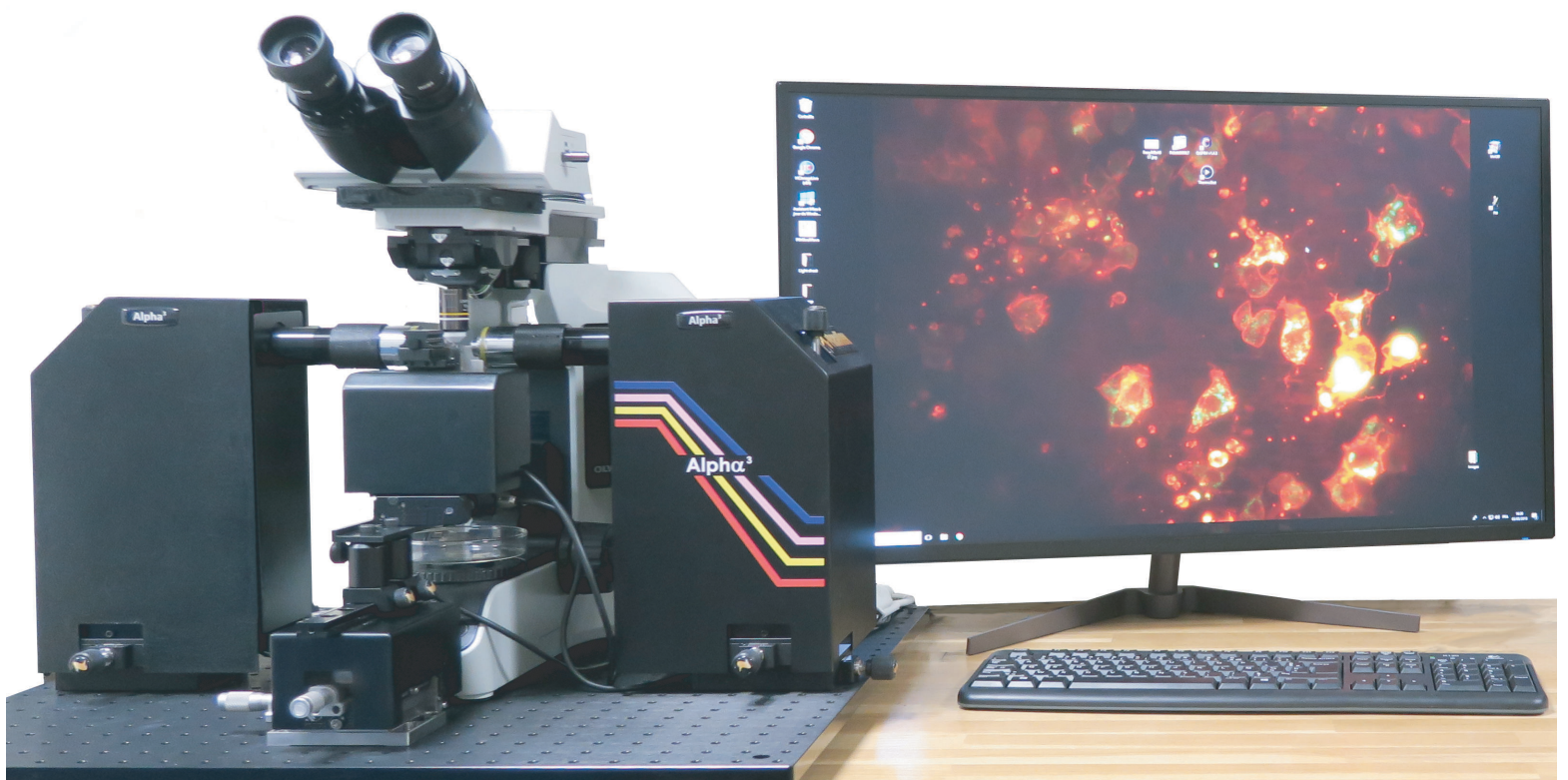
PhaseView

2 Impasse de la Noisette
91370 Verrieres Le Buisson, France
Phone: +33 9 54 03 05 43
Email: contact@phaseview.com
Internet: www.phaseview.com

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