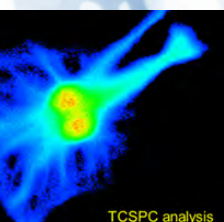


HORIBA

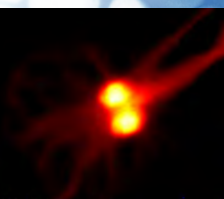


InverTau

Fluorescence Lifetime Imaging Platform

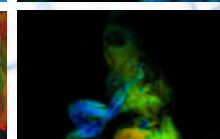
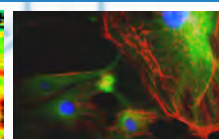
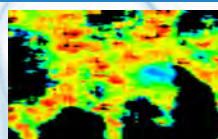
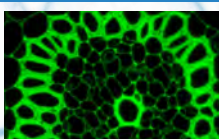
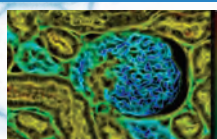
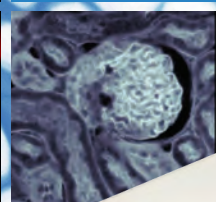


TCSPC analysis



TCSPC intensity

Infinity 3 camera



4K x 4K Resolution

[Fluorescence.com](https://www.fluorescence.com)



InverTau™

For lifetime acquisition from 50 ps to seconds timescale

The HORIBA InverTau™ is a laser scanning platform for Fluorescence Lifetime Imaging (FLIM) on an inverted microscope.

InverTau flexibility provides seamless integration of pulsed laser sources and single photon counting detectors, in addition to the award-winning FLIMera widefield camera.

InverTau is powered by HORIBA's highly intuitive and extremely powerful EzTime Image touchscreen software interface, and is based on Time-Correlated Single Photon Counting (TCSPC) using FiPho timing electronics. InverTau comes complete with a Nikon® Ti2-U manual microscope, and is optimized for use with our innovative pulsed lasers.

4K

Imaging

Need more resolution? The InverTau's Galvo-laser scanner can produce up to 4k x 4k images, providing better resolution for large field-of-view applications.

Excitation/Emission

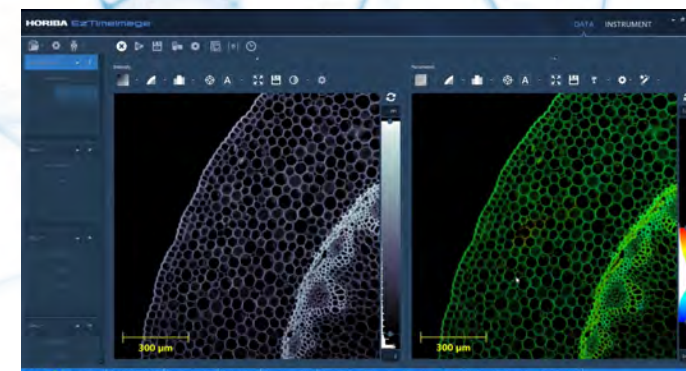
The InverTau comes equipped with two detector ports and two excitation ports, allowing users to conduct various FLIM methods, including two-photon excitation. HORIBA's cutting-edge time-correlated single photon counting (TCSPC) FiPho timing electronics is capable of resolving lifetimes ranging from <15 picoseconds to seconds. InverTau is capable of measuring lifetimes from ~50ps to 10's of ns, scanning (seconds if single point) while working seamlessly with our large menu of DeltaDiode lasers. The InverTau is also compatible with 3rd party lasers.

Motorized Upgrade

Add the motorized stage for large sample imaging outside the normal field of view. Seamlessly develop a FLIM mosaic using our EzTime Image software.

EzTime™ Image

Sit down, collect FLIM data, and go!! HORIBA's EzTime Image software platform is just as intuitive as it is stunning. Our mission was to create the easiest-to-use FLIM microscope on the market. Contact us for a remote demo and see for yourself.



Fully Automated Optics

The InverTau was designed while keeping the researcher's workflow in mind. That's why the InverTau comes standard with automated software-controlled optics to avoid the time-draining hassle of manually toggling optical components. We want our users to stay focused on their research, and leave the groundwork to us.

Real-Time FLIM

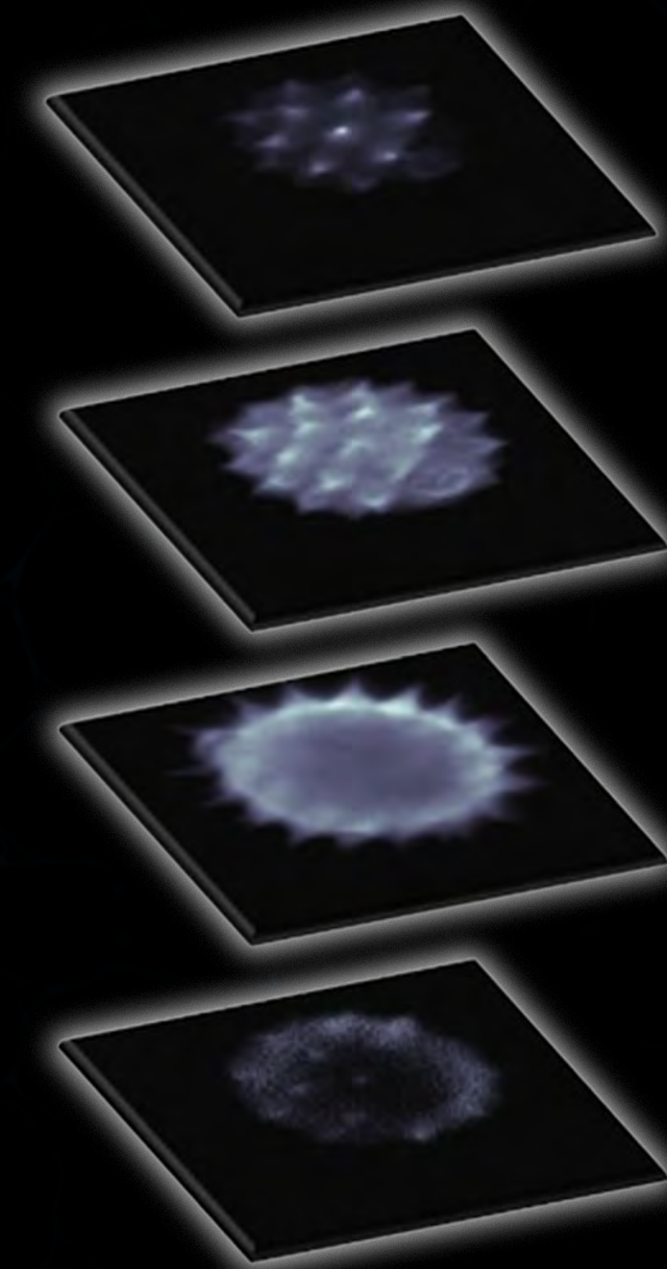
Add the FLIMera™ camera for video-rate FLIM measurements. The FLIM-FLIX feature on our EzTime Image software will assist users in creating and editing FLIM videos capturing dynamic lifetime shifts in real-time.

Optics & Imaging

The InverTau's fully automated optics allow users to take advantage of its many features with minimal hardware interaction. Our optical components are software-recognizable and seamlessly operate at the user's command.

4k x 4k Resolution

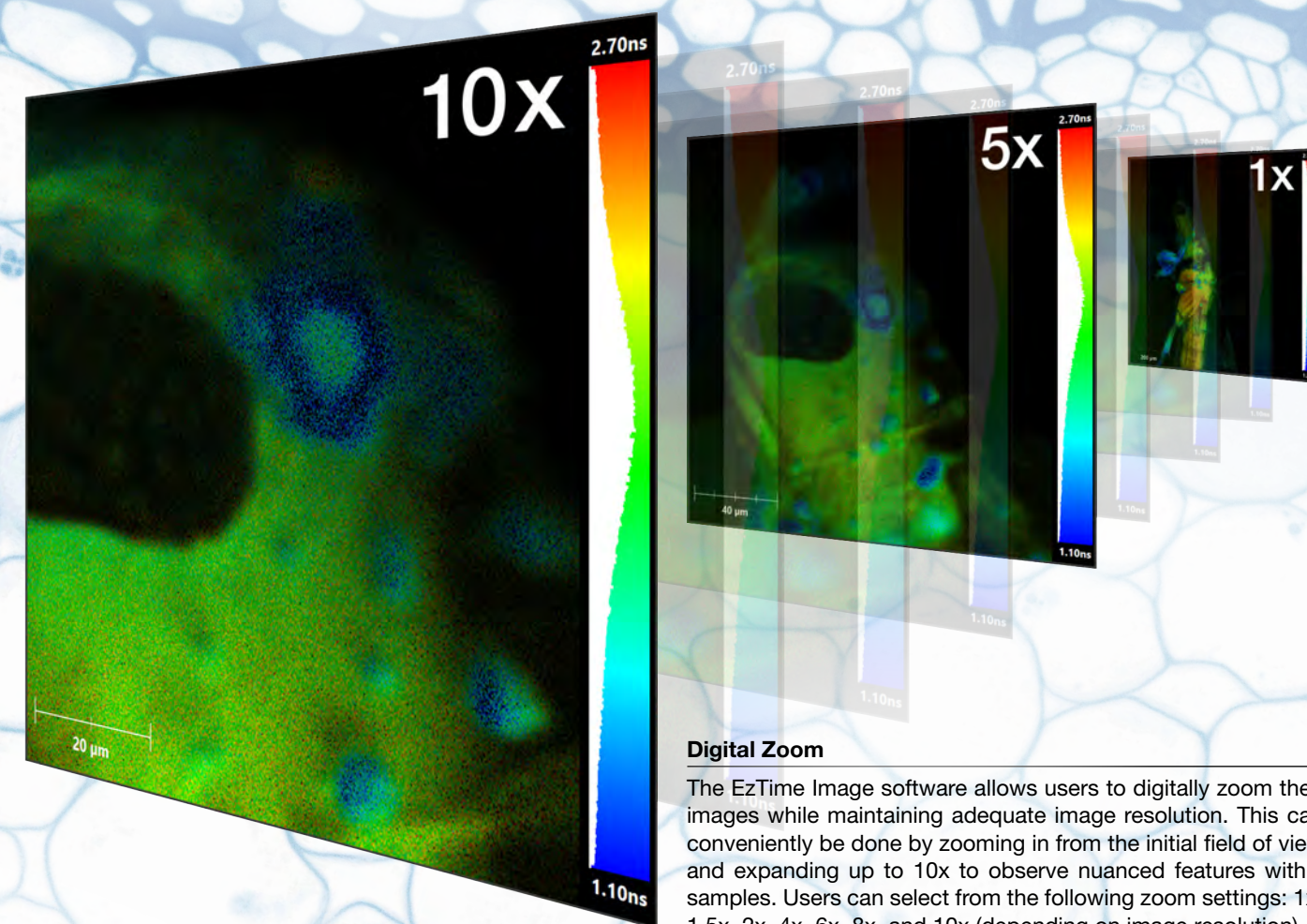
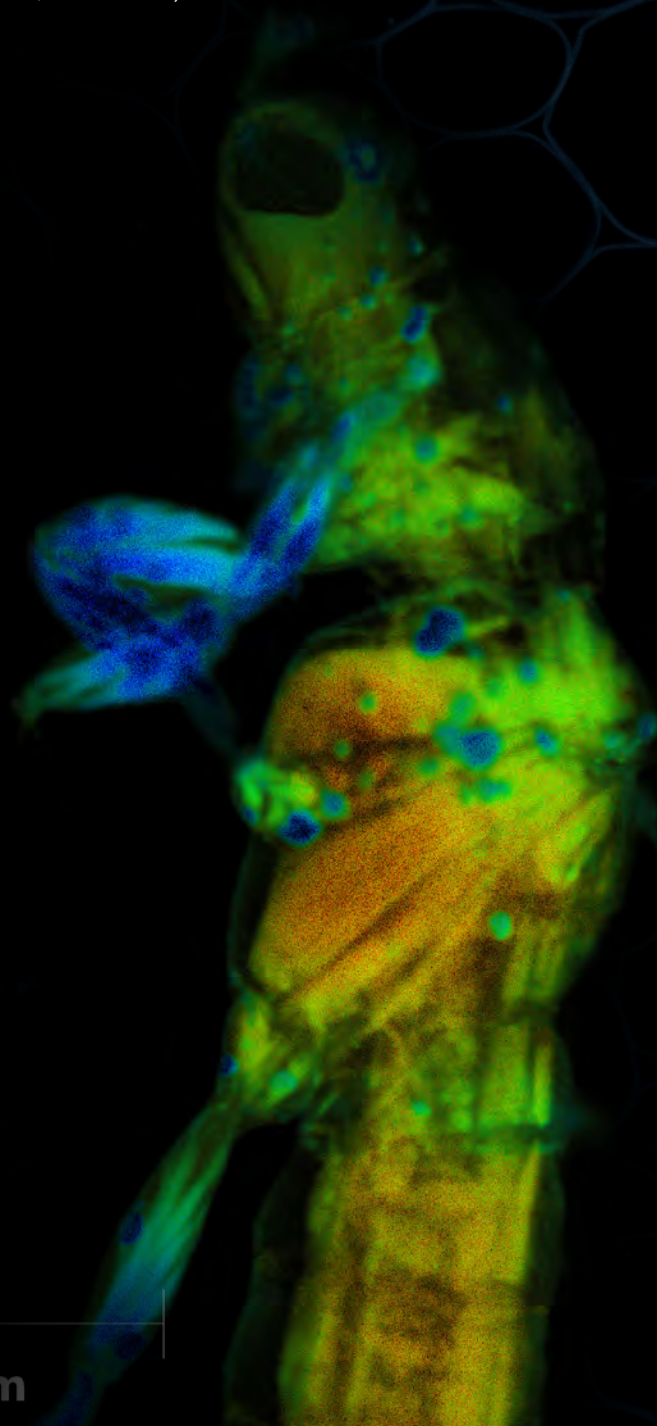
The InverTau is capable of producing images with improved resolutions as high as 4096 x 4096 pixels for large field-of-view applications. For high throughput applications, lower resolutions are available as well (32 x 32, 64 x 64, 128 x 128, 512 x 512, 1k x 1k, and 2k x 2k).



Confocality

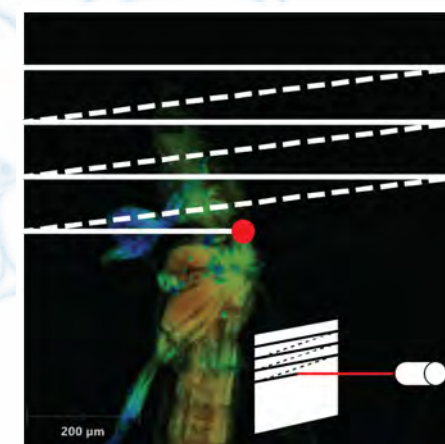
The InverTau's confocality enables optical sectioning via software-controlled pinhole diameters (closed, 10 μm , 25 μm , 50 μm , 100 μm , 200 μm , and open). This allows users to analyze FLIM data at various depths within their samples. The 200 μm image of a fly (seen right) shows the contrast in great detail.

200 μm

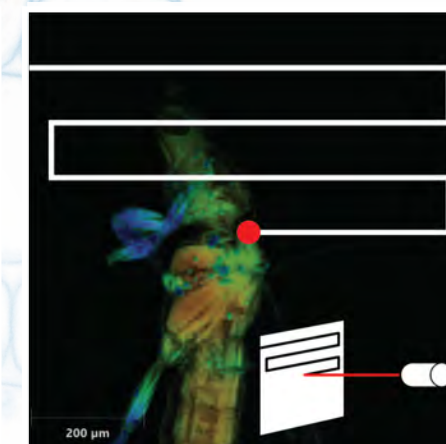


Digital Zoom

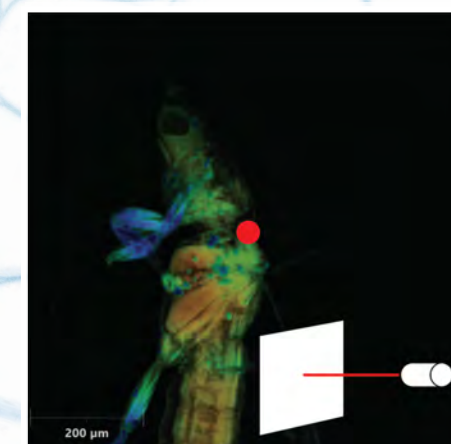
The EzTime Image software allows users to digitally zoom their images while maintaining adequate image resolution. This can conveniently be done by zooming in from the initial field of view and expanding up to 10x to observe nuanced features within samples. Users can select from the following zoom settings: 1x, 1.5x, 2x, 4x, 6x, 8x, and 10x (depending on image resolution).



Laser Rastering



Bi-Directional



Single-Point

Fast Scanning

The InverTau is capable of both laser rastering (left) for optimal precision, and bi-directional scanning (middle) for optimal speed. The InverTau can reach 6 frames per second (fps) at a 512 x 512 resolution allowing a real time TCSPC image to be used to preview and record data. This is achieved with our high-precision, high speed Galvo scanner. Single-point measurements can be conducted on the InverTau (right).

FLIMera

Video FLIM

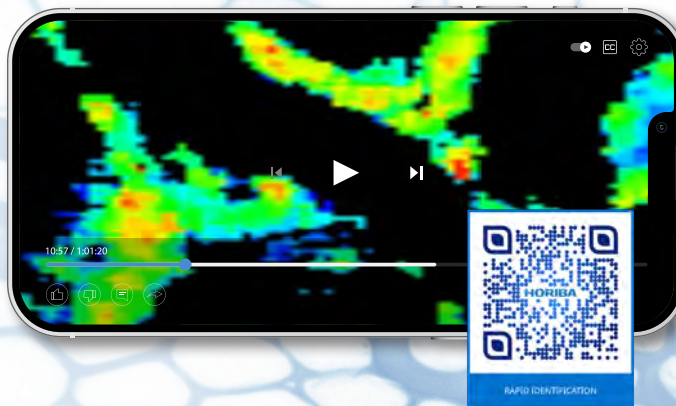
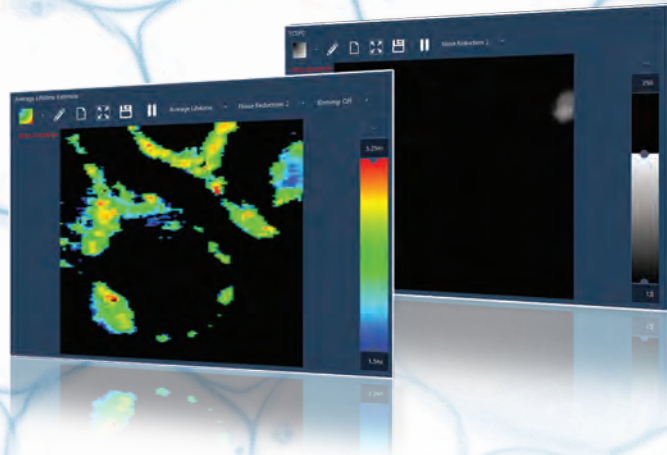


Time-Correlated Single Photon Counting

The FLIMera is a first-of-its-kind FLIM-dedicated SPAD array detector capable of true TCSPC on a pixel-per-pixel basis. Each pixel has dedicated timing electronics embedded in its semiconductor design. Unlike gated detectors, TCSPC is better suited for resolving multi-exponential decays at each individual pixel. This is critical for biological samples with competing multiple emissions.

FLIM-FLIX Real-Time Video

Life is a dynamic event that requires dynamic tools to capture and interpret its intricacies. With the FLIMera camera added to the InverTau microscope you can capture biological processes in real-time at video rates using the FLIM-FLIX mode on our EzTime Image software platform. To demonstrate, the below FLIM video of mobile chloroplasts in a pond weed (vallis) was captured on the FLIMera in real-time.



Excitation, Emission, & Electronics



HPPD

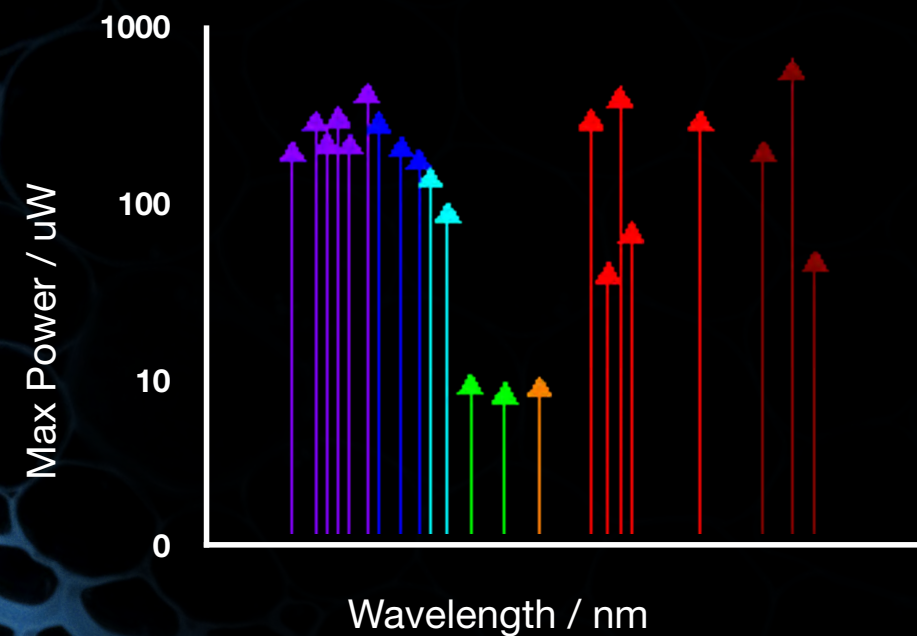
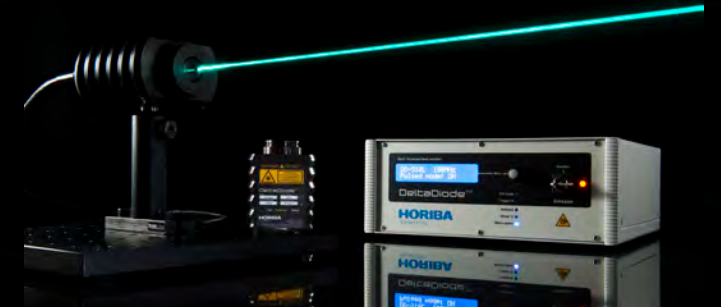
The HPPD (Hybrid Picosecond Photon Detector) detectors are our latest development in TCSPC detector technology that combines the benefits of conventional PMT design (wide spectral response and large active area) with the advantages of solid state APD technology (exceptional temporal resolution, good detection efficiency and negligible after-pulsing).

**FiPho**

HORIBA's FiPho Photon-counting Platform combines up to three high-performance timing engines into a single module that seamlessly spans a time range over thirteen orders of magnitude. Combining the latest in SiGe ASIC technology with a cutting-edge FPGA core and USB 3 interface, FiPho is a photon-timing powerhouse that is uniquely simple to use.

SOLAS Lasers

Solas is a new high-power, picosecond, fiber laser from HORIBA based on a Master Oscillator Fiber Amplifier (MOFA) design. With a master oscillator generating over 300 mW of power at 1064 nm at 100 MHz, Solas can be configured to deliver either 1064 nm, 532 nm or 355 nm laser pulses. As with all DeltaDiodes, the Solas can be operated at up to 100 MHz, with pulse configurations including pulse on demand and burst mode. The Solas allows for software-controlled intensity adjustment from 100% to 10% of full output power (in 10% increments).



DeltaDiodes

DeltaDiode lasers are an excellent choice for short picosecond lifetimes, with pulse durations as short as 35 picoseconds. These sources have the possibility of measuring fluorescence lifetimes down to 5 ps (1/10th of the instrument response function), with a fast HPPD detector and the high resolution FiPho-HR electronics selected.

EzTime™ Image Software



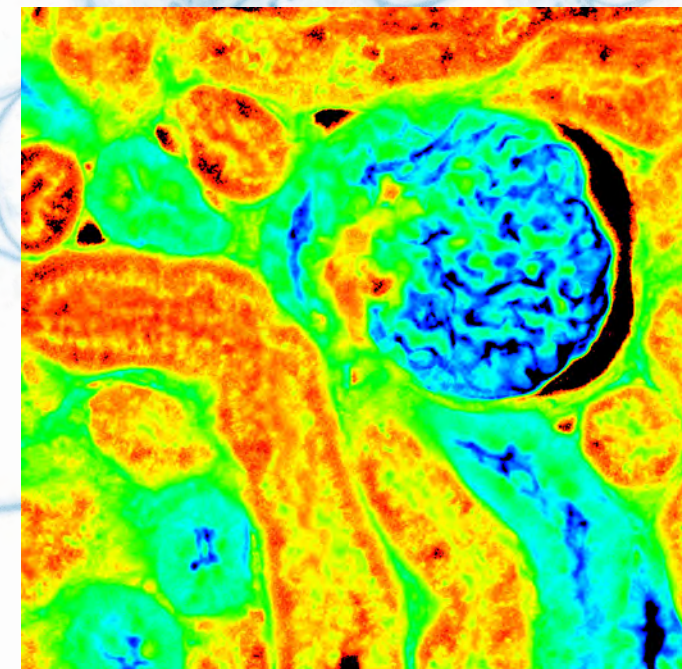
EzTime™ Image

InverTau's software platform was created by researchers for researchers. We understand the impact the user interface has on the quality of research, and inherently, the quality of life. That's why our EzTime Image software is not only feature-rich and intuitive, but also packed with modern amenities such as touch screen controls. Check out the FLIM Image tutorial above and see for yourself.

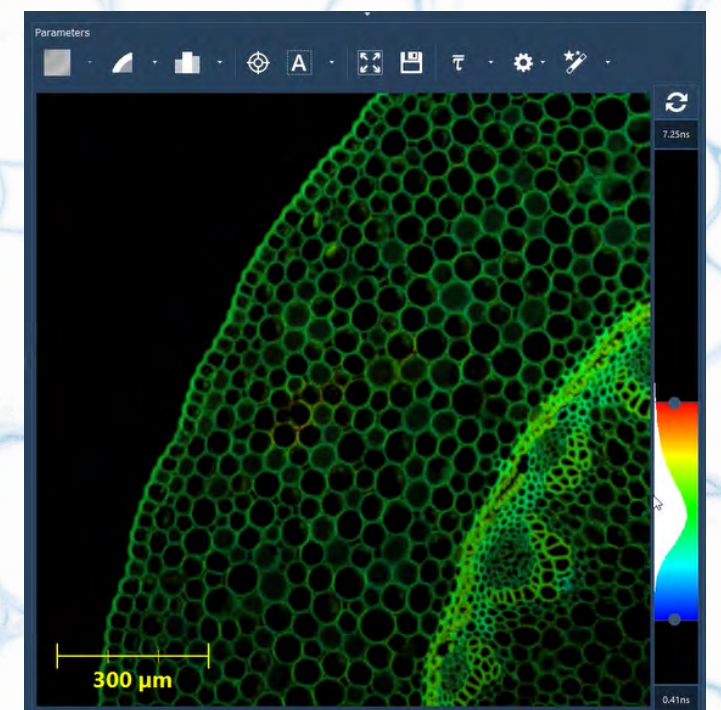
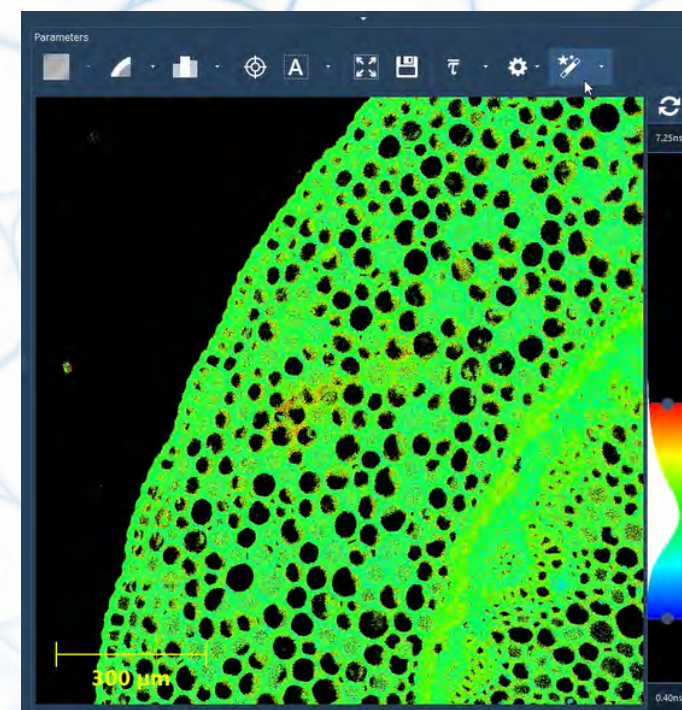
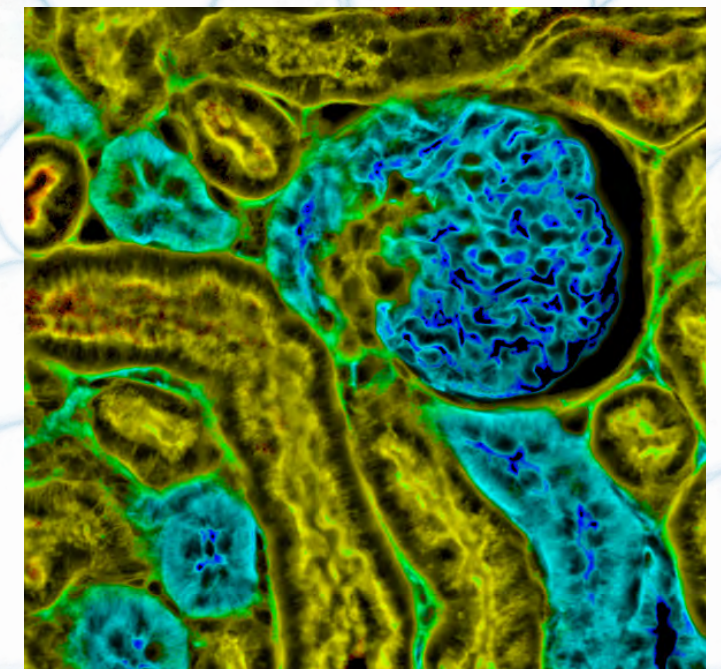
Software Information

- One package for system control, data collection and analysis
- Curve fitting analysis capable of resolving up to 5 exponentials in a global analysis
- Script editor feature enabling commands to control the data acquisition process
- Optimized for use with touch screen computers / monitors
- Tabulate function enables data and analysis to be saved in spreadsheet form (EzTime Image features a built-in spreadsheet editor, and exported spreadsheets will open in MS® Excel®). Spreadsheets can be manipulated using scripting to assist in building custom reports
- Support for photon streaming (aka time tag mode)
- Automated instrument recognition and control
- Real-time phasor plots provide quick lifetime visualization
- Ability to flip between imaging devices (e.g. InverTau and FLIMera) without the need to close the software

Before



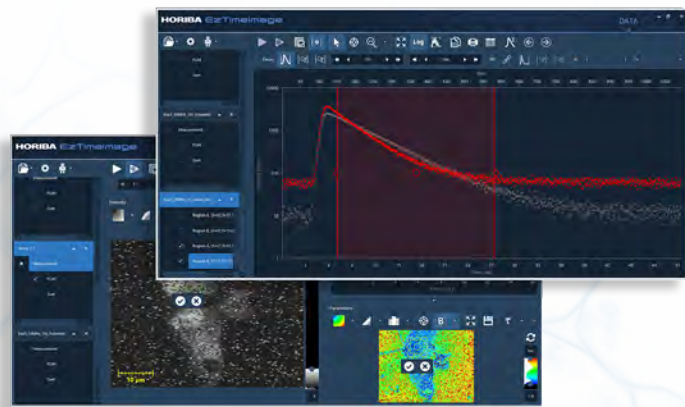
After



FLIM Intensity and Average Lifetime

The EzTime Image software platform allows users to preview both the intensity image along with the average lifetime image. To improve visualization, users can apply an intensity weighted FLIM image display to obtain a crisper, better defined FLIM image, as shown by the above images of a mouse kidney (top row) and a convallaria root (bottom row).

Data Analysis & Applications

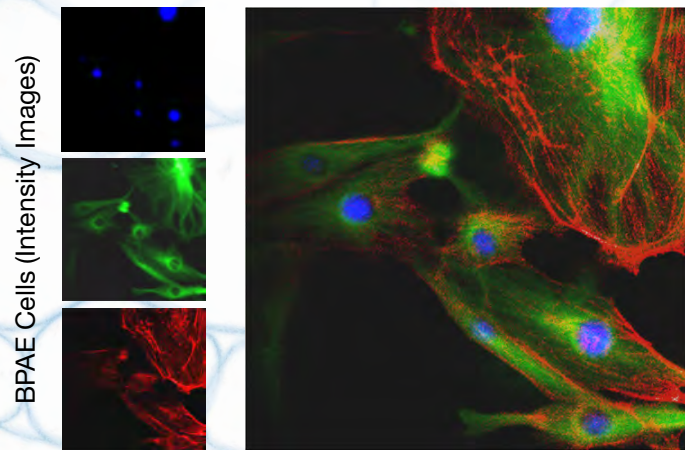
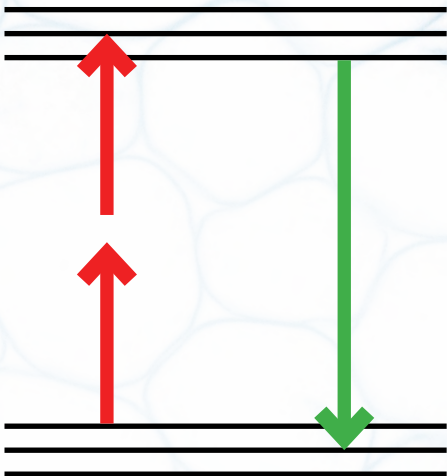


Curve Fitting and Data Analysis

EzTime Image's FLIM data analysis software can resolve up to 5 exponential decays in a global analysis. It is accompanied by a large library of fitting models for single curve analysis from selected regions. These include common models, such as Förster and Micellar quenching, along with much more esoteric models, such as Yokata-Tanimoto quenching and maximum entropy method (MEM).

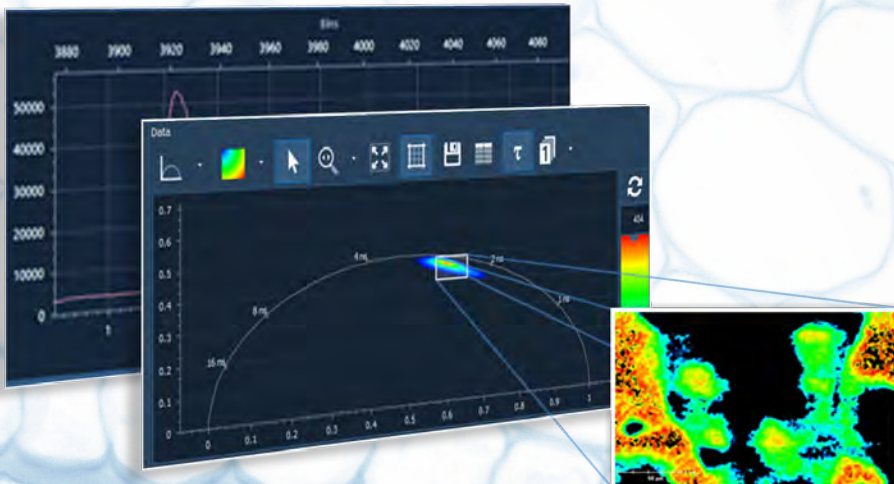
Two-Photon Excitation

The InverTau is capable of two-photon excitation (TPE), with the addition of a femtosecond laser. The small focal volume (femtolitre) provides for sharpness of image with deeper penetration into biological samples.



Cell Analysis

Labelling cells with fluorescent markers enables insights into cell function and structure. The InverTau can be used to uncover the biomechanical properties of membranes by the use of tension probes, along with pH fluctuations and molecular crowding.

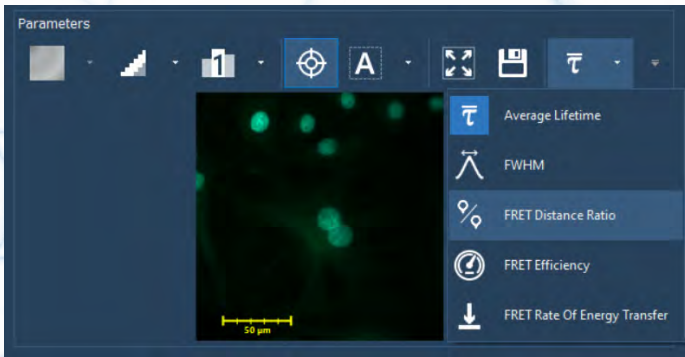


Phasor Plot

Users can toggle between a real-time histogram, or decay kinetics plot, and a phasor plot to capture shifts in global lifetimes of protein interactions in real time.

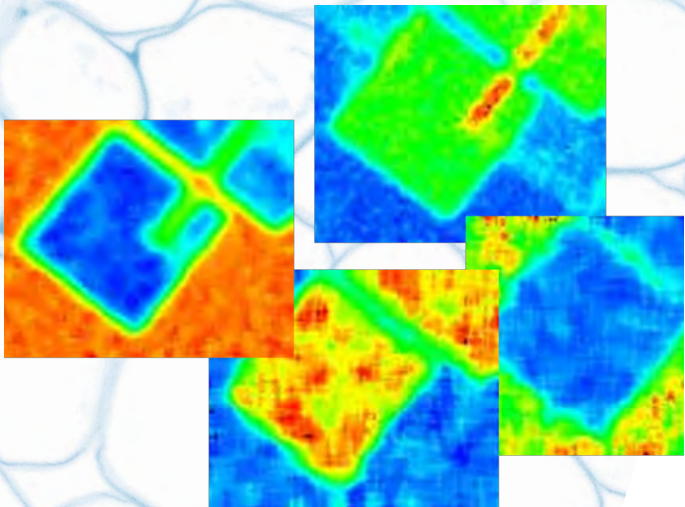
Materials

Time-resolved measurements are becoming more common in material studies, primarily for charge carrier analysis in semiconductors, including photovoltaics. Upgrade with a motorized stage to create a FLIM mosaic of large samples, such as semiconductor wafers (inverted microscope).



FRET

Along with Average Lifetime, EzTime Image permits users to select additional calculations such as FWHM, FRET Distance Ratio, FRET Efficiency and FRET range of energy transfer.



Technical Specifications

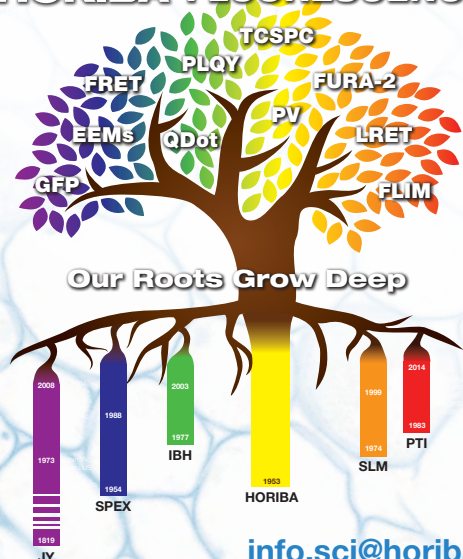
InverTau Fluorescence Lifetime Imaging Platform	
Modes	Single Point, Raster, Bi-directional (XY)
Scan Speed	Up to 6 FPS (Bi-directional) at 512 x 512
Image Resolution	1 FoV to 0.1 FoV
Attachment	To Side Port of Inverted Microscope (C-Mount)
Control Software	EzTime™ Image Software
Optical Ports	2 on Excitation, 2 on Emission
Attenuation Filters*	Steps from 0-6 OD ND
Dichroic Filters*	400 nm, 450 nm, 500 nm, 550 nm, 600 nm, 730 SP, 50/50 BS
Emission Filters*	400BP, 450BP, 500BP, 550BP, 600BP, 440LP, 475LP, 530LP, 570LP, 630LP
Pinhole	10, 25, 50, 100, 200 μ m (+ closed and fully open)
Photon Streaming	Stream to HDF5
Phasor Analysis	Switchable with Histogram
Data Analysis	Global up to 5 Exponentials

*Additional filter combinations are available upon request

Electronics Specifications for FLIM

FiPho Photon-Counting Platform	
Lifetimes From	<50 ps
TCSPC Bin Width	<15 ps
Histogram Bin Depth	8-bit, 16-bit, and 32-bit
Independent Stops	1 to 4
Maximum Start Rate	100 MHz
Maximum Rate/Stop Channel	10 Mcps
Operating Mode	Automatic Forward Timing
Streaming Mode	Photon Streaming (Time-Tag)
Acquisition and Analysis Macro Scripting	Yes
PC Interface	USB 3.0>
Software	EzTime™ Image Software

HORIBA FLUORESCENCE



For more information scan the QR code
or visit: fluorescence.com



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Singapore: +65 (0)6 745 8300
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