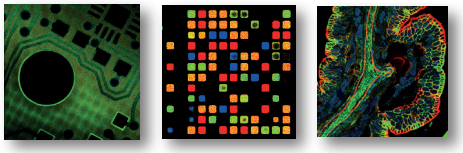
MicroTime 100

Upright Time-Resolved Confocal Fluorescence Microscope

- Laser excitation from 375 to 1060 nm
- Up to 4 detectors (PMTs, SPADs, Hybrid-PMTs) and coupling to a PL spectrometer
- Coupling to time-resolved spectrometers FluoTime 250/300
- Up to 3 scanners available: 3D Piezo objective scanning, wide-range sample stage and emission port scanner for carrier diffusion

Applications

- Time-Resolved Fluorescence
- Fluorescence Lifetime Imaging (FLIM)
- Phosphorescence Lifetime Imaging (PLIM)
- Fluorescence Correlation Spectroscopy (FCS)
- Fluorescence Lifetime Correlation Spectroscopy (FLCS)
- Foerster Resonance Energy Transfer (FRET)
- Pulsed Interleaved Excitation (PIE)
- Pattern Matching Analysis
- Time-Resolved Photoluminescence (TRPL)
- Time-Resolved Photoluminescence Imaging
- Antibunching
- Single Molecule Detection / Spectroscopy



The confocal time-resolved microscope MicroTime 100 is a complete system for recording time-resolved photoluminescence signals in small volumes by means of Time-Correlated Single Photon Counting (TCSPC). The system based on a conventional upright microscope body in combination with pulsed excitation, optics, TCSPC electronics and efficient emission detection. This combination of all parts enables photoluminescence lifetimes detection from down to some picoseconds, up to several milliseconds with the MicroTime 100.

The flexible excitation subsystem includes:

- Pulsed diode laser driver of the PDL series and
- Different laser heads with pulses in the picosecond time regime
- Different operation modes e.g., pulsed mode, cw mode or burst mode
- Available wavelengths range from 375 nm to 1060 nm

- Laser heads are either directly coupled to the MicroTime 100 or
- Integrated along with multiple optical components in one Laser Combining Unit (LCU)

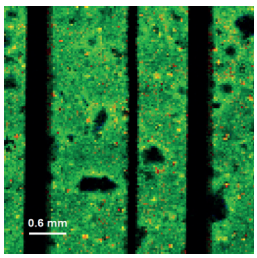
The photoluminescence detection subsystem with single photon sensitivity includes:

- Specially designed for maximum flexibility
- High light collection efficiency
- Configuration of up to four detection channels which are coupled to the microscope via a multimode fiber
- Variety of sensitive detectors, which are optimized for wavelength, signal brightness, or photophysical attributes like after-pulsing free detection.

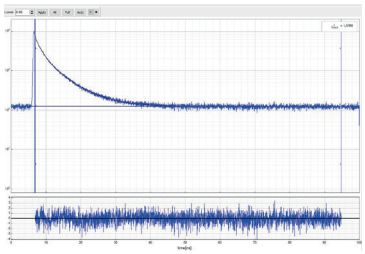
The lifetime detection with picosecond resolution up to ms includes:

- A time-taggin electronic which based on the method of Time-Correlated Single Photon Counting (TC-SPC) in combination with the unique Time-Tagged Time-Resolved mode (TTTR)
- TTTR data acquisition can be used for standard lifetime measurements, Fluorescence Lifetime Imaging (FLIM) or TRPL Imaging can be performed
- Photoluminescence lifetimes down to a few picoseconds or even up to ms for phosphorescence and luminescence studies can be easily resolved

Measurement Example



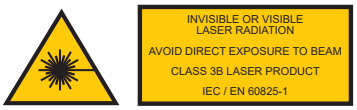
Fluorescence lifetime image of a CIGS based solar cell, 4x4 mm, 128x128 pixel, 1.1ms/pixel, excitation at 560 nm with LDH picosecond diode laser, detected emission at 1250 nm, nm, 40x air objective.



Time-resolved luminescence analysis of CIGS based solar cell. Measured with 20x air objective, excitation at 560 nm and emission detection at 1250 nm. The result of this analysis are three different decay lifetimes with 0.42 ns, 1.90 ns and 6.24 ns. This resulted lifetimes are strongly power depent, which is known in literature for this type of material.

Options

Different types of sample illumination, e.g. Epi-Fluorescence illumintation or gooseneck side-on illumination in combination with a camera for intensity images



Specifications

Excitation Sources				
Picosecond diode laser wavelengths	375 - 1060 nm			
Repetition rate	up to 40 MHz, (optional 80 MHz)			
Detectors				
Type	PMA Series	PMA Hybrid Series	SPAD (PDM Series)	SPAD (Excelitas Series)
Spectral range[1)]	185 – 820 nm	300 – 900 nm	400 – 1000 nm	500 - 1150 nm
Dark counts (at 20 °C, typ. value)	< 200 cps	< 1000 cps	< 250 cps	< 100 cps
Instrument Response Function[2)]	typ. < 180 ps	typ. < 150 ps	typ. < 50 ps	typ. < 250 ps
Data Acquisition				
Type	TimeHarp 260		MultiHarp 150	
Version	PICO	NANO	4P	4N
Time resolution (bin width)	25 ps	250 ps	10 ps	80 ps
Dead time	< 25 ns	< 2 ns	650 ps	
Time channels per curve	32768		65536	
Scanning (optional)				
Type	Piezo wide-range scanner		XYZ Piezo objective scanner	
Range	75 × 75 mm		80 × 80 (× 100) µm	
Positioning accuracy	< 400 µm		< 10 nm	
Operation & Electrical				
PC requirements	Quad-core CPU > 3 GHz, RAM >= 4 GB, Windows™ 10/11			
Power requirements	220/240 or 110/120 VAC, 50/60 Hz			
Dimensions				
Microscope unit	320 × 600 × 600 mm (w × d × h)			

1) other detectors and cooling available upon request,
2) IRF @ l = 650 nm

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