

MicroTime 100

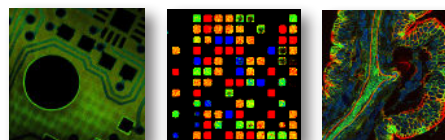
Upright Time-Resolved Confocal Fluorescence Microscope

- Up to 4 detectors (PMTs, SPADs, Hybrid-PMTs) and coupling to a PL spectrometer
- Coupling to time-resolved spectrometers FluoTime 250/300



Supported methods

- Time-resolved photoluminescence (TRPL)
- Time-resolved photoluminescence imaging
- Carrier diffusion measurements
- Coincidence correlation / photon antibunching $g(2)(t)$
- Single molecule detection / spectroscopy (SMD)
- Pattern matching analysis
- Fluorescence correlation spectroscopy (FCS)
- Fluorescence lifetime correlation spectroscopy (FLCS)
- Molecule blinking and time-trace analysis
- Foerster resonance energy transfer (FRET)
- Pulsed interleaved excitation (PIE)
- Fluorescence lifetime imaging (FLIM)
- Phosphorescence lifetime imaging (PLIM)



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 is based on a conventional upright microscope body in combination with pulse 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
- Laser heads are either directly coupled to the MicroTime 100 or
- Integrated along with multiple optical components in one Laser Combining Unit (LCU)

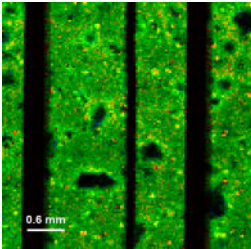
The photoluminescence detection subsystem with single photon sensitivity includes:

- 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.

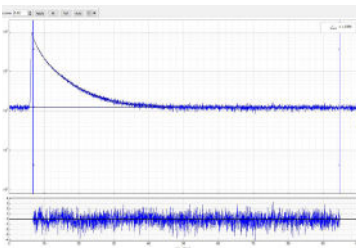
The lifetime detection with picosecond resolution up to ms includes:

- A time-tagging electronic which is based on the method of Time-Correlated Single Photon Counting (TCSPC) 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, 4 x 4 mm, 128x128 pixel, 1.1ms/pixel, excitation at 560 nm with LDH picosecond diode laser, detected emission at 1250 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 results 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 dependent, which is known in literature for this type of material.



INVISIBLE OR VISIBLE
LASER RADIATION
AVOID DIRECT EXPOSURE TO BEAM
CLASS 3B LASER PRODUCT
IEC / EN 60825-1

Options

Different types of sample illumination, e.g. Epi-Fluorescence illumination 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 @ 1 = 650 nm



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