pco.flim

fluorescence lifetime imaging CMOS camera

unique resolution
1008 x 1008 pixels

frequency synthesizer
5 kHz – 40 MHz

lifetimes from
100 ps to 100 µs

high frame rate
up to 90 fps

1288
EMVA Standard Compliant

pco.

technical data

image sensor

type of sensor	CMOS
image sensor	proprietary
resolution (h x v)	1008 x 1008 pixels
pixel size (h x v)	5.6 µm x 5.6 µm
sensor format / diagonal	5.7 mm x 5.7 mm / 8.1 mm
shutter mode	rolling reset / global exposure
fullwell capacity	45 000 e^- (typ.)
readout noise	45 e^- rms (typ.)
dynamic range	> 1 000 : 1 (60 dB)
quantum efficiency	appr. 39 % @ peak
spectral range	visible (tbd)
dark current	1100 e^-/(s.pixel)
DSNU	49 e^- rms
PRNU	0.7 %

general

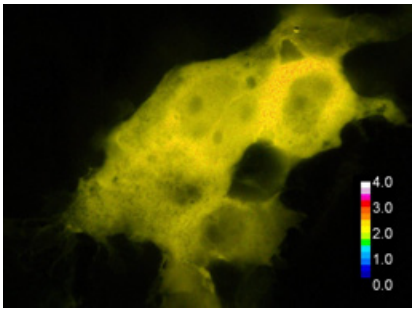
power supply	90 .. 260 VAC (12 VDC opt.)
power consumption	40 W max.
weight	2.4 kg
ambient temperature	+ 5 °C .. + 40 °C
operating humidity range	10 % .. 90 % (non-condensing)
storage temperature range	- 20 °C .. + 70 °C
optical interface	C-mount
CE / FCC certified	yes

camera

max. frame rate (full frame, full resolution)	90 fps (2 tap readout)
modulation frequency	internal 5 kHz - 40 MHz external 500 kHz - 40 MHz
modulation signal shape	sinusoidal / rectangular
exposure / shutter time	10 ns - 10 s
dynamic range A/D	14 bit
A/D conversion factor	3.2 e^-/count
region of interest	steps of 16x1 pixel
thermoelectrically cooled	+ 5 °C
nonlinearity	< 1 %
trigger input signals	exposure start (phase sequence trigger)
trigger output signals	exposure, busy, gate (light enable)
modulation signal output	1 $V_{peak-peak}$ in 50 Ω, AC coupled
modulation signal input	max. +/- 5 V in > 1 kΩ
data interface	USB 3.0

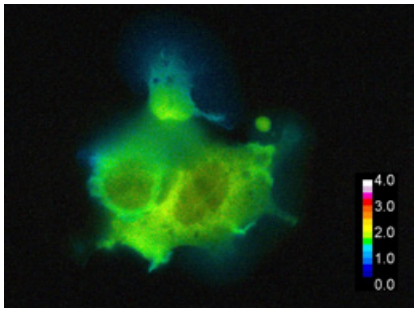
applications

life science



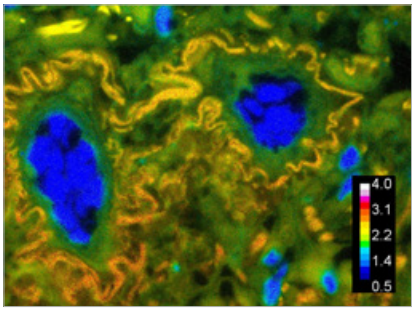
HEK-293 cells expressing a fusion protein with Cyan Fluorescent Protein (CFP). The image shows the fluorescence lifetime distribution derived from the measured phase angle in false color coding and weighted by the fluorescence intensity. The displayed range is from 0 – 4 ns (see color bar, courtesy of Fred Wouters & Gertrude Bunt, University Medicine Göttingen).

life science



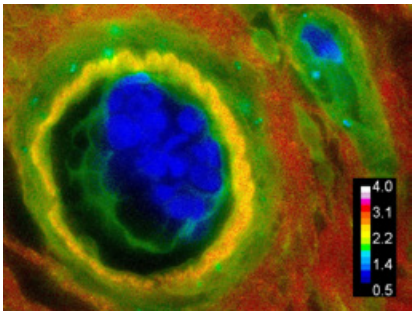
HEK-293 cells co-expressing a fusion protein with Cyan Fluorescent Protein (CFP) and with Yellow Fluorescent Protein (YFP). Dimerization of this protein is detected by FRET as judged by the reduction in CFP lifetime. The image shows the fluorescence lifetime distribution derived from the measured phase angle in false color coding and weighted by the fluorescence intensity. The displayed range is from 0 – 4 ns (see color bar, courtesy of Fred Wouters & Gertrude Bunt, University Medicine Göttingen).

life science



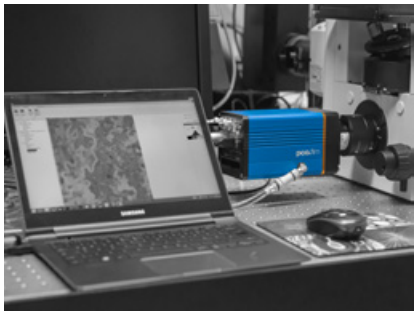
Autofluorescence of a lung tissue slice sample. The image shows the autofluorescence lifetime distribution derived from the measured phase angle in false color coding and weighted by the fluorescence intensity. The displayed lifetimes range from 0.5 – 4 ns (see color bar, courtesy of Fred Wouters & Gertrude Bunt, University Medicine Göttingen).

life science



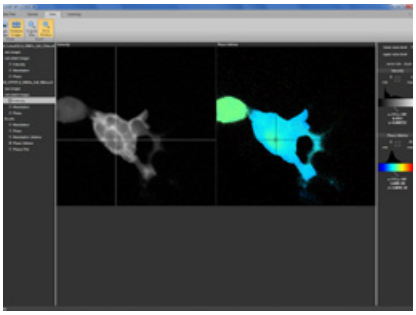
Autofluorescence of a tonsil tissue slice sample. The image shows the autofluorescence lifetime distribution derived from the measured phase angle in false color coding and weighted by the fluorescence intensity. The displayed lifetimes range from 0.5 – 4 ns (see color bar, courtesy of Fred Wouters & Gertrude Bunt, University Medicine Göttingen).

life science



Typical microscope set-up of the pco.flim connected to the camera port of an inverted microscope. The camera is controlled and read out by a computer.

life science



Look@FLIM software – designed to use the pco.flim camera for homodyne frequency domain fluorescence lifetime imaging.

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