FASTAC FLIM System

Fast-Acquisition TCSPC FLIM System

Based on bh’s multi-dimensional TCSPC technique
Acquisition times down to 100 ms
Peak count rates exceeding 20 MHz
Ultra-high time resolution
IRF width < 25 picoseconds
Time-channel width down to 820 femtoseconds
Images size from 128 x 128 pixels to 2048 x 2048 pixels
Number of time channels per pixel up to 4096
Upgrade for bh DCS120 laser scanning systems
Upgrade for laser scanning system of other manufacturers

The bh Fast-Acquisition FLIM system uses four parallel TCSPC channels and a device that distributes the photon pulses of a single detector into the four recording channels. The system features an electrical IRF width of less than 7 ps (FWHM), and a time channel width down to 820 fs. The optical time resolution with an HPM-100-06 or -07 hybrid detector is shorter than 25 ps (FWHM). The system is virtually free of pile-up effects. FLIM data can be recorded at acquisition times down to the fastest frame times of the commonly used galvanometer scanners. The data are recorded with the TCSPC-typical number of time-channels of up to 4096, and with pixel numbers from 128 x 128 to 2048 x 2048 pixels. The system is therefore equally suitable for fast FLIM and precision FLIM applications [2, 3].


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1900ps τ 2300ps
FASTAC FLIM System

Megapixel FLIM within Seconds

BPAE Sample stained with DAPI, Alexa 488 and Mito tracker Red, 2p excitation at 800 nm, Zeiss LSM 880 NLO, 1024 x 1024 pixels, 1024 time channels. Acquisition time 10 seconds

Beautifully Resolved Decay Functions

Decay curves resolved with 1024 time channels. Decay curve from 8x8 pixel area around the spot marked in the image. 2p excitation, HPM-100-06 detector. Note the fast rise of the fluorescence, which is a result of the extremely fast IRF of the system.
Resolution of Multi-Exponential Decay Functions

Double-exponential analysis of FASTAC FLIM data by bh SPCImage. Convallaria sample, 2p excitation. 
Left: Amplitude-weighted lifetime, $t_m$. Right: amplitude ratio of decay components, $a_1/a_2$. Data recorded with 4 seconds acquisition time.

Left: Lifetime image of fast decay component, $t_1$. Right: Lifetime image of slow decay component, $t_2$.

25 years experience in multi-dimensional TCSPC. More than 1500 TCSPC systems worldwide.
FASTAC FLIM System

Available FLIM Data Formats:

<table>
<thead>
<tr>
<th>Pixels</th>
<th>Time Channels, max</th>
<th>Time-Channel width, min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>128 x 128</td>
<td>4096</td>
<td>813 fs</td>
</tr>
<tr>
<td>256 x 256</td>
<td>4096</td>
<td>813 fs</td>
</tr>
<tr>
<td>512 x 512</td>
<td>1024</td>
<td>3.26 ps</td>
</tr>
<tr>
<td>1024 x 1024</td>
<td>256</td>
<td>13 ps</td>
</tr>
<tr>
<td>2048 x 2048</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Instrument Response Function (IRF)

<table>
<thead>
<tr>
<th>IRF width, FWHM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical</td>
</tr>
<tr>
<td>HPM-100-06 detector</td>
</tr>
<tr>
<td>HPM-100-07 detector</td>
</tr>
<tr>
<td>HPM-100-40 detector</td>
</tr>
</tbody>
</table>

Electrical IRF

Optical IRF, HPM-100-06 Detector

Software version required

- Data acquisition, SPCM: April 2018 or later
- Data analysis, SPCImage: April 2018 or later

Acquisition Time

Acquisition time depends on speed of scanner, number of pixels in the image, photon rate delivered by the sample, and on the requirements to the lifetime accuracy. Please see [1] and [5] for details. Examples of images recorded with different acquisition time are shown below.

Images: Left to right: Acquisition time 0.16 s (zoom to obtain short frame time), 0.5 s, 2.5 s. Insert: Decay data in 5x5 pixel area around the cursor position. FLIM data format 256 x 256 pixels, 1024 time channels. Online-lifetime display of SPCM [5].

Related Products

- SPC-150, SPC-150N, SPC-160 TCSPC/FLIM Modules
- HPM-100-06, -07, -40 hybrid detectors
- DSC-120 Confocal and multiphoton laser scanning systems
- DCS-120 Macro System
- FLIM Systems for Zeiss LSM 710 /780 / 880 Laser scanning microscopes

Literature


International Sales Representatives

US: Boston Electronics Corp
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