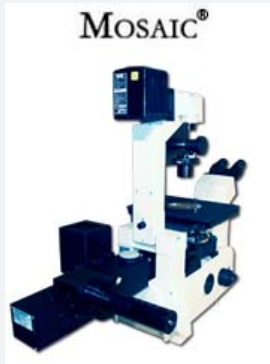


MOSAIC®

Digital Illumination



Digital Illumination

With MOSAIC, it is possible to simultaneously and precisely excite multiple regions of interest with complex geometries in real time and with zero delta acquisition time - realizing true digital illumination. With its continuous wave (CW) laser or arc lamp light fluorescence excitation sources, MOSAIC's benefits are demonstrated today in combination with laser scanning and spinning disk confocal as well as wide field

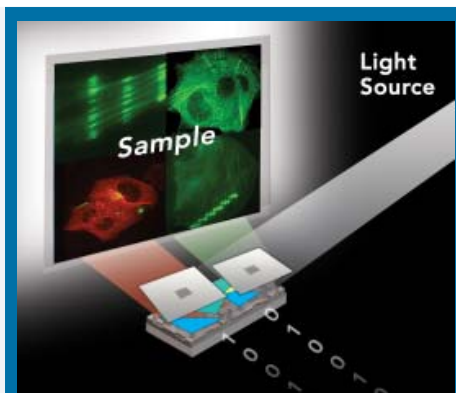
fluorescence microscopy. It addresses the inherent limitations in fluorescence imaging of live cells that include spatio-temporal based cell processes, phototoxicity, photobleaching, and background noise and decreased sensitivity caused by fluorescence from regions outside the region of interest (ROI).

MOSAIC Digital Illumination System

The MOSAIC uses a computer controlled spatial light modulator to map a mask defined in the image acquisition software at the specimen plane. Its simple optical design is readily integrated with the complex optical microscope designs to realize diffraction limited imaging with minimal loss over a broad spectral range. Like traditional galvo mirror scanning systems, the user applies illumination pixel-by-pixel where and for as long as necessary. MOSAIC, however, uniquely enables simultaneous pixel-by-pixel illumination of multiple ROIs with complex geometries with zero delta image acquisition time. There is no scanning of the sample and thus no time lapse between illuminating pixels in the mask. This is not possible with traditional galvo mirror technology that scans the regions of interest over a period of time.

Breadth of Applications

- FRAP
- FRET
- Photoactivation
- Photobleaching
- Photoswitching
- Photoconverting
- Cell Re/Degeneration
- Release of Caged Compounds
- Drug Delivery
- Thrombosis
- Free Radical Release
- CALI



FEATURES AND BENEFITS

- Unlimited flexibility in shape, size, complexity and opacity of illumination mask
- Simultaneous illumination of multiple regions of interest
- Precise illumination of areas of interest that protects target specimen and fluorophore
- Zero delta acquisition time for true digital excitation
- Lowest test cost and highest throughput achieved with unmatched capability to precisely target a large number of infinitely complex geometries with zero delta time
- Longest lifetime and lowest maintenance with rugged semiconductor device

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HARDWARE SPECIFICATIONS

Model

The Mosaic system is available optimized for a factory set magnification.

Model	7200	7201	7202	7203	7204	7205
Magnification	0.75	0.88	1.00	1.13	1.33	1.00

Optical

Transmission	360nm to 700nm
Intensity stability	absolute
Extinction ratio	> 1000:1
Minimum resolvable spot	diffraction limited with 100x objective
Optical pixel rise/fall time	< 1msec
Minimum optical pulsewidth	60msec external trigger 100msec internal trigger
Maximum frame repetition rate	600 frames / sec

Illumination Source Options

High pressure mercury lamp	100W to 300W (maximum)
CW laser	405nm diode
	488nm Argon
	514nm Argon
	Other on request

Illumination Port Options

Dichroic beamsplitter	Single pass, specify wavelength Multi pass, specify wavelength
Beamsplitter	450nm to 750nm, R = 100, 70, 50 or 30%
Excitation filter	480nm / 20nm (GFP)
	470nm / 40nm (FITC)
	535nm / 40nm (Rhodamine)
	Other on request
Laser safety filter, interlocks	Laser specific
Shutter	Optional

Mechanical / Electrical

Illumination port clear aperture	Ø34mm
Illumination port filter size	Ø38mm
Dimensions	minimum: 12.5" (l) x 8.0" (w) x 4.5" (h)
	maximum: 15.0" (l) x 8.0" (w) x 4.5" (h)
Power	90-240VAC 50-60 Hz .25A max 25W
Weight	8 pounds

Adapters

Adapters are available to retrofit to the epi-port or video port of commercially available microscopes.

Adapter	Part No.
Leica DMI series	7310-DMI
Nikon TE2000	7310-N2000
Nikon Ti series	7310-Nti
Olympus IX series	7310-IX70
Zeiss Axiovert 200	7310-ZV200
Zeiss Axio Imager	not required
Zeiss Axio Observer	7310-ZV200
C-mount video port	not required

INTEROPERABILITY

- Compatible with microscopes platforms
 - point & slit scan confocal
 - spinning disk confocal
 - wide field
- Custom OEM systems available for High Content Screening and other fluorescence based bioimaging instrumentation
- Compatible with control and acquisition software from market leading microscope manufacturers including Carl Zeiss, Leica, Nikon and Olympus
- Wavelength modularity - add lasers and filters cost effectively

MOSAIC

Digital Illumination

SOFTWARE SPECIFICATIONS

SOFTWARE DEVELOPERS' KITS

KITS

SDKs are available for OEMs to develop software to control integrated MOSAIC systems. The SDK includes:

- MOSAIC optical head with galvanometers and USB controller
- Software drivers
- Instructions and sample C++ code

SOFTWARE DRIVERS

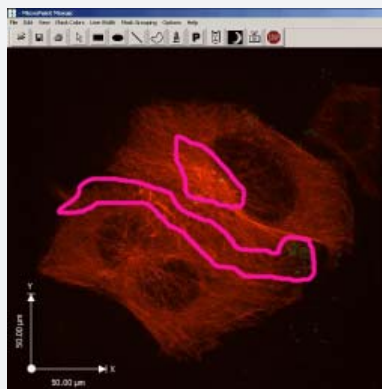
Drivers available for market leading bioimaging software including MetaMorph[®], Volocity[®] and SlideBook[™]

The angular alignment of either the CW laser or lamp illumination is factory set. The spatial alignment is controlled via the software calibration routine. The focus in the z-direction is fixed at installation or OEM integration. Beam shaping is then controlled with the spatial light modulating DMD device.

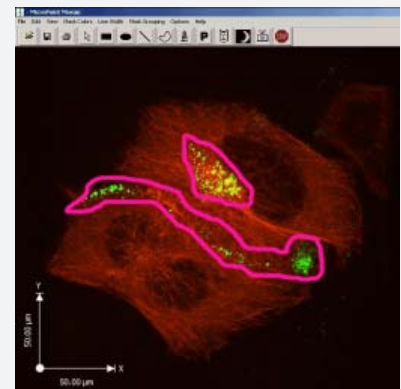
Software

The MOSAIC includes software that controls calibration and enables the user to graphically or numerically define and edit the shape and characteristics of the illumination at the target. It also includes options to control real time digital video.

Release	MicroPoint Mosaic Ver 1.1
Driver	PLX 9054 API ver 4.10
Calibration	Scale & Offset corrections for X & Y 8 user-defined descriptions
File Functions	Import (*.dxf, *.msk); Save *.msk
Drawing Editor Shapes	Line Paintbrush Rectangle Oval Freehand polyshape
Drawn Shape Characteristics	Positive, negative (erase) Linewidth, paintbrush size Alpha blended color and opacity of defined regions Color palette Click and drag shapes and edges Cut, copy, paste, delete shape Group, ungroup shapes
Controls	Engage mask pattern Go dark (global) Stop Snapshot video "Peek" video used for reducing phototoxicity
Options	Continuous update from drawing editor Configure video subsystem Exposure time & trigger selection Video mode & time selection On/Off, Adjust laser outline highlight



Define region of interest and excitation energy at the target in image acquisition software



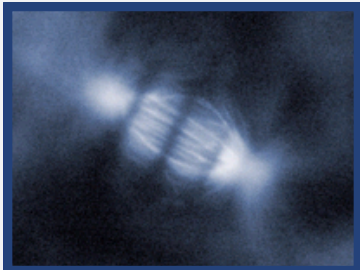
Simultaneously excite and acquire image with zero delta time

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APPLICATIONS

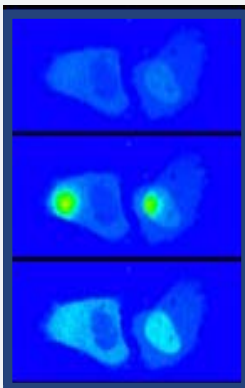
Fluorescence Recovery after Photobleaching (FRAP)



Metaphase cells after 25ms photobleaching

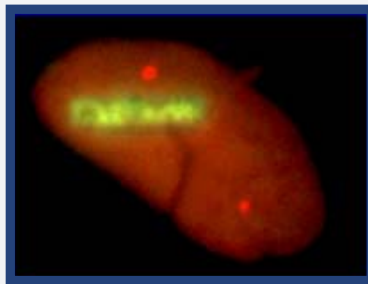
An inherent limitation of FRAP is external illumination that initiates the fluorescence transfer leading to background noise from direct excitation of the acceptor or from photobleaching. Overcome this difficulty by precisely targeting fluorescence excitation with the MOSAIC digital diaphragm.

Release of Caged Compounds



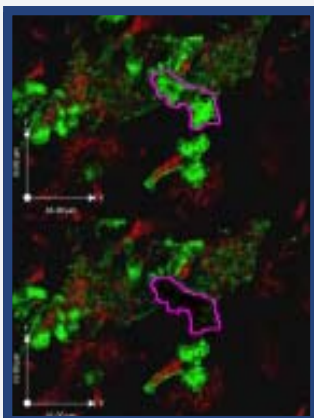
Before, during and after simultaneous photoactivation of cytoplasm and nucleus; compounds uncaged in 4msec.

Photoactivation



Photoactivation of GFP: U2OS cells after 2sec photoactivation

Photobleaching



Precisely photobleach specific areas to detect any molecules that migrate into the bleached areas for the study protein dynamics.



DMD Technology

The core of the Mosaic is the Digital Micromirror Device (DMD), a high speed and highly efficient semiconductor-based "light switch" array of hundreds of thousands hinge-mounted, addressable, tiltable, microscopic mirrors. When a DMD chip is coordinated with a digital video or graphic signal, a light source, and beam delivery optics, its mirrors reflect a digital image of the illumination mask onto the sample.

Systems for High Content Screening OEMs

Lowest test cost and highest throughput are achieved with the unique capability to target a large number of infinitely complex, multiple regions - simultaneously, precisely, and repeatably - in real time and with zero delta time.

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