High Performance Solution For Bio Imaging System

10th Edition
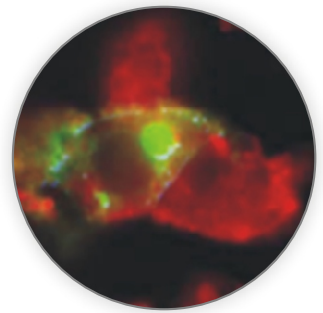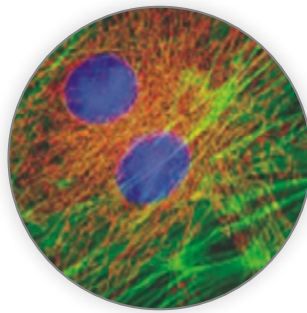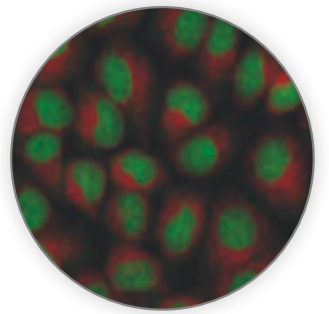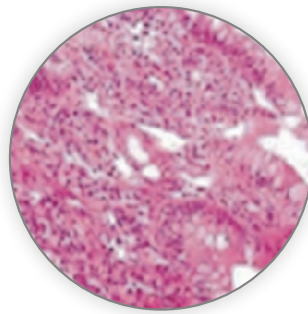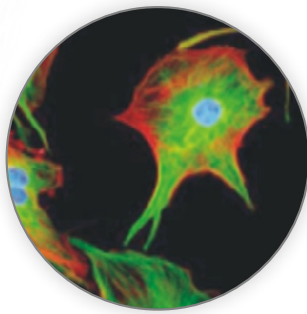
Contents

(주)케이오에스
KOS,Inc.

Optical Instruments

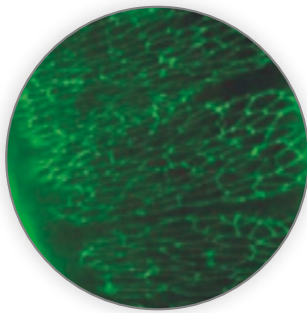-Motorized Microscope Stages

-Automation Controllers-MAC6000

-NanoScanZ – Fast Piezo Focusing

 Stage

-Xenon Light Source and Accessories

-Polychrome V monochromator

-High Speed Wavelength Switcher

-Lambda LS / 10 Xenon Lamp

-MultiChannel Imaging System

-Micro*Color and Macro*Color

 tunable RGB Fillters

-Semrock Optical Filter

System

-Real-time Confocal Microscope

 System

-Angstrom™ Grid Confocal System

-Long Term Live Cell Imaging System

-Single Molecule Fluorescence Imaging

-Micro Imaging Ststem-FRAP 3D

-In-vivo whole Body Imaging System

 (Lumazone)

-Cytogenetics Analysis System

-Digital Holographic Microscope

 for 3D real-time Optical topography

-Virtual Microscopy System

-Scanning Near-field Optical Microscope

-Raman Spectroscopy System

CCD Camera List

	Model	Imaging size	Pixel Size (µm)	Frame Rate (Full Resolution)
Photometrics	Evolve™ 512	512 × 512	16 × 16	33.7 fps
	Evolve™ 128	128 × 128	24 × 24	530 fps
	QuantEM™ 512SC	512 × 512	16 × 16	31.5 fps
	Cascade ‖®1024	1024 × 1024	13 × 13	8.5 fps
	CoolSNAP HQ2	1392 × 1040	6.45 × 6.45	11 fps
	CoolSNAP ES2	1392 × 1040	6.45 × 6.45	10 fps
	CoolSNAP EZ	1392 × 1040	6.45 × 6.45	10 fps
	CoolSNAP cf2	1392 × 1040	4.65 × 4.65	10 fps
	CoolSNAP K4	2048 × 2048	7.4 × 7.4	3 fps
PI Acton	ProEM 512B	512 × 512	16 × 16	33 fps
	ProEM 1024B	1024 × 1024	13 × 13	8.5 fps
	PIXIS 512	512 × 512	24 × 24	6.6 fps
	PIXIS 1024	1024 × 1024	13 × 13	1.7 fps
	PIXIS 2048	2048 × 2048	13.5 × 13.5	0.44 fps
	Versarray 1300	1340 × 1300	20 × 20	0.56 fps
	Versarray 2048	2048 × 2048	13.5 × 13.5	0.22 fps
Q Imaging	Rolera Mgi-Plus	512 × 512	20 × 20	30 fps
	Rolera EM-c2	1004 × 1002	8 × 8	34.2 fps
	Rolera XR	696 × 520	13.7 × 13.7	20 fps
	Exi Blue	1392 × 1040	6.45 × 6.45	15 fps
	Exi Aqua	1392 × 1040	6.45 × 6.45	11 fps
	Retiga SRV	1392 × 1040	6.45 × 6.45	11 fps
	Retiga 4000 Series	2048 × 2048	7.4 × 7.4	4 fps
	Retiga 2000 Series	1600 × 1200	7.4 × 7.4	10 fps
	Qiclick	1392 × 1040	6.45 × 6.45	10 fps
	QICAM	1392 × 1040	4.65 × 4.65	11 fps
	MP 3.3	2048 × 1536	3.45 × 3.45	5 fps
	MP 5	2560 × 1920	3.4 × 3.4	3.5 fps
	Go 3	2048 × 1536	3.2 × 3.2	6 fps
	Go 5	2592 × 1944	2.2 × 2.2	7 fps
	Go 21	1280 × 1024	5.2 × 5.2	15 fps
Lumenera	Infinity 1-2	1600 × 1200	4.2 × 4.2	20 fps
	Infinity 1-3	2048 × 1536	3.2 × 3.2	12 fps
	Infinity 1-5	2592 × 1040	2.2 × 2.2	7 fps
	Infinity 2-1	1392 × 1040	4.65 × 4.65	15 fps
	Infinity 2-2	1616 × 1216	4.4 × 4.4	12 fps
	Infinity 2-3	2080 × 1536	3.45 × 3.45	7 fps
	Infinity 3-1U	1392 × 1040	6.45 × 6.45	15 fps
	Infinity 3-1	1392 × 1040	9 × 9	15 fps
	Infinity 4-11	4008 × 2672	5.2 × 5.2	3.5 fps
	Infinity X-21	1280 × 1024	4.4 × 4.4	30 fps
	Infinity X-32	1616 × 1216	4.2 × 4.2	12 fps
	Infinity Lite	1440 × 1080		15 fps

CoolSNAP Series Cameras

PHOTOMETRICS®
a division of Roper Scientific, Inc.

The CoolSNAP Monochrome camera series from Photometrics® is a fast, high-resolution digital imaging system designed for quantitative fluorescence microscopy applications. This cooled CCD camera system provides a large dynamic range with very low noise at both 10 MHz and 20 MHz. The fine pitch of the pixels is ideally matched to the resolution of optical microscopes.
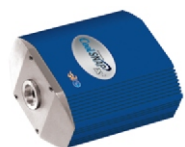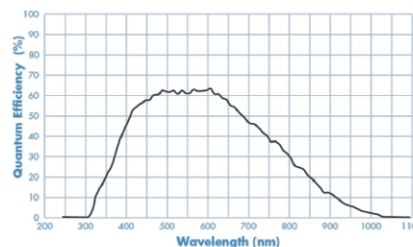

CoolSNAP HQ² [M]

CCD type	Sony® ICX285; Interline-Transfer, Progressive-scan
CCD format	1392 x 1040 imaging array 6.45 x 6.45 µm pixels
Digitizer type	IEEE-1394a 14 bits @ 20 MHz or 10 MHz LVDS 12 bits @ 20 MHz or 10 MHz
CCD Cooling	-30°C (regulated)
Linear full well	16,000 e- (single pixel) 30,000 e- (2 x 2 binned pixel)
Nonlinearity	<1%
System Gain	1 e-/ADU
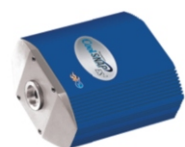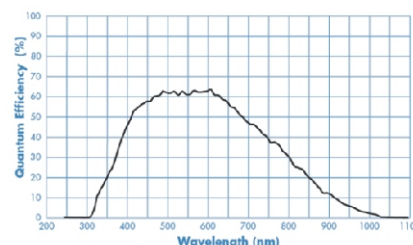
CoolSNAP ES² [M]

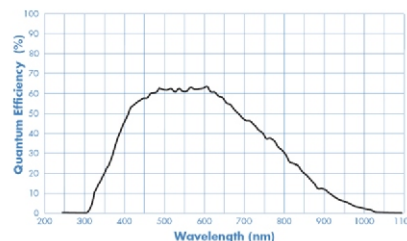|	
CCD type	Sony® ICX285; Interline-Transfer, Progressive-scan
CCD format	1392 x 1040 imaging array 6.45 x 6.45 µm pixels
Digitizer type	12 bits @ 20 MHz
CCD Cooling	0°C
Linear full well	13,500 e- (single pixel) 25,000 e- (2 x 2 binned pixel)
Nonlinearity	<1%
System Gain	3 e-/ADU

CoolSNAP EZ [M]

CCD type	Sony® ICX285; Interline-Transfer, Progressive-scan
CCD format	1392 x 1040 imaging array 6.45 x 6.45 µm pixels
Digitizer type	12 bits @ 20 MHz
CCD Cooling	5°C below ambient
Linear full well	12,300 e- (single pixel) 24,500 e- (2 x 2 binned pixel)
Nonlinearity	<1%
System Gain	3 e-/ADU

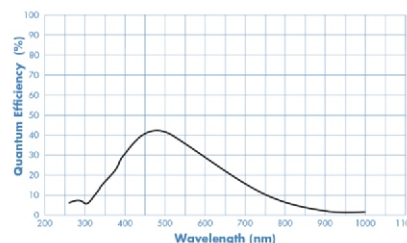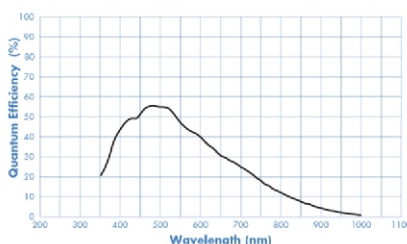
CoolSNAP cf² [C] [M]

CCD type	Sony® ICX205AL; Interline-Transfer, Progressive-scan
CCD format	1392 x 1040 imaging array 4.65 x 4.65 µm pixels
Digitizer type	12 bits @ 20 MHz
CCD Cooling	5°C below ambient
Linear full well	10,200 e-
Nonlinearity	<4%
System Gain	3 e-/ADU

CoolSNAP k4 [M]

CCD type	Kodak® KAI-4020M; Interline-Transfer, Progressive-scan
CCD format	2048 x 2048 imaging array 7.4 x 7.4 µm pixels
Digitizer type	12 bits @ 20 MHz
CCD Cooling	-25°C (regulated)
Linear full well	30,000 e- (single pixel) 60,000 e- (2 x 2 binned pixel)
Nonlinearity	<1%
System Gain	1 e-/ADU

[C] Color Camera   [M] Mono Camera

photometrics®
evolve™

PHOTOMETRICS®
a division of Roper Scientific, Inc.

The Photometrics Evolve:512 is the ultimate deep-cooled, back-thinned EMCCD camera. Years of engineering expertise have enabled Photometrics to perfect every element of the Evolve:512. The Evolve:512 offers life science researchers the world's first advanced feature set designed specifically for EMCCD cameras and for low-light-level bio-imaging applications. Each of the Evolve camera's revolutionary features can easily be enabled or disabled by the camera user via software control. This sophisticated functionality enhances the quantitative nature of the camera while simultaneously allowing researchers to concentrate on acquiring image data relevant to their work.

Applications

- Speckle microscopy
- Spinning disk confocal microscopy
- Total internal reflection fluorescence (TIRF) microscopy
- Cell trafficking studies
- Live-cell fluorescent protein imaging
- Single molecule fluorescence (SMF)
- All low light fast applications!

Features

- Smallest, most powerful scientific EMCCD camera on the market
- Most advanced feature set available for low-light applications
- Lowest dark current available for an EMCCD camera
- Lowest read noise available for an EMCCD camera
- Ideal for sophisticated researcher and multi-user labs
- Superb electron multiplication (EM) gain and bias stability
- Most accurate EM calibration technique in the industry
- Backed by Photometrics' worldwide support team

QE curve

Advanced Features

- Vari-bit   (up to Full 16 bit!)
- Quant-View
- Rapid-Cal
- Black-lock
- Top-lock
- Background Event Reduction Technology
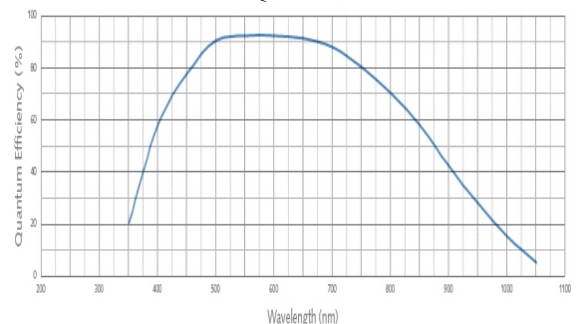
Model	evolve 512	evolve 128
Sensor	e2v CCD97	eV2 CCD60
Pixels	512x512(back-illuminated/back-thinned)	128x128(back-illuminated/back-thinned)
Pixel Size	16x16 μm	24x24 μm
Well Size	800,000 e- (EM mode) 200,000 e- (conventional)	800,000 e- (EM mode) 200,000 e- (conventional)
Digital Output	16 bit	16 bit
Frame Rate	33.7 fps full resolution >224 fps @ 8x8	530 fps full resolution >2887 fps @ 8x8
Gain States (Electron Multiplication)	1 to 1000x (self calibrated)	1 to 1000x (self calibrated)
Cooling	−85 C −100 C	−85 C
Binning Modes	Up to 256x1 in parallel direction, arbitrary in serial direction	Up to 256x1 in parallel direction, arbitrary in serial direction
Digital Interface	IEEE-1394a	IEEE-1394a

EMCCD Camaeras

PHOTOMETRICS®
*a division of Roper Scientific, Inc.*

The Photometrics® Cascade® Series are the only true 16-bit, megapixel EMCCD camera in the world to offer -30°C ~ -60°C cooling without LN2 or water! This high-resolution camera uses its deep thermoelectric cooling to maximize gain and minimize dark current. A stainless-steel vacuum chamber (with all-metal seals) houses a high-QE, back-illuminated or front-illuminated, frame-transfer EMCCD.

*The camera's exclusive vacuum technology is so robust it carries a lifetime guarantee.*

Evolve 512 [M]

|	
CCD type	e2v CCD97; back-illuminated, frame-transfer EMCCD
CCD format	512 x 512 imaging array 16 x 16 µm pixels
Digitizer type	16 bits @ 10 MHz, 5MHz, 1.25MHz
CCD Cooling	-85°C (typical)
Linear full well	200 ke- 800 ke- ("EM gain" amplifier)
On-Chip multiplication Gain	1 to 1,000x (typical) Controlled via software

Quantum Efficiency

QuantEM : 512SC [M]
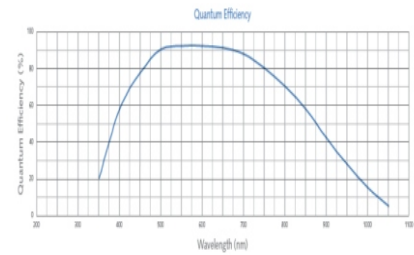
|	
CCD type	e2v CCD97; back-illuminated, frame-transfer EMCCD
CCD format	512 x 512 imaging array 16 x 16 µm pixels
Digitizer type	16 bits @ 10 MHz, 5MHz, 1.25MHz
CCD Cooling	-30°C (regulated)
Linear full well	200 ke- 800 ke- ("EM gain" amplifier)
On-Chip multiplication Gain	1 to 1,000x (typical) Self-calibrating linearization

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Cascade 1K [M]
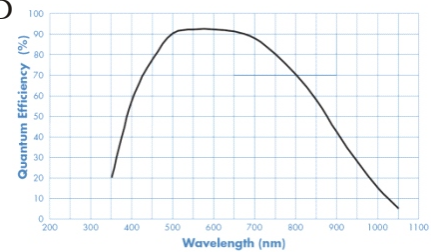
CCD type	Texas Instruments TC285; front-illuminated, frame-transfer CCD
CCD format	1004 x 1002 imaging array 8 x 8 µm pixels
Digitizer type	16 bits @ 10 MHz
CCD Cooling	-30°C (regulated)
Linear full well	30,000 e-
On-Chip multiplication Gain	Software selectable; minimum gain: 200x

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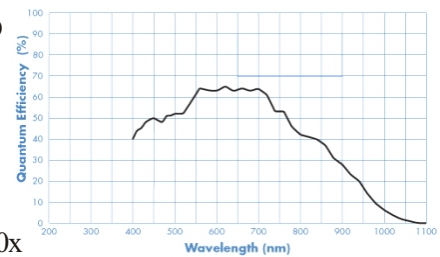
Evolve 128 [M]

CCD type	e2v CCD60; back-illuminated, frame-transfer CCD
CCD format	128 x 128 imaging array 24 x 24 µm pixels
Digitizer type	16 bits @ 10 MHz
CCD Cooling	-85°C (regulated)
Linear full well	200 ke- 800 ke- ("EM gain" amplifier)
On-Chip multiplication Gain	1 to 1,000x (typical) Controlled via software

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[C] Color Camera   [M] Mono Camera

ProEM EMCCD
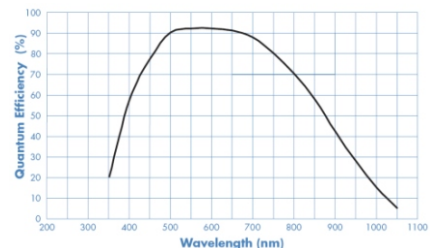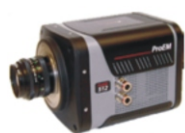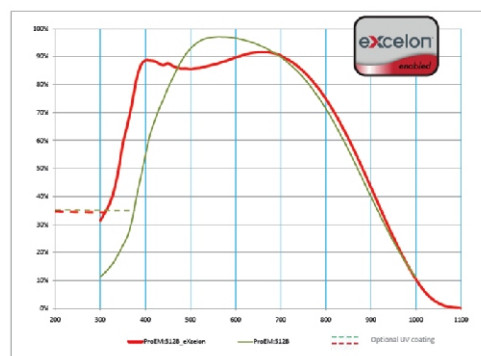
Princeton Instruments △ACTON

The ProEM: 512BK series of EMCCD cameras from Princeton Instruments are the most advanced EMCCD cameras on the market. *The eXcelon version of the ProEM: 512BK offers the lowest etaloning in the NIR, and enhanced QE in in blue and red, while also featuring* a high speed EM mode to capture fast kinetics, a low speed normal CCD Mode with very low read noise for precision photometry applications, and advanced features such as solid baseline stability and linear EM gain control. These cameras are cooled to below -90° C using either air or liquid, or a combination of both, while the all metal, hermetic vacuum seals are warranted for life – the only such guarantee in the industry – and feature the latest Gigabit Ethernet (GigE) interface to allow remote operation over a single cable without the need for custom framegrabbers.

Features

- On-chip electron multiplication(EM-CCD) gain and deep cooling for single-photon sensitivity
- Low spurious charge for photon counting applications
- All-metal vacuum seals with lifetime guarantee for worry-free operation
- Frame-transfer architecture for 100% duty cycle imaging
- Fiber optic interface for remote operation from up to 300 meters
- Liquid cooling(CoolCUBE) option for vibration sensitive applications

Applications

-Single-molecule fluorescence
-Astronomy
-Adaptive optics
-High-speed tomography

ProEM : 512B	e2v CCD97; back-illuminated, frame-transfer EMCCDD
CCD format	512 x 512 imaging pixels
	16 x 16 μm pixels
	8.2 x 8.2 mm imaging area (optically centered)
Digitizer type	16 bits @ 10 MHz, 5 MHz, and 1 MHz
CCD Cooling	-70°C ±0.05°C(guaranteed)
Linear full well	~200 ke- (single pixel)
	~800 ke- (EM mode)
	Read noise effectively reduced to <1 e- rms with on-chip multiplication gain enabled

ProEM : 512BK	Princeton instruments propriataryCCD; back-illuminated, frame-transfer EMCCD
CCD format	512 x 512 imaging pixels
	16 x 16 μm pixels
	8.2 x 8.2 mm imaging area (optically centered)
Digitizer type	16 bits @ 10 MHz, 5 MHz, and 1 MHz
CCD Cooling	--70°C ±0.05°C (guaranteed)
Linear full well	~200 ke- (single pixel)
	~800 ke- (EM mode)
	Read noise effectively reduced to <1 e- rms with on-chip multiplication gain enabled

ProEM : 1024B	e2v CCD201; back-illuminated, frame-transfer EMCCDD
CCD format	1024 x 1024 imaging pixels
	13 x 13 μm pixels
	13.3 x 13.3 mm imaging area (optically centered)
Digitizer type	16 bits @ 10 MHz, 5 MHz, and 1 MHz and 100kHz
CCD Cooling	-55°C ±0.05°C (guaranteed)
Linear full well	~80 ke- (single pixel)
	~730 ke- (EM mode)
	Read noise effectively reduced to <1 e- rms with on-chip multiplication gain enabled

C Color Camera   **M** Mono Camera

PIXIS Series Cameras

PIXIS™, the most affordable, advanced detection system in the world!

PIXIS is a no-compromise, next-generation camera platform engineered for low-light-level spectroscopy and imaging. Whether your application involves Raman spectroscopy in the near infrared or semiconductor imaging in the ultraviolet, PIXIS has everything you need to tackle the most demanding applications.

Never before have so many state-of-the-art features been incorporated in a single camera design. Simply put, no other camera in the world can match PIXIS for performance and value.

PIXIS : 512

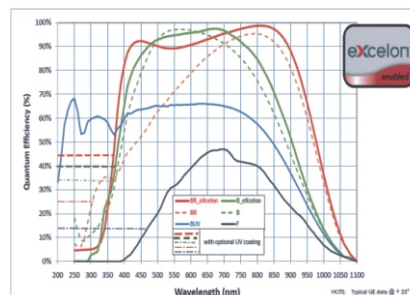| M PIXIS : 512F | e2v CCD77-10, front illuminated |
PIXIS : 512B/BUV	e2v CCD77-10, back illuminated
CCD format	512 x 512 imaging array
	24 x 24 μm pixels
Digitizer type	16 bits @ 2 MHz, 100 KHz
CCD Cooling	-75°C typical; - 65°C guaranteed
Linear full well	350 ke- (typical), 250 ke- (min)
	700 ke- (typical), 600 ke- (min)
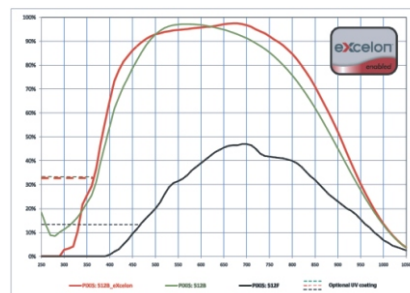
PIXIS : 1024

| M PIXIS : 1024F | e2v CCD47-10, front illuminated |
PIXIS : 1024B/BUV	e2v CCD47-10, back illuminated
PIXIS : 1024BR	e2v CCD47-10, back illuminated Deep depletion
CCD format	1024 x 1024 imaging array
	13 x 13 μm pixels
Digitizer type	16 bits @ 2 MHz, 100 KHz
CCD Cooling	-75°C typical; - 65°C guaranteed
Linear full well	100 ke- (typical), 60 ke- (min)
	250 ke- (typical), 220 ke- (min)

PIXIS : 2048

M PIXIS : 2048F	e2v CCD42-40, front illuminated
PIXIS : 2048B	e2v CCD42-40, back illuminated
CCD format	2048 x 2048 imaging array
	13.5 x 13.5 μm pixels
Digitizer type	16 bits @ 2 MHz, 100 KHz
CCD Cooling	-75°C typical; - 65°C guaranteed
	(with CoolCUBE Liquid circulator)
	-65°C typical; - 55°C guaranteed
	(with air)
Linear full well	100 ke- (typical), 80 ke- (min)
	1000 ke- (typical), 800 ke- (min)
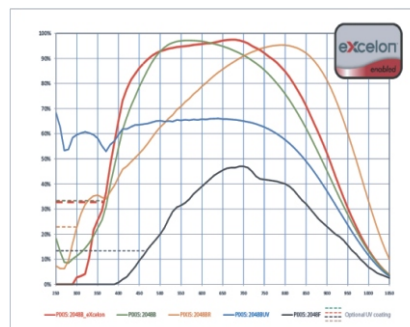
PIXIS : 1300F	Princeton Instruments proprietary CCD, front illuminated
PIXIS : 1300B	Princeton Instruments proprietary CCD, back illuminated
PIXIS : 1300BR	Princeton Instruments proprietary CCD, back illuminated Deep depletion
CCD format	1340 x 1300 imaging array
	20 x 20 μm pixels
Digitizer type	16 bits @ 2 MHz, 100 KHz
CCD Cooling	-65°C typical; - 55°C guaranteed
Linear full well	250 ke- (typical), 200 ke- (min)
	1000 ke- (typical), 800 ke- (min)

C Color Camera   M Mono Camera

eXcelon
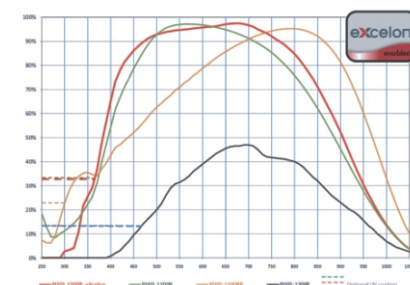
Princeton Instruments
ACTON

New-generation CCD/EMCCD technology

eXcelon is a new CCD/EMCCD sensor technology jointly developed by Princeton Instruments, e2v and Photometrics. The technology is a significant enhancement to standard back illuminated (B) CCD/EMCCDs and back illuminated deep depletion (BR) CCDs It provides three significant benefits
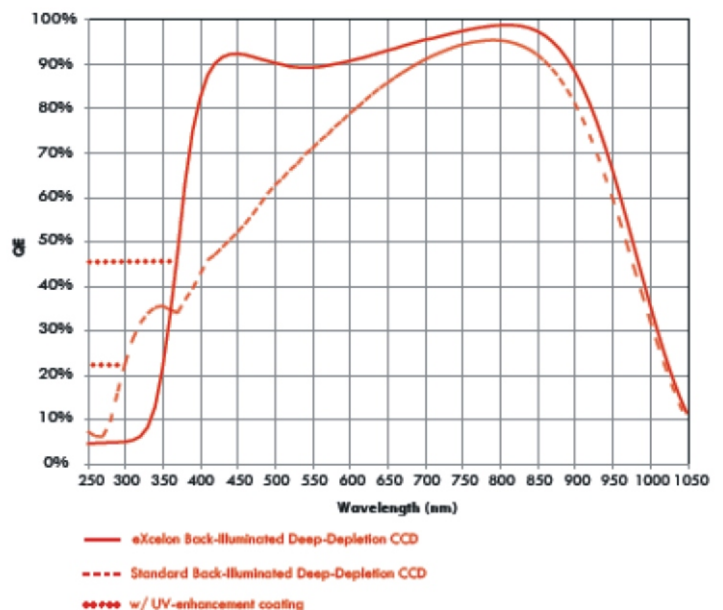
- Improved sensitivity – improved QE over broader wavelength region compared to the standard back illuminated (B) and deep depletion (BR) sensors
- Reduced etaloning – up to 10 times lower etaloning or unwanted fringes in near infrared (NIR) region compared to standard counterparts
- Lower dark current – all this performance without increasing the dark current from their standard counterparts

Reduction in etaloning provided by eXcelon back-illuminated deepdepletion
CCDs (top) compared to standard back-illuminated deep-depletion CCDs.
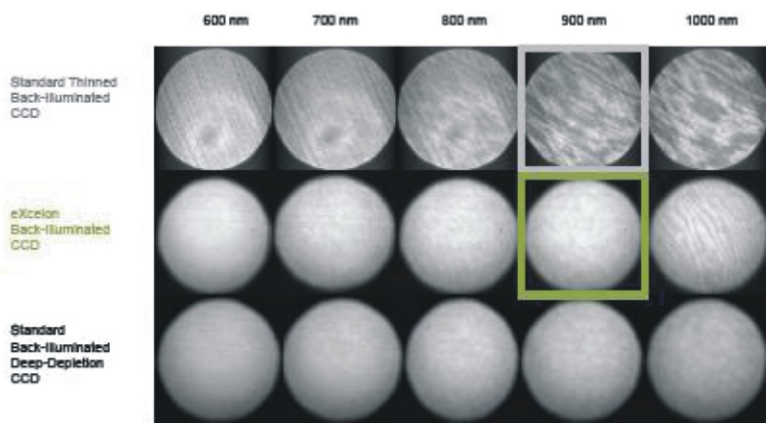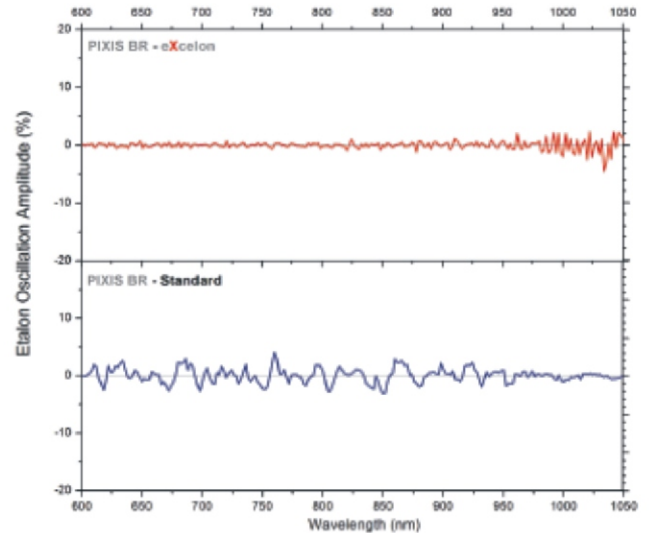
Etaloning in the NIR for standard thinned back-illuminated CCD cameras, eXcelon back-illuminated CCD cameras, and standard back-illuminated deep-depletion CCD cameras.
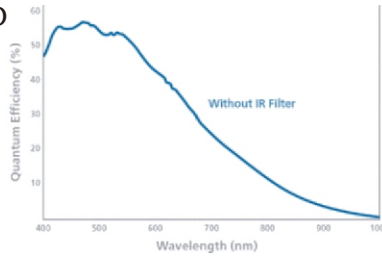

Typical QE of new eXcelon back-illuminated deep-depletion CCDs and standard back-illuminated deep-depletion CCDs. Dotted lines on the left represent QE in UV region with optional UV-enhancement coating.

eXcelon™
...CCD and EMCCD sensitivity redefined

— eXcelon Back-illuminated Deep-Depletion CCD
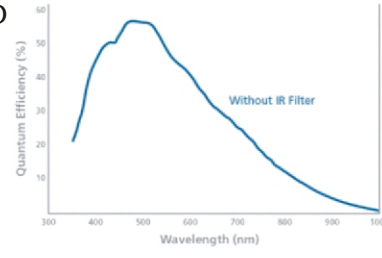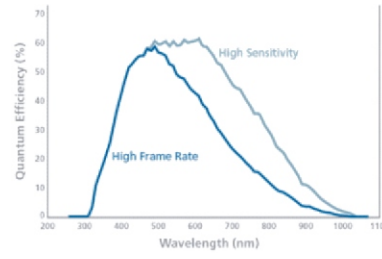--- Standard Back-illuminated Deep-Depletion CCD
•••• w/ UV-enhancement coating
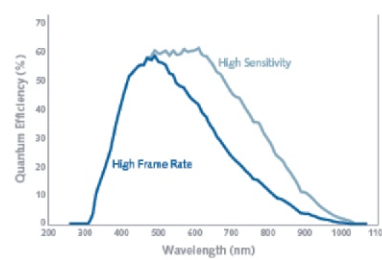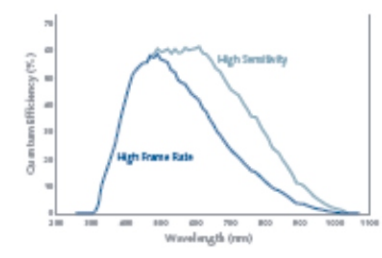
QImaging Series Cameras

QImaging digital cameras are compact and designed for use in both microscope and optical lens imaging applications. All QImaging cameras are FireWire™ IEEE 1394 interfaced for easy connectivity with a single wire connecting the camera to the computer requiring no frame grabber. The FireWire interface allows for portability with use of a laptop computer and control of multiple cameras from one controller.

Retiga2000DC

CCD type	Kodak® KAI-2020 progressive-scan interline CCD
CCD format	1.92 million; 1600 x 1200 imaging array
	7.4 x 7.4 μm pixels
Digitizer type	12 bits @ 20, 10, 5MHz
CCD Cooling	-45°C
Exposure	10μs increments
Linear full well	40,000e- (1x1 binning); 80,000e- (2x2 binning)

Retiga4000DC

CCD type	Kodak® KAI-4022 progressive-scan interline CCD
CCD format	4 million; 2048 x 2048 imaging array
	7.4 x 7.4 μm pixels
Digitizer type	12 bits @ 20, 10, 5MHz
CCD Cooling	-45°C
Exposure	10μs to 17.9min in 1μs increments
Linear full well	40,000e- (1x1 binning); 80,000e- (2x2 binning)

Retiga-SRV

CCD type	Sony® ICX285 progressive-scan interline CCD
CCD format	1.4 million; 1392 x 1040 imaging array
	6.45 x 6.45 μm pixels
Digitizer type	12 bits @ 20, 10, 5MHz
CCD Cooling	-30°C
Exposure	1μs to 17.9min in 1μs increments
Linear full well	18,000e- (22,000e- with 2x2 binning)

EXi Blue

CCD type	Sony® ICX285 progressive-scan interline CCD
CCD format	1392 x 1040 imaging array
	6.45 x 6.45-μm pixels
Digitizer type	8/14 bits @ 30, 20, 10 MHz,
CCD Cooling	Down to -0°C
Exposure	10μs to 17.9min
Linear full well	16,000e- (30MHz); 18,000e- (20, 10MHZ)

EXi Aqua

CCD type	Sony® ICX285 progressive-scan interline CCD
CCD format	1.4 million; 1392 x 1040 imaging array
	6.45 x 6.45 μm pixels
Digitizer type	8/14 bits @ 20, 10MHz
CCD Cooling	0°C (regulated)
Exposure	10μs to 17.9min in 1μs increments
Linear full well	18,000e-

C Color Camera   M Mono Camera

QImaging Series Cameras

High performance quantitative digital CCD cameras designed for life science microscopy and industrial imaging applications. Models are available in color/monochrome, NIR/visible/UV spectral ranges, cooled/ uncooled, 12-bit, and high sensitivity for low light. All are fully computer controlled with electronic shutters.


Retiga2000R [M]

|	
CCD type	Kodak KAI-2020 progressive-scan interline CCD
CCD format	1.92 million; 1600 x 1200 imaging array
	7.4 x 7.4 μm pixels
Digitizer type	12 bits @ 20, 10, 5MHz
CCD Cooling	Peltier thermoelectric cooling to 25°C below ambient
Exposure	10μs to 17.9min in 1μs increments
Linear full well	40,000e- (1x1); 800,000e- (2x2)

Retiga4000R [M]
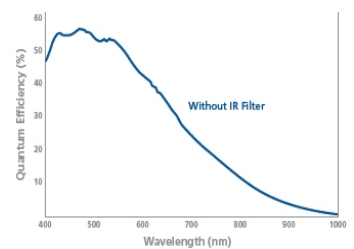
CCD type	Kodak KAI-4021 progressive-scan interline CCD
CCD format	4.19 million; 2048 x 2048 imaging array
	7.4 x 7.4 μm pixels
Digitizer type	12 bits @ 20, 10,, 5MHz
CCD Cooling	Peltier thermoelectric cooling to 25°C below ambient
Exposure	10μs to 17.9min in 1μs increments
Linear full well	40,000e- (1x1); 800,000e- (2x2)
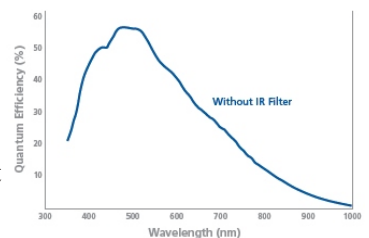
**Rolera-XR** [M]

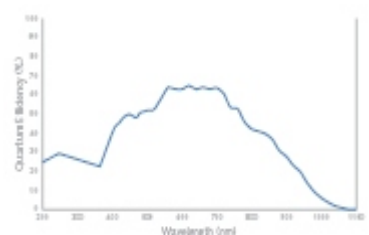|	
CCD type	VQE3618L progressive-scan interline CCD
CCD format	696 x 520 imaging array
	13.7 x 13.7-μm pixels
Digitizer type	12 bits @ 20, 10, 5, 2.5MHz
CCD Cooling	Peltier thermoelectric cooling to 25°C below ambient
Exposure	10μs to 17.9min in 1μs increments
Linear full well	22,000e-
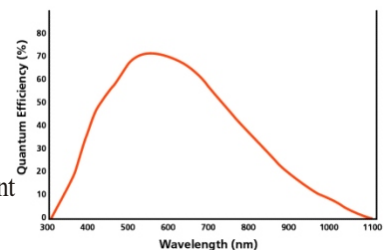
Rolera-MGI Plus [C][M]

CCD type	E2v L3Vision CCD97, back-illuminated CCD
CCD format	512 x 512 imaging array
	16 x 16-μm pixels
Digitizer type	14 bits @ 10, 5MHz(EM mode), 5, 1MHz(Normal)
CCD Cooling	Down to -25°C
Exposure	10μs to days
Linear full well	240,000e- (1x1); 800,000e- (2x2, non-EM mode)

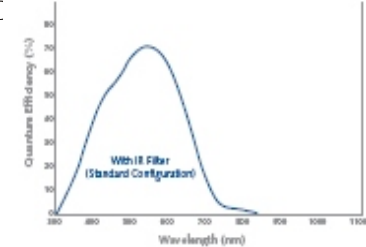
Rolera EM-C^2 [M]
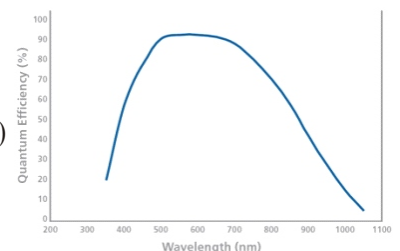
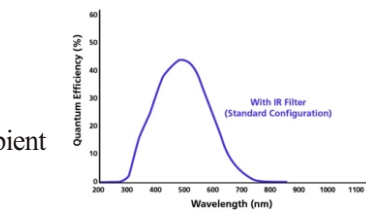|	
CCD type	Texas® Instruments TX285 frame transfer EMCCD
CCD format	1004 x 1002 imaging array
	8 x 8 μm pixels
Digitizer type	8/14 bits @ 40, 20, 10 MHz,
CCD Cooling	Down to -50°C
Exposure	200μs to 17.9min
Linear full well	32,700e-

[C] Color Camera   [M] Mono Camera
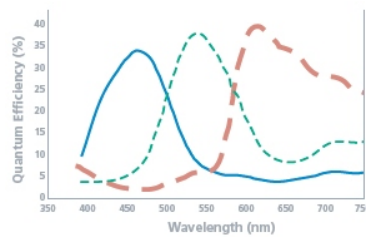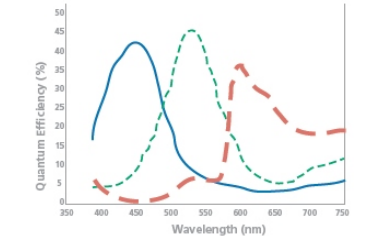
Q Imaging Series Cameras

QImaging digital cameras are compact and designed for use in both microscope and optical lens imaging applications. All QImaging cameras are FireWire™ IEEE 1394 interfaced for easy connectivity with a single wire connecting the camera to the computer requiring no frame grabber. The FireWire interface allows for portability with use of a laptop computer and control of multiple cameras from one controller.
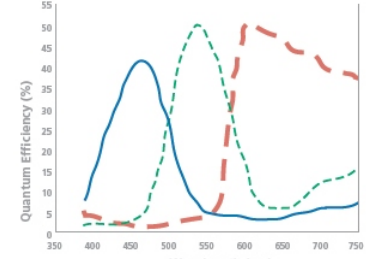
QIClick [C][M]

CCD type	Sony® ICX285 progressive-scan interline CCD
CCD format	1392 x 1040 imaging array
	6.45 x 6.45 µm pixels
Digitizer type	12 bits @ 20, 10, 5, 2.5 MHz,
CCD Cooling	Passively cooled to ambient temperature
Exposure	10µs to 17.9min
Linear full well	18,000e- (22,000e- with 2x2 binning)

MicroPublisher 5.0 & 3.3RTV [C]

CCD type	MP3.3RTV ; Sony® ICX252 progressive-scan interline CCD (color)
	MP5.0RTV ; Sony® ICX282 progressive-scan interline CCD (color)
CCD format	MP3.3RTV ; 2048 x 1536 imaging array, 3.45 x 3.45 µm pixels
	MP5.0RTV ; 2560 x 1920 imaging array, 3.4 x 3.4 µm pixels
Digitizer type	10 bits @ 20, 10, 5, 2.5 MHz
CCD Cooling	Peltier thermoelectric cooling to 10°C below ambient
Exposure	1.6ms to 17.9min in 1µs increments

QICAM [C][M]

CCD type	Sony® ICX205 progressive-scan interline CCD
CCD format	1.4 million; 1392 x 1040 imaging array
	4.65 x 4.65 µm pixels
Digitizer type	12 bits @ 20, 10, 5, 2.5MHz
CCD Cooling	Peltier thermoelectric cooling to 25°C below ambient
Exposure	12µs to 17.9min in 1µs increments
Linear Full Well	10,000e-

GO-3 [C]

CCD type	CMOS Color
CCD format	2048 x 1536 imaging array
	3.2 x 3.2 µm pixels
Digitizer type	8 or 10 bits (24- or 30-bit color) @ 24MHz
CCD Cooling	None
Exposure	0ms to 1.74sec
Linear full well	>20,000e-

GO-5 [C]

CCD type	CMOS Color
CCD format	2592 x 1944 imaging array
	2.2 x 2.2 µm pixels
Digitizer type	8 or 10 bits (24- or 30-bit color) @ 48MHz
CCD Cooling	None
Exposure	1ms to 3sec
Linear full well	~8300e-

GO-21 [C]

CCD type	CMOS Color
CCD format	1280 x 1024, 2560 x 2048, 3840 x 3072,
	5120 x 4096 imaging array
	5.2 x 5.2 µm pixels
Digitizer type	8 or 10 bits (24- or 30-bit color) @ 24MHz
Luminous Gain	None
Exposure	0ms to 8.84sec
Linear full well	>20,000e-

[C] Color Camera   [M] Mono Camera

INFINITY Cameras

INFINITY X Seriex [C] [M]

Lumenera's INFINITYX digital camera is designed to be a flexible microscopy tool for clinical, life sciences, materials sciences, and educational professionals where high-resolution images are essential. Variable resolutions up to 21 megapixels allow the user to take full advantage of their microscope optics in capturing the sharpest image conceivable.

Patented DeltaVU™ technology represents a breakthrough in sub pixel shifting imaging. The technology ensures more accurate color for detailed image documentation. The result is an increase in image resolution and precise color accuracy. Live video preview provides for real-time focus. INFINITYX auto exposure and auto white balance efficiently captures your optimal image. Software control provides exposures from 64µs through 2 seconds. The INFINITYX is fully supported by Lumenera's INFINITY CAPTURE and INFINITY ANALYZE software. An intuitive user application provides camera control, while full integration to popular third-party imaging applications is available through our TWAIN drivers.

Specifications

	INFINITY X-32 [C] [M]
Sensor	1/1.8" SONY ICX274
Pixels	1616 x 1216, 4.4 x 4.4 µm
Digital Output	12 fps at full resolution, 25fps at 640 x 480
Frame Rate	8 and 12-bit
Integration Time	67ms to 2sec
Gain	Programmable ; 1 to 10x
Digital Video Resolution	1616 X 1216 12 fps 1280 X 1024 14 fps 808 X 608 (Binning 2x2) 21 fps 640 X 480 25 fps 404 X 304 (Binning 4X4) Mono 37 fps 320 X 240 39 fps
Digital Still Image	1616 X 1216 Demosaic 24 bit RGB: 5.6 MB 3232 X 2432 / 8 Meg 24 bit RGB: 22 MB 4848 X 3648 / 16 Meg 24 bit RGB: 50 MB 6464 X 4864 / 32 Meg 24 bit RGB: 90 MB

INFINITY lite 1.5 Megapixel CMOS USB 2.0 Cameras

[C]

Specifications	
Sensor	1/2.5" CMOS format, color, 6.0 x 4.5mm
Pixels	1440 x 1080, 4.2µm square pixels
Frame Rate	15 fps at 1440 x 1080, 60 fps at 640 x 480
Digitizer type	8-bit uncompressed
Exposure time	1m to 3sec

[C] Color Camera   [M] Mono Camera

INFINITY Cameras

INFINITY 1-2 : 1.9 Megapixel USB 2.0 Camera

INFINITY 1-3 : 3.1 Megapixel USB 2.0 Camera

INFINITY 1-5 : 5.0 Megapixel USB 2.0 Camera

	INFINITY 1-2 C M	INFINITY 1-3 C	INFINITY 1-5 C
Sensor	1/2" CMOS	1/2" CMOS	1/2.5" CMOS
Pixels	1600 x 1200, 5.2 x 5.2 μm	2048 x 1536, 3.2 x 3.2 μm	2592 x 1944, 2.2 x 2.2 μm
Frame Rate	20 fps at full resolution	12 fps at full resolution	7 fps at full resolution
Digitizer type	8 and 10-bit uncompressed	8 and 10-bit uncompressed	8 and 12-bit uncompressed
Exposure time	1μm to 3sec	1μm to 3sec	1μm to 3sec

INFINITY 2-1 : 1.4 Megapixel CCD USB 2.0 Camera

INFINITY 2-2 : 2.0 Megapixel CCD USB 2.0 Camera

INFINITY 2-3 : 3.3 Megapixel CCD USB 2.0 Camera

	INFINITY 2-1 C M	INFINITY 2-2 C M	INFINITY 2-3 C
Sensor	1/2" SONY ICX205	1/1.8" SONY ICX274	1/1.8" SONY ICX262
Pixels	1392 x 1040, 4.65 x 4.65 μm	1616 x 1216, 4.4 x 4.4 μm	2080 x 1536, 3.45 x 3.45 μm
Frame Rate	15 fps at full resolution	12 fps at full resolution	7 fps at full resolution
Digitizer type	8 and 12-bit	8 and 12-bit	8 and 12-bit
Exposure time	1μm to 16sec	1μm to 16sec	1μm to 16sec

	INFINITY 3-1 C M 1.4 M Cooled CCD USB 2.0	INFINITY 3-1U C M 1.4 M Cooled CCD USB 2.0	INFINITY 4-11 C M 11M CCD USB 2.0
Sensor	2/3" SONY ICX285	2/3" SONY ICX285	Kodak KAI11002
Pixels	1392 x 1040, 6.45 x 6.45 μm	1392 x 1040, 6.45 x 6.45 μm	4008 x 2672, 9 x 9 μm
Frame Rate	15 fps at full resolution	15 fps at full resolution	3.5 fps at full resolution
Digitizer type	8 and 12-bit	8 and 12-bit	8 and 12-bit
Exposure time	2ms to 20min	3.5μs to 60sec	1μm to 16sec

C Color Camera   M Mono Camera

Image-Pro® Plus

MediaCybernetics®

## Powerful and Customizable
Image Processing and Analysis Software

Image-Pro Plus combines the latest tools for scientific and industrial image analysis into one intuitive software package.

Easily Acquire Images
Utilize the full precision of your capture equipment with easy-to-use acquisition tools. Image-Pro Plus supports digital cameras, image capture cards, and other devices.

Process and Manage Multiple Images
Spend less time managing multiple images with Image-Pro Plus. Tile together a series of images to see a full representation of your research sample. Align individual or sequence images to gain a clear understanding of your image. Use Extended Depth of Field to create a focused image from a series of unfocused images. Manage multiple image sets with the Set Manager feature.
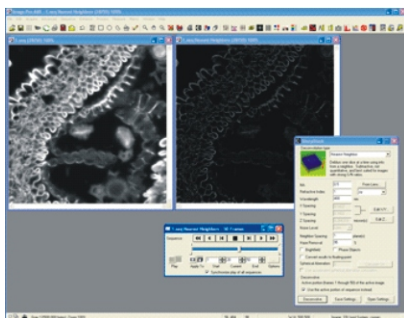
Nearest Neighbor Deconvolution in Image-Pro Plus
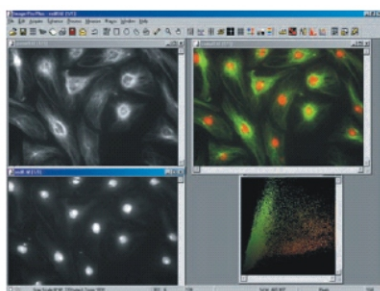
Colocalization

**Enhance and Eliminate Artifacts**
Many imaging applications require you to remove noise or artifacts from images. Use the built-in SharpStack® 2D deconvolution, Nearest Neighbor, No-neighbor and Inverse Filter algorithms to retrieve better data from your images. The Fast Fourier Transform(FFT) feature in Image-Pro Plus allows you to perform forward and inverse FFTs to eliminate noise from your images. You can also use the background correction tool to extract background objects from your images. Apply a variety of enhancement filters, edge filters, morphological filters and large spectral filters to extract features of interest. Voxel-based 3D filters can be used with 3D volumetric, time-lapse and other 3D image sets.
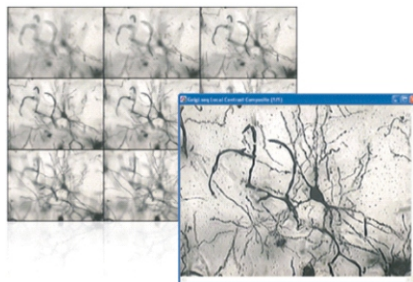
Create a focused image from a series of unfocused images with Extended Depth of Field. Image courtesy of Michael King, Ph.D., Dept. of Neuroscience, University of Florida, Gainesville, FL, USA.

Analyze and Visualize Image Data
Image-Pro Plus includes a full range of qualitative analysis tools that help you to better visualize your image data. The built-in OpenGL 3Dviewer allows for interactive 3D volume rendering. Display image intensity values in a 3Dplotwith the Surface Plot tool. Visualize image data with scatter grams, histograms and line profiles. Define and manage multiple areas of interest (AOI) in a single image.
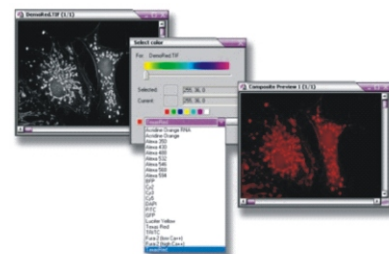
Apply lookup tables to monochrome fluorescence images using the Dye Management tool.

"My productivity has increased and turn-around time for analysis results has been reduced by 30%"
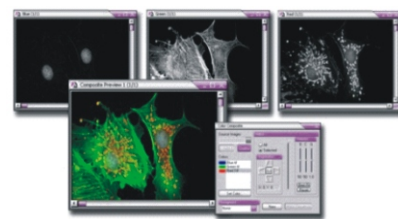
Create composite images from an infinite number of source gray scale images with the Color Composite Tool

Obtain quick distance measurements with display on the image. Image courtesy of Triptar Lens Company.

Image-Pro® Plus

MediaCybernetics®

Calibrate Your Images
Image-Pro Plus includes intensity and spatial calibration tools that let you report measurement data in terms that are meaningful to your research. Create and display spatial calibration markers and system calibrations. You can use pre-defined spatial calibration units and calculate derived calibrations automatically.

Classify Objects
With Image-Pro Plus you can manually or automatically characterize objects within your images. Count and size objects automatically, with the ability to identify over 100,000 objects per frame (memory dependent). Work with over 50 measurement tools including areas, perimeters, lengths, roundness, major and minor axes, angles, centroids, holes, and population density.
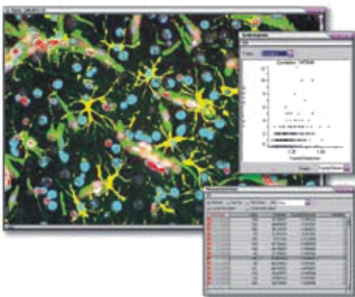
Count and Size objects automatically with tools that allow you to measure areas, perimeters, lengths, roundness, and more.

Image courtesy of Alex C. Stan, M.D., Ph.D., Institute of Neuropathology, Hannover Medical School, Germany.

Apply Quantitative Measurements
Extract valuable data from your images using the many measurement functions found in Image-Pro Plus. Metrology tools allow you to measure best-fit line, arc and circle. Detect edges and derive distance

measurements using the Caliper tool. Measure co-localization of probes in separate gray scale images or within a color image.
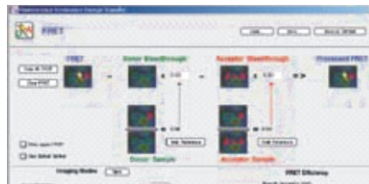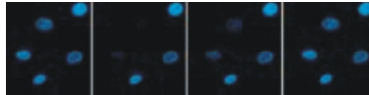
Use configurable acquisition and analysis tools to supplement and enhance data analysis capabilities for FRET applications..

Track Moving Objects
Manually or automatically follow an object in an image sequence as it moves through time and space using the built-in Object Tracking tools. Correlation tracking lets you track objects when image segmentation is difficult or not possible. You can also track and graph the changing of intensity parameters over time within an area of interest.

Customize Your Workflow
Image-Pro Plus offers convenient customization tools and a built-in programming language to streamline your imaging research. Save frequently performed operations using the Macro Recording Tools. Easily edit recorded macros with the command recognition tools in the Intelligent Macro Editor.
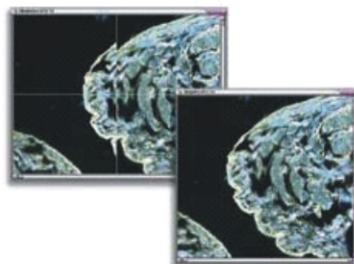
Build large images from multiple, smaller location acquisitions with tiling tools.

Image-Pro Plus built-in IPBASIC programming engine offers a debugger, full editor and dialog builder. Use with COM objects such as Microsoft® Word or Excel, and integrate and customize macros with Microsoft® Visual Basic or Visual C++.

Report and Publish Your Results
Share your findings with others using Image-Pro Plus' reporting tools. Export image data via DDE to Origin® and Microsoft® Excel. Create custom reports and automatically grab screen captures of individual images or an entire screen.
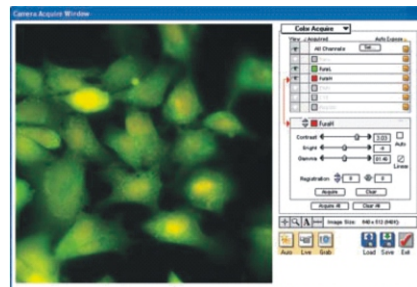
FURA 2 labeled Primary cultures of sheep pulmonary artery endothelial cells.

Image courtesy of Claudette St. Croix, University of Pittsburgh Graduate School of Public Health, Pittsburgh, PA, USA.
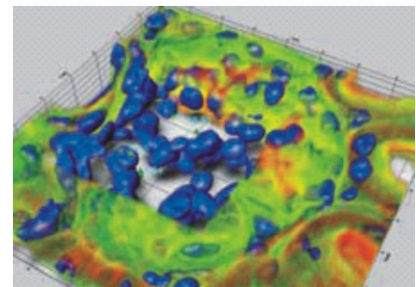
3D rendering of a kidney glomerulus.

Image courtesy of Dr. Brian Matsumoto, Department of Molecular, Cellular and Developmental Biology University of California, Santa Barbara, CA, USA.

Image-Pro® Plus
AutoQuante X

**Advanced Image Deconvolution and 3D Visualization
Software for Life Science Researchers.**

Auto Delblur®

AutoDeblur is the life science industry's leading image deconvolution software. Retrieve better data from your images using the most complete suite of 2D and 3D algorithms available, including the industry's only Blind Deconvolution Algorithm. Using the AutoQuant Algorithms technology, the advanced image processing tools in AutoDeblur reflect years of research, development and user feedback.

Unlike other image processing programs that tie up your computer, the multi-dimensional and multi-processing capabilities in AutoDeblur will allow you to start working on another dataset once processing has begun. You no longer need to process time-series data one by one. With AutoDeblur you can load and process your datasets all at once.

Let AutoDeblur show you what you've been missing in your images, because better data means better science.
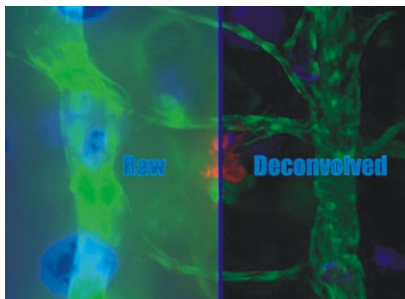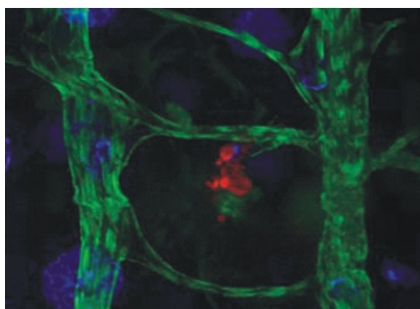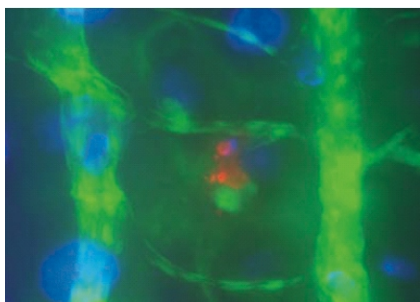

Auto Visualize®

AutoVisualize will give you an exciting and in-depth understanding of your images. See complex datasets come to life with easy-to-use 3D visualization and manipulation tools.

View your time-series datasets through time and from multiple angles to locate important features. Navigate through your 3D datasets with orthogonal slices. Simultaneously view before and after 3D time-lapse volumes.

Create impressive AVI files of your 3D data rotating through time. Share these 3D movies with others through PowerPoint presentations or via the Internet. See your data in a new way with AutoVisualize 3D visualization software.
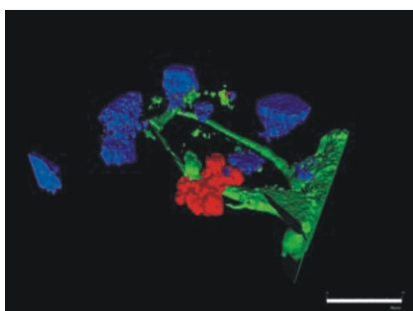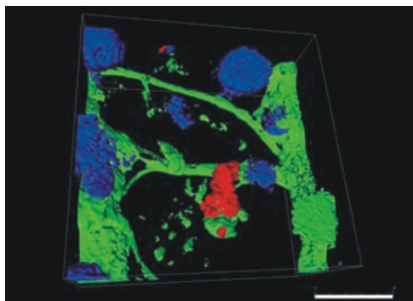
Advanced Imaging Modules

Ratiometrics Module

The Ratiometrics module is designed for researchers who study the effect of changing the environment of a sample by comparing the same sample with differing concentrations of calcium or changing the pH.

FRET Module

Created for researchers focusing on protein-protein interactions, the FRET module incorporates the two most commonly accepted algorithms: Elangovan and Periasamy, and Gordon and Herman, and adds our own proprietary algorithm as well. All three algorithms correct Cross Talk, but AutoQuant's proprietary algorithm goes one step further. Where other algorithms make assumptions about the Cross Talk, our Maximum Likelihood Estimation algorithm mathematically solves the Cross Talk, allowing for a much more accurate analysis of the images.

Colocalization Module

Multi-channel images often have sections where two or more of the dyes overlap. The Colocalization module can identify these areas, display them, and generate statistics on user-selected regions of interest.

Counting & Tracking Module

The Object Counting and Tracking module has the ability to count a nearly infinite number of objects. It runs on a multiDimensional compatible platform and can load and process 3D time-series datasets. Counting and Tracking X has powerful and intuitive preprocessing tools to give complete control over the objects to be counted and tracked.
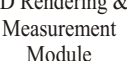
Image-Pro® Plus

Image-Pro Plus Bundle solutions

Image-Pro® AMS

Image-Pro Advanced Microscopy Suite (AMS) is a complete solution for high-level microscory. Imager0Pro AMS includes:

Image-Pro AMS	Microscope Control Module	Multi-dimensional Imaging Module	Image Deconvolution Module	3D Rendering & Measurement Module
Image-Pro Plus	Scope-Pro	AFA	SharpStack	3D Constructor

Image-Pro® MDA

Image-Pro Multi-dimensional Acquisition (MDA) is ideal for auutomated microscopy work. Image-Pro MDA includes:

Image-Pro PLUS	Microscope Control Module	Multi-dimensional Imaging Module
Image-Pro Plus	Scope-Pro	AFA

Image-Pro® INSPECTOR

Image-Pro Microscope Control (MC) combining tools to control and program your automated microscope or stage. Image-Pro MC includes:

Image-Pro PLUS	Z-Profile Surface Measurement
Image-Pro Plus	Scope-Pro

Image-Pro® 3D SUITE

Image-Pro 3D Suite offers tools for deconvolution and interactive control and analysis of 3D volume stacks. Image-Pro 3D Suite includes:

Image-Pro PLUS	Image Deconvolution Module	3D Rendering & Measurement Module
Image-Pro Plus	SharpStack	3D Constructor

Gel-Pro® ANALYZER
The Proven Solution™

- 1-D Gel
- Dot/Slot Blot
- Colony Counting ∗
- Area Density ∗
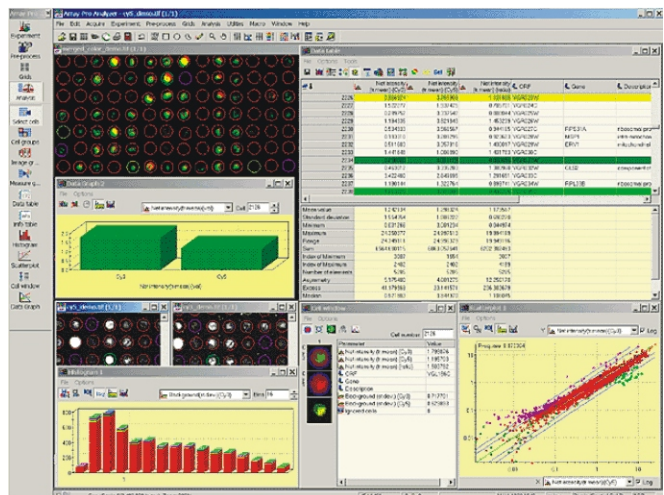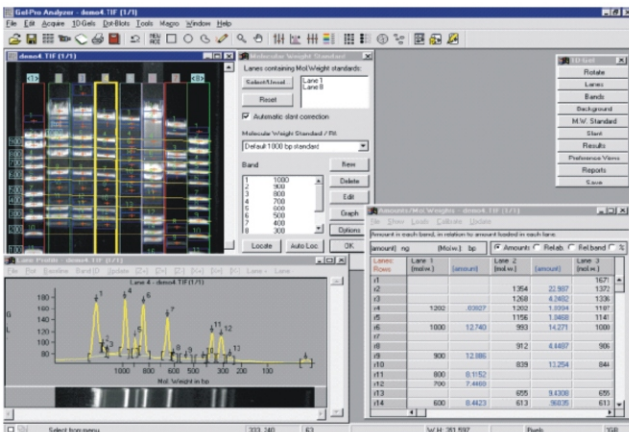
Data analysis windows from version 4.0

Array-Pro® ANALYZER
The Proven Solution™

MetaMorph®

Multi Dimensional Acquisition

Option allows for the retrieval of up to 6D of data and also allows for the arrangement and viewing of acquired data. This is different from acquiring data in conventional journals. With this feature, just by selecting the necessary items and assigning the values, in the dialog box, complex data can be simply obtained.
Save that moment's data acquired conditions as a state file, use Select Best Focus feature, RGB color composition or Z Projection to automatically extract the optimal focused image of the acquired data that you were viewing and still be able to preview it. Option is one of a kind extremely useful feature not found anywhere else.

-Main
Assigns the place to save and filename of the acquired data and camera controls(Live Display, Range and Resolution)

-Timelapse
Designates the number of measurements and time interval

-Multiple Stage Position
Assigns the multiple points of the data to be acquired and register the positions of the electric powered XY and Z stages

-Multiple Wavelengths
Sets the position information, sectioning number, interval for the Z stage and sets the peripheral devices to acquire the high-speed data

-Stream
Stream data can also be acquired through means of cameras that are not CCD cameras.

1-D X Axis
2-D Y Axis
3-D Z Series
4-D Wavelengths
5-D Timelapse
6-D Stage Position
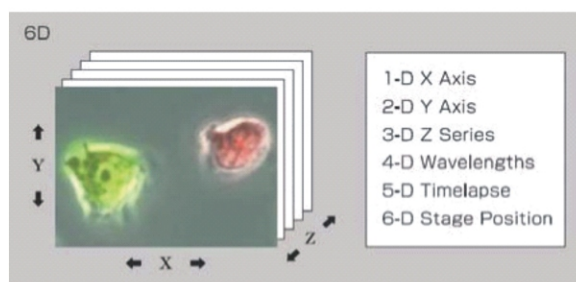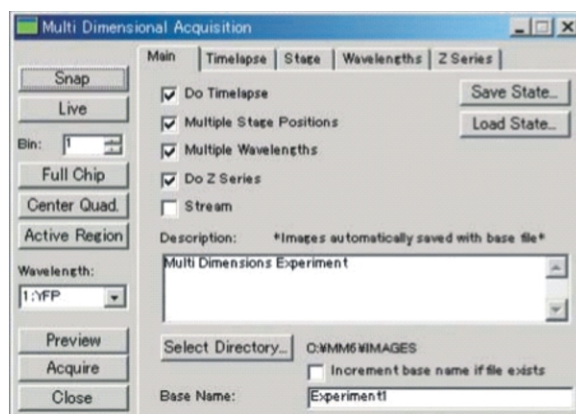
Review Multi Dimensional Data

Multi-Viewer(Review Multi-Dimensional Data)
Acquired multi-dimensional image data is saved on recordable mediums such as HDD etc. With Multi-Viewer, you can observe 2D data, focal plane data, wavelength data, time data and stage position data.
By adding the Best Focus feature, you can extract frames that are automatically focused from 3D images and run finely focused timelapse movies.
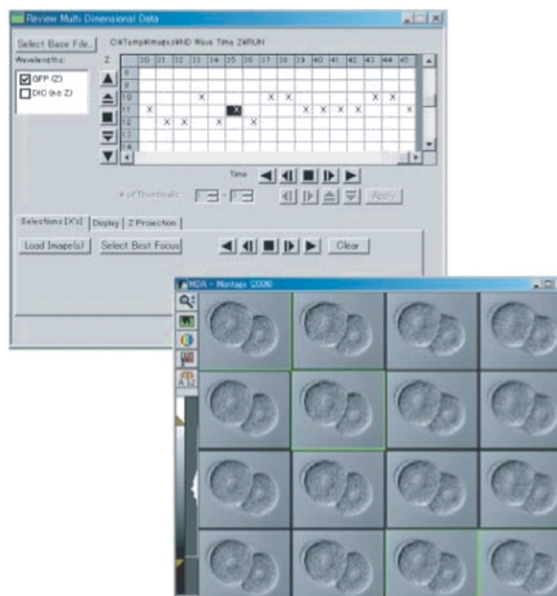
System Configuration(Example)
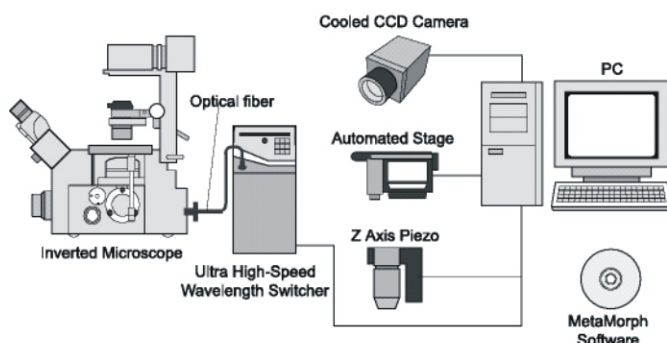
⊙ flexible   ⚙ labor saving   ⏱ time saving   ◎ better results $ cost saving

Overlay Images

This feature will overlay fluorescent images acquired by a highly sensitive monochrome camera. Different from the standard RGB Color Compositor, this feature will process up to 7 images (combination of transparent and fluorescent images) while correcting for position declinations in the preview window. Further, with its ability of having its color assigned, you can overlay filters that are close in color marking this feature extremely useful.
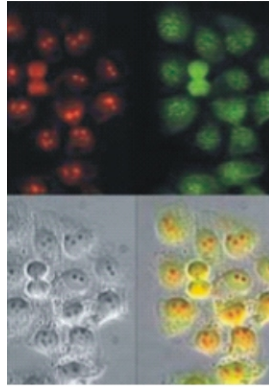
Measure Colocalization

Observe 2 overlapping specimens by dying each with a different color pigment. You can also find the overlapping ratio from the area and average intensity value.
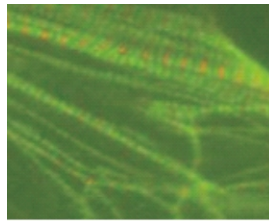
FRET Observation Example using Multi-Dimension
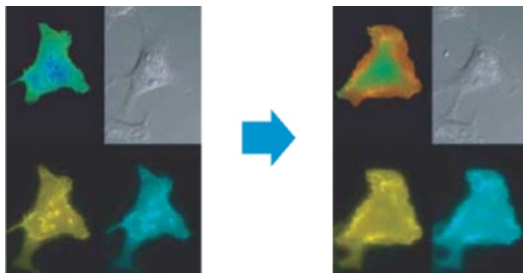
Transformation
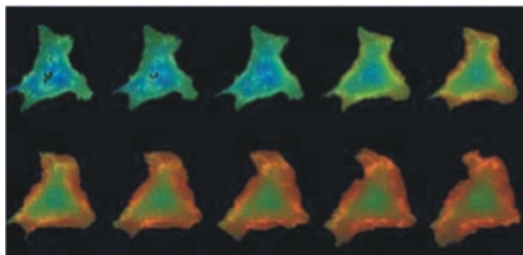
Observe the Ras activation using Raichu. The epidermal cell(Cos1 cell) of an African Green Monkey where Ras monitor molecule(Raichu) was found was stimulated by the Epidermal Growth Factor(EGF). It is understood that the Ras activation starts from the edge of the cell and expands into the entire cell. This data was provided by the Professor Yusuke Oba, Osaka University Research Institute for Microbial Disease, Field of Oncolytic Virus (Matsuda Research Facility)

3D Deconvolution

This feature is capable of improving the S/N ratio of the image of the countless captured images during the 2D deconvolution process and can use this to simply analyze the images. Further, because this can be incorporated with the journal feature, the sequence from an image acquisition to deconvolution and then 3D reconstruction can be in one continuous flow with a click of one button.

### AutoQuant Deconvolution(Widefield/Confocal)

AQI 3D deconvolution feature is incorporated in Option as part of the MetaMorph software. Different from the AutoDeblur stand alone software, this feature can be incorporated and used with the Journal feature.

PSF-based Constrained Iterative 3D Deconvolution

This is an UIC original 3D Deconvolution feature Option. Although it is necessary to measure the PSF beforehand, using a fluorescent bead, this feature can carry out the deconvolution process at high-speeds.(By connecting the data processing PC parallel a real-time deconvolution system can be constructed.)
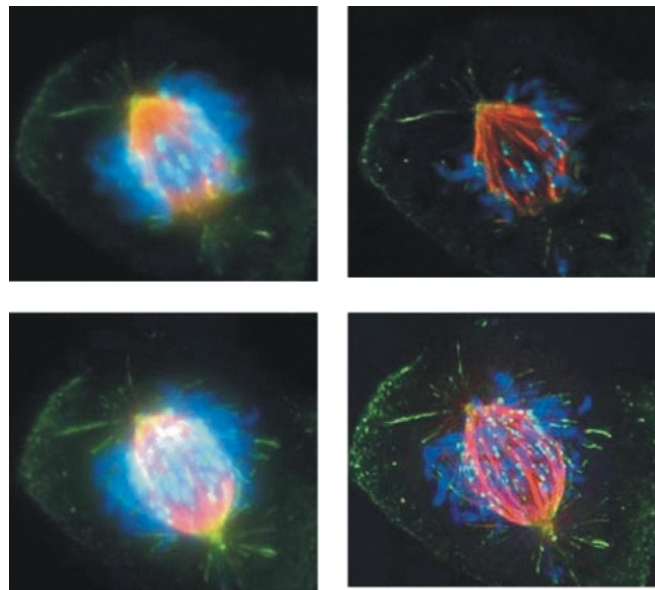
AutoQuant 3D AutoVisualize

AQI 3D construction analysis feature is incorporated in Option as part of the MetaMorph software. Different from the AutoVisualize stand alone software, this feature can be incorporated and used with the Journal feature.

flexible   labor saving   time saving   better results   cost saving

MetaFluor ®

Fluorescence ratio imaging is the monitoring of live cells in which a fluorescent indicator of intracellular ions is introduced. Indicator dyes have been designed to shift their fluorescence excitation or emission spectrum when binding with specific ions. Images are obtained at two different wavelengths, typically matching the absorption bands at the high and low binding conditions.

MetaFluor ®

Applications

- Ratio imaging
- pH imaging
- Calcium imaging
- Ion concentration
- FRET
- Intensity-over-time

Powerful Real Time Processing Acquisition

When acquiring from video sources, MetaFluor can average up to 256 images per time point, significantly reducing random image noise. Background subtraction is also used to improve accuracy by correcting for stray light, camera noise and auto-fluorescence.

Powerful Real Time Processing Acquisition

Phase contrast

Ratio Image

Venus/ECFP Ratio
2.7
1.7
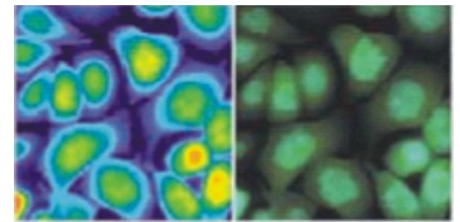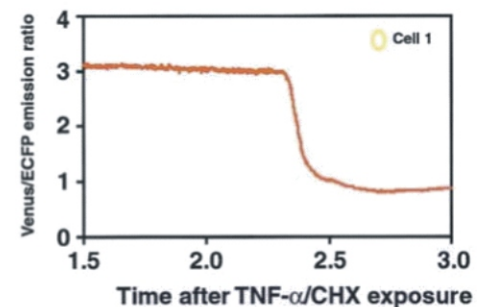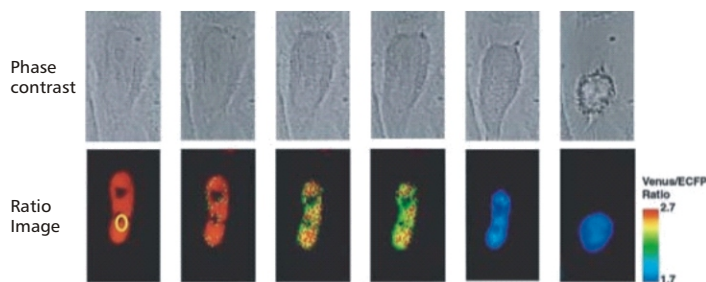
Nuclear activation of caspase-3 precedes apoptotic nuclear changes.
(Image) Ratio images and phase contrast images of NLS-SCAT-expressing cells. HeLa cells were transfected with 0.5ug pcDNA-SCAT3. Imaging analysis was started 18H after transfection.
(Graph) Venus/ECFP emission ratio changes of individual cells examined in (Image).

Calibration

Adirect display of intracellular ion concentrations is obtained by using the various calibration options offered; the Grynkiewicz equation (Grynkiewicz et al., 1985) and titration equation for both in situ and in vitro experiments. These calibrations can then be stored for future use.

G. Grynkiewicz, M. Poenie, R.Y. Tsien. A new generation of Ca2+ indicators with greatly improved fluorescence properties. The Journal of Biological Chemistry. 260(6):3440-3450 (1985).

Automation

Device Control
- filter wheels, shutters, monochromators and high speed filter changers for illumination control
Camera drivers are optional

Journaling and Task Automation
- allows you to create functions to simplify system operations, automate acquisition and device control, set variables and sequence events

In Vivo Imaging of the Dynamics of Glucose Uptake in the Cytosol of COS-7 Cells by Fluorescent Nanosensors

Image analysis and processing

- Interactive Graphs : A display of multiple graphs gives flexibility in the presentation of your experiment's data

- Export for Data Analysis : can log and export all measurements to either a text file or to a spreadsheet program such as Microsoft Excel

- Compatible with MetaMorph : saves images in TIFF file format, you can import them into MetaMorph for further processing and analysis

- Presentation and Publication
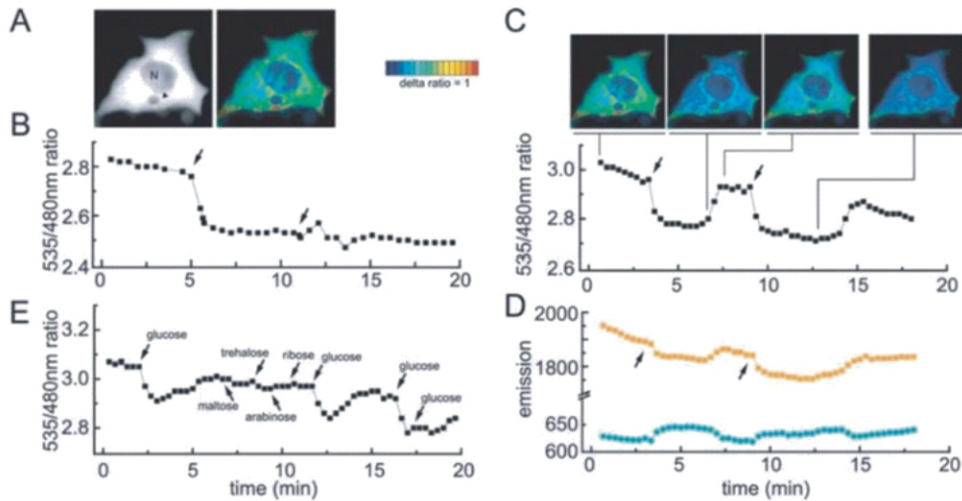
In Vivo Imaging of the Dynamics of Glucose Uptake in the Cytosol of COS-7 Cells by Fluorescent Nanosensors

MetaVue®

Cost-Effiective Integrated System for Bioimaging

The MetaVue Imaging System is the cost-effective solution for basic imaging applications such as digital photography, multi-wavelength fluorescence, image processing and image analysis. MetaVue is a simple, easy-to-use system for acquiring and processing images, performing graphics functions, and archiving and retrieving images.

Acquisition

For multi-mode microscopy, MetaVue is able to acquire multiple fluorescence wavelengths combined with a transmitted light image. Images can be stacked into one file and saved as a Stack file format, then processed or measured all at once in one easy step.

With the MetaVue system's modular architecture, expanding the software is simple and allows the system to grow as your imaging needs change. Compatibility with MetaMorph and MetaFluor offers a well-defined upgrade path.
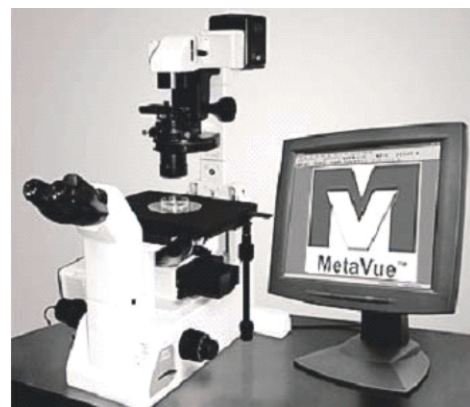
Motorized Microscope Stages

Developing precision positioning stages for microscopes is an exercise in trading performance for size. Since most microscopes aren't designed for heavy stages, achieving high performance is often very challenging. Ludl Electronic Products understands these challenges very well. As a result LEP is able to provide the best solution for automated microscope stages. Period. We offer many different stage designs that are specific for particular microscope and/or application. See which stage is right for your application. For applications where resolution, repeatability and accuracy are important, the BioPrecision2 stages are the choice. The BioPrecision2 design and component technology represent the state of the art. Options for high precision leadscrews, rotary or linear encoders yield performance that satisfies the most demanding requirements.

BioPoint stages provide reliable performance for routine applications at a reasonable price. Featuring an ergonomic design, anti-backlash leadscrews and high resolution microstepping the BioPoint2 stages are a good choice.

Ludl Electronic Products Ltd.

Programmable Filter Wheels

The LEP filter wheel provides fast, automated and efficient optical filter changing for microscopes. The filter wheel position is digitally encoded which makes it immune to slippage and skipping errors. Accurate filter positioning is essential to eliminate imaging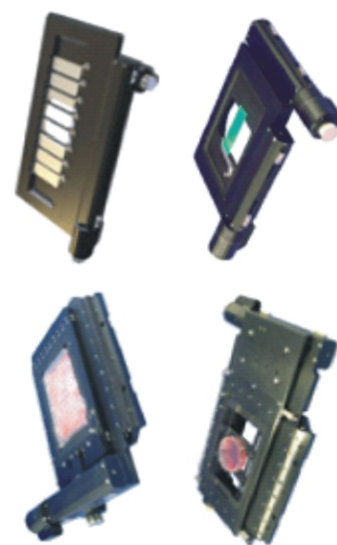 errors that can affect the optical performance of the microscope and add unnecessary variations to measurement results. The LEP filter wheel is driven by a DC servo motor specifically selected for smooth, quiet, damped wheel motion. Flexibility and expandability is assures with the MAC 5000/6000 controller system. The modular controller provides high performance and flexibility. Furthermore it is widely supported by almost any available imaging software application.

APPlication	Part Number	Filter Positions	Internal Shutter	Dimensions	Weight	Speed*
Fluorescence filter change with integral shutter. Accepts filters 25 and 32mm diameters	99A350	10	YES	203x170x28.56mm	1.5kg	60ms
	99A354	6	YES	188x133x28.56mm	980g	50ms
Fluorescence emission (no shutter). Accepts 25mm diamter filters.	99A351	6	No	147x98,28.56mm	650g	50ms
	99A357	6	No			
Dual filter wheels with high filter capacity, includes integral shutter. Accepts filters 25 and 32mm diameters	99A355	2x10	YES	203x170x50.8mm	2.5kg	60ms
	99A356	2x6.		188x133x50.8mm	1.8kg	50ms
Separate shutter either brightfield or fluroescence illumination	99A360					*adjacent filters

Nano Positioning – Piezo Focus

Nano positioning focus controls provide very high resolutions with high throughput and speed. High resolution and speed are needed for acquiring stacks of images for processing and deconvolution.

Automation Controllers – MAC 6000

The modular system can support an almost unlimited number of motion axes. Each axis can be either stepper motor, DC servo motor or dedicated application modules for filter changers, focus control and piezo drive.

All new MAC 6000 is the state of art for controlling an managing microscope automation.

The system features a built-in programmable language that allows simple development of scripts for sequencing combinations of actions. Electronic and software triggering features enable high throughput applications.

Expanded communication ports include dual RS-232 ports up to 115k baud, Ethernet and CAN bus.
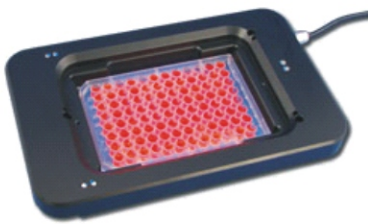
Focus Control

LEP offers different options and technologies to suit the application: a simple motor for basic automated or remote focusing, add-on encoder systems for more precision and stability, and piezo driven nano-precision focusing for the highest performance.
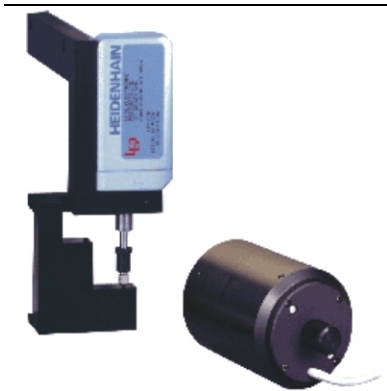
Standard Motor Drive

The LEP precision stepper motor drive can provide very high resolution: up to 2.5 nanometers. An optional linear encoder can be integrated with the focus motor. The encoder is fixtured to the microscope body so that it provides real-time measurement of the stage height in relation to the optics. The result is a stable, highly accurate performance that can dynamically compensate for focus drift and drive errors.

Piezo Z motor : P-725

PIFOC Long-Range, High-speed Nanofocusing Z-drives with direct Metrology

-Scans and Positions Objectives with Sub-nm Resolution
-High Linearity and Stability with Direct-Measuring Capacitive
 Sensors-Travel to 460 µm, Fast Response & Settling Time
-Frictionless Precision Flexure Guiding System
-Enhanced Guiding Precision for Better Focus Stability
-Ask about DIC Prism Holder Option
-Controller Compatible with Metamorph™ Imaging Software
-Quick Lock Adapter for Easy Attachment

Applications

-Scanning interferometry   -Disk drive testing   -Confocal microscopy
-semiconductor test   -Surface structure analysis -Autofocus systems
-Biotechnology equipment

NanoScanZ – Fast Piezo Focusing Stage

PRIOR
Scientific

Features

The NanoScanZ from Prior Scientific offers researchers unprecedented levels of performance and convenience when fast and precise control of the Z Axis is required. Ideally suited to Z-Stacking applications, particularly those involving live cells, the NanoScanZ brings a new dimension to deconvolution, 3D reconstruction and confocal microscopy. Unlike traditional piezo focusing devices that move a single objective lens, the NanoScanZ can be used with all nosepiece positions. This ensures no loss of parfocality. It is also possible to continue using DIC as a contrasting technique when using NanoScanZ.

- Travel range 100 or 200 micron
- 1nm Resolution
- 1nm Repeatability
- Interchangeable Sample Holders
- High Precision closed loop feedback
- Compatible with ProScan Controllers and motorized stages
- Can be driven by any software supporting piezo objective collars
- Faster than objective collars
- Any size movement complete in approximately 10ms
- Fully CE compliant
- LCD Display to clearly show current position

Specifications

Range of Motion	100 or 200 micron
Repeatability	1nm
Bandwidth	200Hz
Accuracy/Linearity	0.5% of Travel
Maximum Load	500g
Resonant Frequency	1KHz
Inplane Tilt	10urad(typical)
Body Material	Anodised Aluminum
Stage Control Input	Analogue(0-10Volt DC)
Power Requirement	90-240Volt AC
Output Position Signal	0.0-10.0Volt DC

Motorized Semiconductor Wafer Shuttle Stage

Features
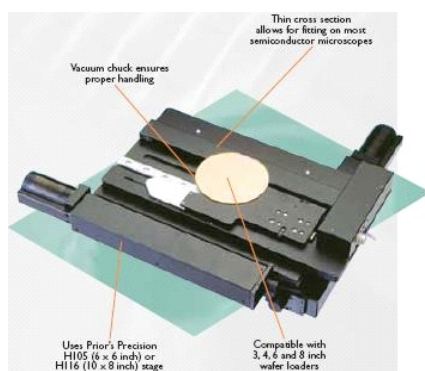
The Prior Scientific motorized Shuttle Stage is designed to be used with the Nikon and Olympus wafer loader systems for 3, 4, 6, and 8 inch wafers. The system greatly reduces operator fatigue while increasing inspection accuracy and repeatability. In operation, the Shuttle System automatically moves to the correct load position and activates the loader switch, notifying the loader that the shuttle's wafer chuck is in position to receive the wafer.

The system has several features that insure smooth, error free operation:

- Power-up initialization procedures set the home positions of the X,Y, and shuttle axes.
- An optical sensor ensures that the stage is in the correct position before it allows the shuttle to move to the load position.
- A pressure sensor allows for the automatic retrieval of wafers to begin analysis.

Specifications

Power	Universal mains input 85-265VAC, 50-60Hz
Control Options	Joystick, Touch Screen Controller, and RS232 ASCII Command set
Computer Interface	RS232C
Communication Protocol	8 bit word, 1 stop bit, no parity, no handshake, baud Rate of 9600, 19200 or 38400
Step Size	As small as $0.04\mu m$ in XY; $0.002\mu m$ in Z
Wafer Sizes	Accepts 3, 4, 6 and 8 inch wafers
Controller Dimension:	350mm x 215mm x 98mm

Accessories

Shuttle System is shown in the load position with a H29XY4 Controller, CS152KB Touch Screen Keypad and a CS152V2 Joystick.

- Shuttle Stage

- Shuttle Stage in load position

Lumen 200 Series

PRIOR Scientific

Lumen 200 is the latest product for fluorescence illumination to be designed and manufactured by Prior Scientific.

Prior have been making illumination systems for fluorescence for over 20 years. The experience gained over this most powerful, cost effective and flexible system on the market. Fluorescence has never been so easy.

Powerful 200W Illumination
Long Life Lamp – Up to 2000 Hours
Easy Lamp Replacement
Flexible Liquid Light Guide
Low Heat Transfer
Shutter and Filter Wheel Options

Option available

Part Number	Shutter/ Attenuator	Filter Wheel	Spectral Range
L200##	Manual	No	Standard Microscopy
L210##	Manual	No	Tuned for Cy5 and Cy5.5
L220##	Manual	No	Extended in UV Fura2 and IR, Cy7
L200P##	Motorized	Motorized 6 position	Standard Microscopy
L210P##	Motorized	Motorized 6 position	Tuned for Cy5 and Cy5.5
L220P##	Motorized	Motorized 6 position	Extended in UV Fura2 and IR, Cy7

Lumen 200Pro For Automated Applications
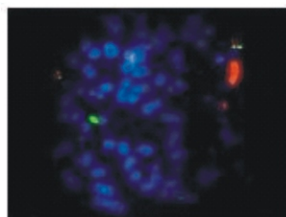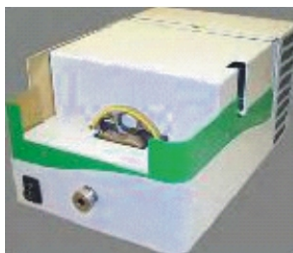
Uneven Illumination
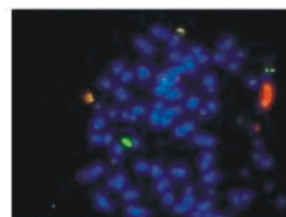
Lumen 200 Even Illunmination

Shutters & Attenuation
High Speed Motorized Filter Wheel
Software Compatibility

Xenon Light sources

ASAHI SPECTRA USA

MAX-150

150W xenon light source
Selective illumination within 2 types of mirror module (UV 250-385nm, VIS 385-740nm)
Low stray light and **no heat**
Continuous light adjustment(100%-5%)
Easy usage and setup

LAX-Cute

100W xenon light source
Selective illumination within the range of xenon lamp (250nm-1000nm)
Low stray light and **no heat**
Continuous light adjustment(100%-10%)
Easy usage and setup

MAX-310

300W high power xenon light source
Simple design & Bright illumination
Perfect solution for the heat problem
Power supply & Lamp box are separate
Specific wavelength is obtainable with a filter
Remotely controllable through RS232 cable

MAX-302

300W high power xenon light source
Selective illumination within 2 types of mirror module(UV 250-385nm, VIS 385-740nm)
Low stray light and **no heat**
Continuous light adjustment (100%-5%)
Easy usage and setup

Light Source Accessories

Collimating Lens Corresponded Models: LAX-102/-cute MAX-302

Achieves a square uniform illumination just by mounting the lens unit on the lightguide.

-Uniformity is more than 90%!
-3 choices of illuminated area size
-Focus is adjustable at any work distance

	x 1.0	x 0.5	x 2.0
Distance (mm)	Illuminated Area (mm)	Illuminated Area (mm)	Illuminated Area (mm)
100	23 sq.	12 sq.	56 sq.
200	43 sq.	26 sq.	86 sq.
500	105 sq.	68 sq.	175 sq.
1000	209 sq.		325 sq.
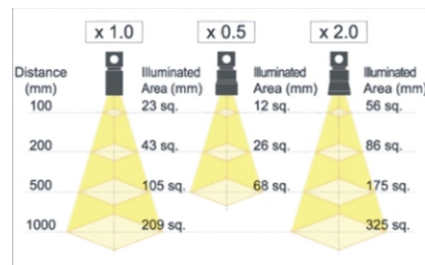
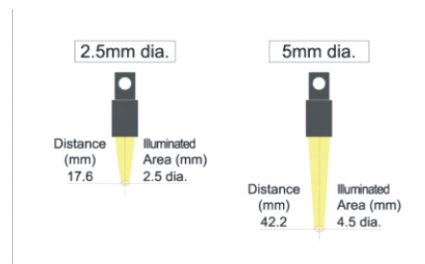**High Condensing Lens Corresponded Models: LAX-102/-cute MAX-302**

Achieves a high density illumination just by mounting the lens unit on the lightguide.

-Get the high power light in a small area
-2 choices of illuminated area
 2.5mm dia. & 5mm dia.

2.5mm dia.	5mm dia.
Distance (mm) 17.6 — Illuminated Area (mm) 2.5 dia.	Distance (mm) 42.2 — Illuminated Area (mm) 4.5 dia.

Photo Fluor II

## *High powered, ULTRASTABLE light source for quantitative fluorescence imaging*

Photo Fluor II light source More power and stable output make the PhotoFluor II the perfect light source for quantitative live cell imaging. With a 1600-hour lamp life and a pre-aligned light engine, the performance of the PhotoFluor II often exceeds that of a 100W mercury lamp.

 - Control shutter with a mouse click
 - Choose filter position or advance wheel
 - Power standby
 - Easily change settings and rename wheel contents
 - Enables control with light source under bench or out of the way
 - Serial control with opportunity to customize the code for your application

Short Term Stability of Light Sources
PhotoFluor II run at 60% output to match 100% power levels of the 120 W metal halide source. Light guide to collimating adapter to 0.5 ND filter to HQ470/40x filter to silicon detector, measurements by Newport 1830C followed by A/D conversion. Sampling at 2000 Hz for five seconds. 49004 filter set used with Tetraspeck slide. 20 X Zeiss objective.
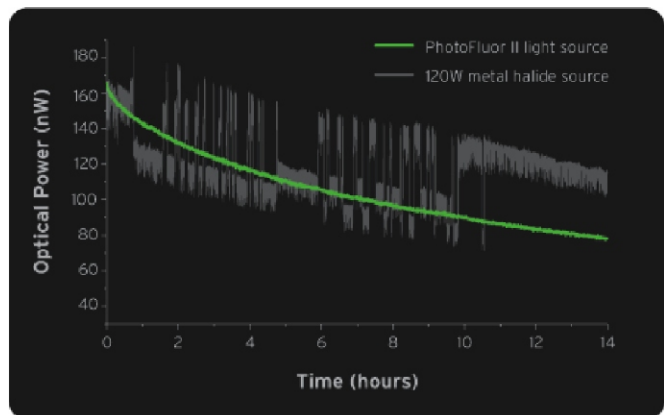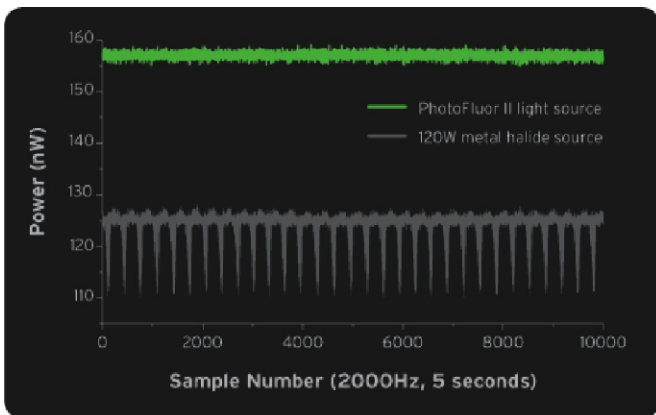
Long Term Stability of Light Sources
PhotoFluor II (blue) and 120 W metal halide source (gray) measured at microscope stage over 14 hours. Power meter measured output of a field of fluorescent beads (Tetraspecks) using a 49004 filter set (excitation from 533 nm to 558 nm), sampling every 5 seconds. Initial brightness of PhotoFluor II was decreased to match that of the 120 W light source. 20 X Zeiss objective used with a 0.5 ND filter.
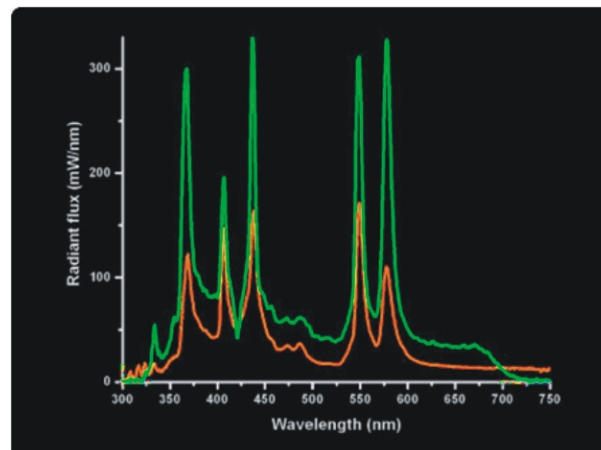
Comparison of the PhotoFluor II lamp (green trace) and a 120 W metal halide lamp (orange trace). Output from the end of the liquid light guide was measured using a spectrometer.
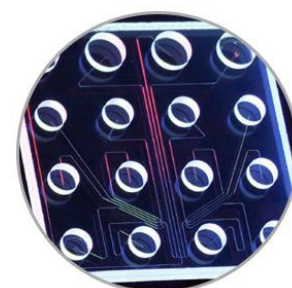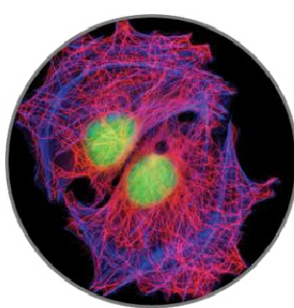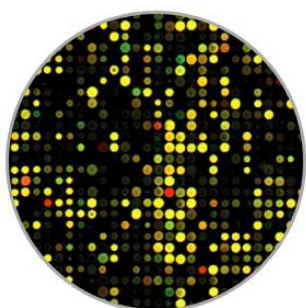
Light Engine Light source

light for life sciences
lumencor®

Lumencor's products are complete light engines with up to seven color outputs. A variety of light source technologies is employed to optimize the output of each color. Light engines provide high power, spectrally pure, stable, and inexpensive light across a broad spectrum. They may be modulated in intensity and wavelength with no external mechanical components making them a "smart" light engine. They are designed to directly replace the entire configuration of light management components with a single, simple unit. Next generation products will fulfill the demand for portable, hand-held analyzers and disposable devices with integrated light sources.

- **Up to SEVEN discrete bands for all the most important fluors:**
  DAPI, Hoechst,CFP, GFP, FITC, YFP, TRITC, Cy3, Texas Red, mCherry, Cy5, and others
- **Spectral & power stability**
- **Spectral purity, no out of band light**
- **Completely flat illumination**
- **100x faster switching than filter wheels- microseconds**
- **No external filters, shutters**
- **Quiet and no heat generation**
- **Ideal for electrophysiology & systems sensitive to electrical noise**
- **Controllable by common microscopy automation software**
- **Long life > 10,000 hours**
- **Easy to use**

Spectrally Pure Outputs

An ensemble of solid state sources in each light engine produce the user defined multicolor output bands. Light engine power levels in each discrete color band match or beat those of comparable metal halide and xenon lamps. Light engine outputs require no compromise in power while offering the added benefits of stability, durability and ease of use. Performance exemplified by the light engine outputs in this spectral plot are constant and stable. Unlike traditional lamps, they will not decay significantly with time, or during the course of a multi-day experiment. Researchers and tool designers alike can attain constant, spectrally pure and powerful bands with no need for external filters, filter wheel, shutters, controllers that other light sources require.
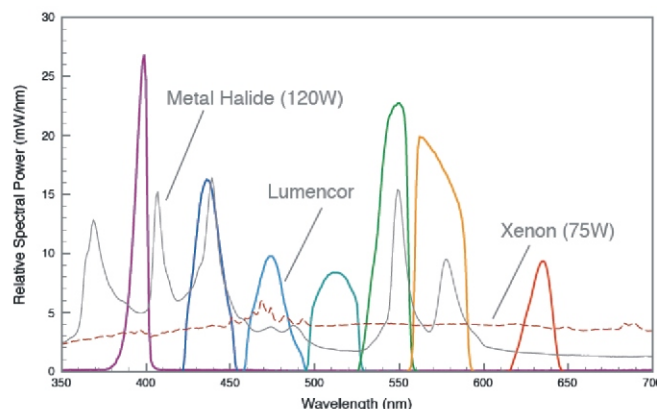
Products and Common Applications

LUMA light engine™
blood typing
environmental sensors
sequencing

AURA light engine®
endoscopy
gene expression analysis
live and fixed cell imaging

RETRA light engine®
diagnostic tools
gene expression analysis
microarray scanners

SPECTRA light engine®
broadband lamp replacement
digital pathology
high content screening

Stability and Lifetime

DC Powered: No RF Noise, no arc wander
Peak to Peak Noise: 2% for 24 hours continuous operation
Short term stability: 1.0 ms ~ 0.5% & 0.1 ms ~ 0.05%
Power monitoring option: For ratioing and feedback functions
MTBF: ~ 10000 hours
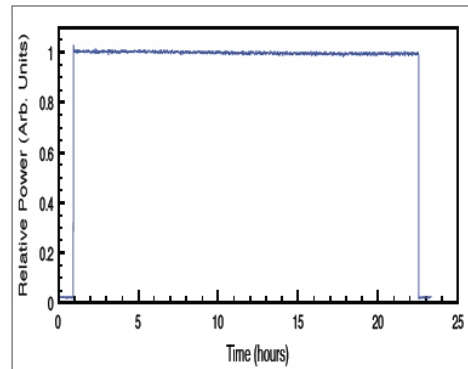
Specifications

Metric	Value
Spectral bands	380 nm to 700 nm, NIR upon request
Power	3 mm, 0.3 NA 150 - 500 mW per band, function of wavelength and bandpass
Switching speed	5 kHz with turn on/off ~ 10 μsec
Stability	< 2% peak to peak
Out of band rejection	> 10-6 with no IR or UV
Field uniformity	< 5% peak to peak
MTBF	~ 10000 hours
Output adapter	Köhler, critical, direct, light guide
Power monitoring	instantaneous or dosage
Computer interface	TTL, RS232, USB
Software platforms	ImageProPlus, iVision-Mac, IQ, MatLab, MetaMorph, MicroManager, Elements, Slidebook
Power requirements	120 W, 24 volt, 5 Amp
Weight, Dimensions	four colors: 3.6 kg, 9 x 18 x 23 cm or smaller seven colors: 4.5 kg, 9 x 18 x 28 cm or smaller
Certifications	TUV Certified, CE label

Polychrome 5000/3000

TILL PHOTONICS

The Polychrome V is an ultra fast switching monochromator with a fully digital high precision galvanometer driven grating. Whether you do high speed ratio imaging experiments, GFP-imaging with a variety of fluorophores to be distinguished, FRET with the faintest signals to be detected, Photometry with very high time resolution or TIRF with a combination of wide− and evanescent field, the Polychrome V, with its optimized condensers for all major microscopes is your superior companion.

Features

- Exceptional stability of the light output
- DSP driven control for highest precision
- Longer life expectance of bulb and light guide
- Stand alone and more compact no external control box or power supply needed
- More versatile as many wavelengths as you wish
- UV-Vis enhanced
- Easy optical coupling to standard microscopes also fits in your existing setup
- Continuously variable bandwidth control(optional)
- Continuously variable intensity control 0 – 100%(optional)

Specifications

Wavelength Range	320nm to 680nm
Lamp Type	150W Xenon high stability lamp
Lamp Lifetime	3000H(average)
Output Power	>10mW at 470nm with new lamp
Half-power Bandwidth	15nm
λ switch speed	Up to 400nm/ms
Optical Fiber	UV/Vis quartz fiber, length 2m or 3m
Interface	Voltage(-10V to +10V), RS232, trigger in and out

High speed Wavelength Switcher

Lambda DG-4 / DG-5

Features

Integral shuttering function
The Lambda DG-4 provides a high speed shutter function with open/close times of 500s.

Intensity attenuation function
The light intensity can be adjusted by offsetting the output galvanometer such that light is not centered on the liquid light guide. Up to 15 logical filters can be defined with this method.

Two outputs for monitoring filter position
A 4 bit TTL signal transmits the current optical channel(filter) position.

Remote interface
Computer control of instrument is possible via parallel or serial port.

Specifications

Output Range
330nm to 700nm – Ozone free
300nm to 700nm – Full spectrum

Xenon Lamp Type
175Watts, pre-aligned, ozone free
(175Watts full spectrum available upon request)

Lamp Expected Lifetime
1,000 hours
Power Consumption
350Watts

Filter Diameter
DG-4 : four 25mm(1 in)
DG-5 : two 25mm (1 in) and three 18mm

Light Guide
2 meter long, 3mm diameter

Lambda LS
Stand-Alone Xenon Arc Lamp and Power Supply

Features

Xenon lamps provide light levels which exceed those of standard microscope fluorescence lamps.
Equipped with a cold mirror to eliminate IR heating of down stream optical components. Compact stand-alone lamp housing-power supply enclosure.
Pre-aligned bulb eliminates common focusing problems. Integrated hour meter for convenient monitoring of lamp life. Modular construction allows use of optional liquid light guide for flexible direction of light output. Easily accommodates Sutter Instrument 25mm filter wheels within the body of the lamp. Can be coupled via a liquid light guide to many standard microscopes (Nikon, Zeiss, Leica and Olympus). Microscope coupling requires special adapters (not included).

Specifications

Output Range
Standard bulb 340nm to IR
(optional full-spectrum bulb) 200nm to IR

Lamp Type
175 or 300 Watts xenon (pre-aligned to produce collimated output)

Radiant Output
25 Watts (175W lamp) (broadband, full beam)

Lamp Life
1000 hours (Bulb warranted for 500 hours. Longer life depends on application. Expected life is 1000 hours.)

Power Consumption
175 Watts

Dimensions
10.5in x 9.5in x 10in
26.7cm x 24.1cm x 25.4cm

SUTTER INSTRUMENT FILTER WHEELS AND CONTROLLERS

Features	Lambda 10-3	Lambda 10-2	Lambda 10-B
Max. # of Wheels	3	2	1
Max. # of Shutters	2	2	1 or 2
Shutter Type	SmartShutter ™ and/or Uniblitz®	Uniblitz®	SmartShutter ™ and/or Uniblizs®
Filter Diameter(mm)	25/32/50	25/32/50	25/32/50
Min. Switching Time(ms)	40ms – 25mm wheel 50ms – 32mm whee l31ms – high speed wheel	55ms – 25 or 32 mm wheel 33ms – high speed wheel	40ms – 25mm wheel 50ms – 32mm wheel 31ms – high speed wheel
Power Supply	Chopper	Linear®	Chopper
Computer Interface	Serial, Parallel and USB	Serial and Parallel	Serial and USB
TTL In/Out	Yes	No	Yes

1. The **Lambda 10-B** can be used to drive two shutters instead of one wheel and one shutter.

2. The controller automatically detects the installed hardware.

3. The controller has to be modified for the larger filter versions of the wheels.

4. Minimum switching time between adjacent filters depends on the filter load. The given values are for a load of 2 filters.

5. Recommended for applications requiring low electrical noise (i.e. electrophysiology).

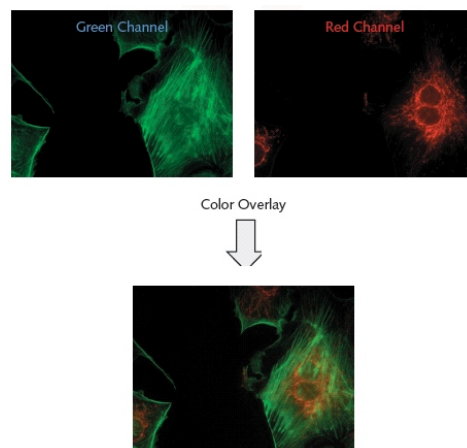# MutiChannel Imaging System

Photometrics® DC²

Dual-Channel, Full-Field, Simultaneous- Imaging System
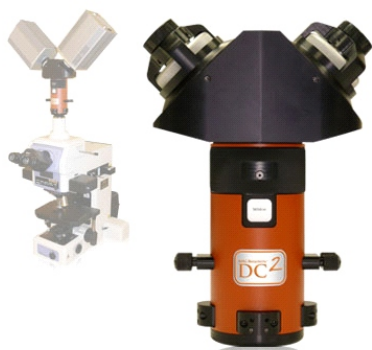
- Simultaneous acquisition of two full-field emission images
- Increases scanning speeds by a factor of two in high-content screening applications
- Improved adjustment control enables easier image alignment
- Exchangeable filter cube allows multiple applications to be run with minimal realignment
- Bypass mode allows user to send all of the emission light to a single camera
- Independent focus adjustment for each camera
- Works with many Photometrics® and QImaging® cameras

Applications

- FRET imaging
- Calcium imaging with fluo-3/Fura Red™ (Molecular Probes) or dual-emission indo-1 imaging
- Fluorescence polarization/anisotropy imaging
- Simultaneous fluorescence/DIC imaging
- Drug discovery with Cy3/Cy5
- Single-molecule fluorescence (SMF) imaging
- pH imaging with SNARF
- Multiwavelength total internal reflection fluorescence (TIRF) imaging
- Voltage sensing with di-4-ANEPPS
- Fluorescence in situ hybridization (FISH) imaging
- cAMP imaging with FICRhR
- Multichannel confocal microscopy when used in conjunction with a spinning-disk confocal

Green Channel | Red Channel

Color Overlay

Dual-Channel, Simultaneous-Imaging System

Photometrics® DV²

- Simultaneous acquisition of two emission channels
- Improved adjustment control enables easier image alignment
- Redesigned aperture adjustments ensure apertures are parallel
- Uses standard 25-mm-diameter emission and polarization filters
- Bypass mode permits no-hassle, full-field imaging
- Exchangeable filter cube allows multiple applications to be run with minimal realignment
- Works with many Photometrics® and QImaging® cameras

Specifications

|	
• Wavelength sensitivity	400 to 750nm
• Efficiency per image*	88 to 92%
• Operation temperature	10 to 37 ℃
• Detector attachment	C-mount(male)
• Front attachment	C-mount(female)
• External mounting option	¼-20 tapped hole on back of unit
• Dimension	2.5" diameter x 7.5" height
• Weight	2.6lbs
• Filters	Emission/barrier, neutral density, polarization; 1"(25.4-mm) max diameter; 0.39"(9.9-mm) max thickness

Green | Red

Ratio (Green/Red)

Ratiometric Analysis
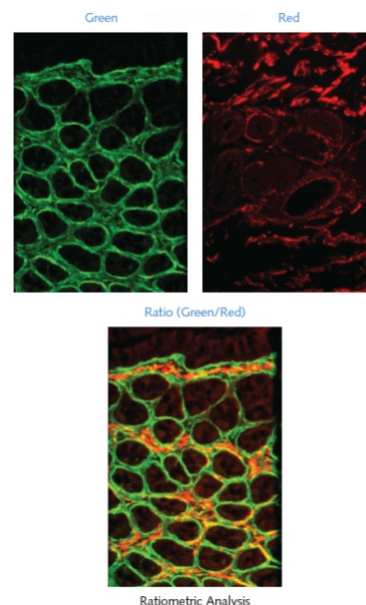
4-Channel Imaging Solution

Photometrics® QV²

- Simultaneous acquisition of up to four images
- Can split the emission by wavelength, polarization, or amplitude
- Uses standard 25-mm-diameter emission and polarization filters
- Bypass mode permits no-hassle, full FOV imaging
- Removable filter cube makes configuring different experiments simple
- Works with many Photometrics® and QImaging® cameras

Applications

- Real-time multicolor imaging
- FRET imaging
- Calcium imaging with fluo-3/Fura Red™ (Molecular Probes) or dual-emission indo-1 imaging
- Multicolor single-molecule fluorescence (SMF)
- Multiwavelength TIRF imaging
- Fluorescence in situ hybridization (FISH)
- Multichannel confocal microscopy when used in conjunction with a spinning-disk confocal
- Two-color polarization/anisotropy studies
- Simultaneous calcium and pH studies with indo-1 and SNARF
- Three-color fluorescence and DIC
- Polarized FRET analysis

RGB COLOR FILTER

CRI INSTRUMENTS
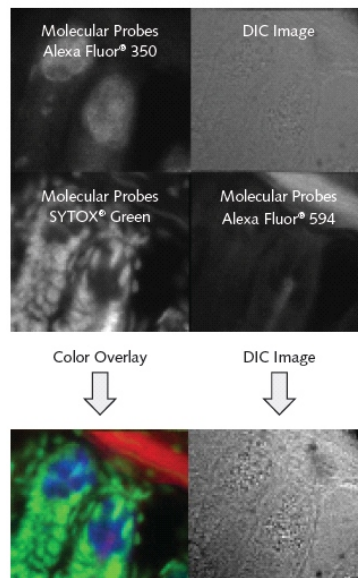
Produce High-Quality Color Images with Monochrome CCD Cameras

TRUE COLOR WHEN YOU NEED IT – Turn your monochrome CCD camera into a high-resolution color imaging system using CRI's Micro *Color or Macro *Color liquid crystal tunable RGB filters. CRI's tunable RGB filters utilize liquid crystal technology to switch rapidly between the red, green, and blue color states. Each color state is carefully designed to transmit, as closely as possible, wavelength ranges that match the individual color sensitivity curves of the human eye. The red, green, and blue color states can be selected by computer control in any order, and the exposure time for each color can be varied to provide an accurate white balance.

Features and Benefits

- High-resolution color images from a monochrome CCD camera when you want them
- Better spatial resolution and color accuracy than conventional "painted-pixel" CCD cameras
- Lower cost than triple-CCD cameras and no pixel mis-registration issues
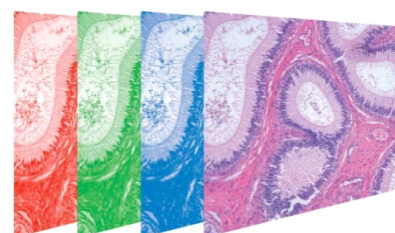- Solid-state liquid crystal technology with no moving parts, no vibration, and no noise
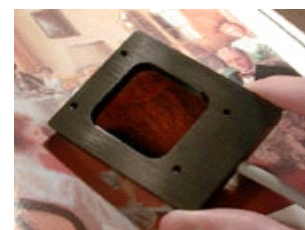
Micro *Color Applications

- Brightfield microscopy
- Fluorescence microscopy
- Pathology

Macro *Color Applications

- Brightfield microscopy
- Fluorescence microscopy
- Pathology

Semrock Optical Filter

Semrock
Quality Optical Filters

## BrightLine® Fluorescence Filters
When You Want The Bast

The highest performance fluorescence filters available … and the choice of major OEM's worldwide!

5 Years of BrightLine

BrightLine filters offer:

*Dazzling brightness
*Optimized blocking for a black background
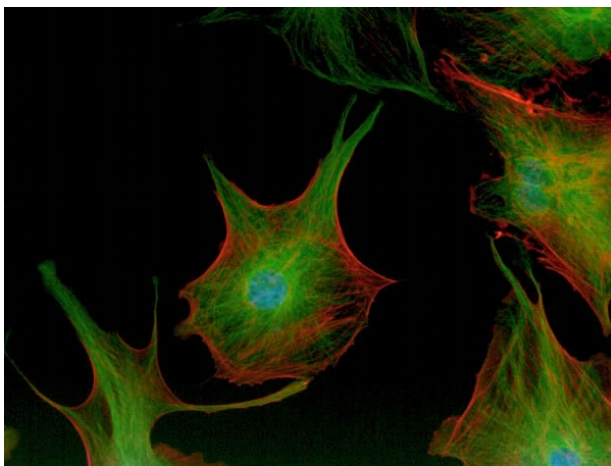*All hard coatings for **"no burn-out" reliability** – no exceptions

Highest Performance Single-band Filter sets
Best Value Basic Single-band Filter Sets
Qdot Filter Sets
FISH Filter Set
Multiband Filter Sets
Multiphoton Filters
Bandpass Filters
**45° Dichroic Beamsplitters**
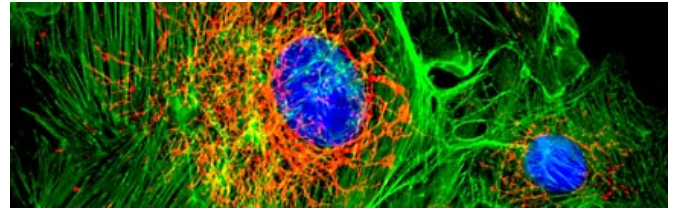
Examples of fluorescence instruments:

*Fluorescence Microscopy – imaging cells and other biological matter for research and diagnostic assays
*Microarray ("Biochip") Readers – for DNA sequencing and analysis, or genomics
*Real-time PCR – for "amplifying" DNA samples
*High Throughput/Content Screening – used widely in drug discovery research process
*Flow Cytometry – counting, analyzing, and sorting cells
*Chemical process monitoring – concentration analysis
*And many more …

Competitor multiband set   **BrightLine award-winning set**
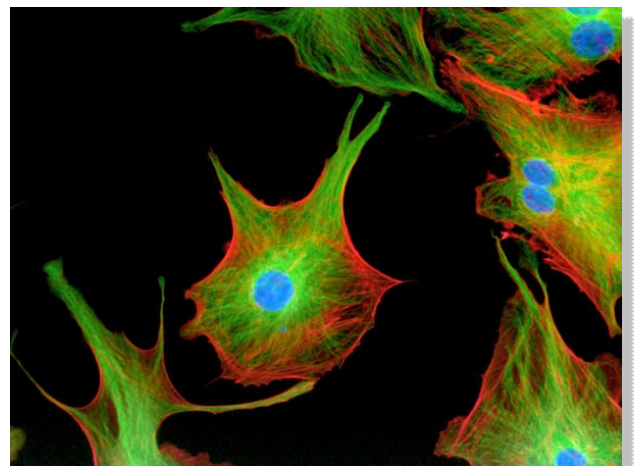
Photographs of a Molecular Probes FluoCells #2 slide, using an Olympus BX41 microscope with competing DAPI/FITC/Texas Red multiband filters sets

"I got the [BrightLine] filters, but you forgot to include the sunglasses!
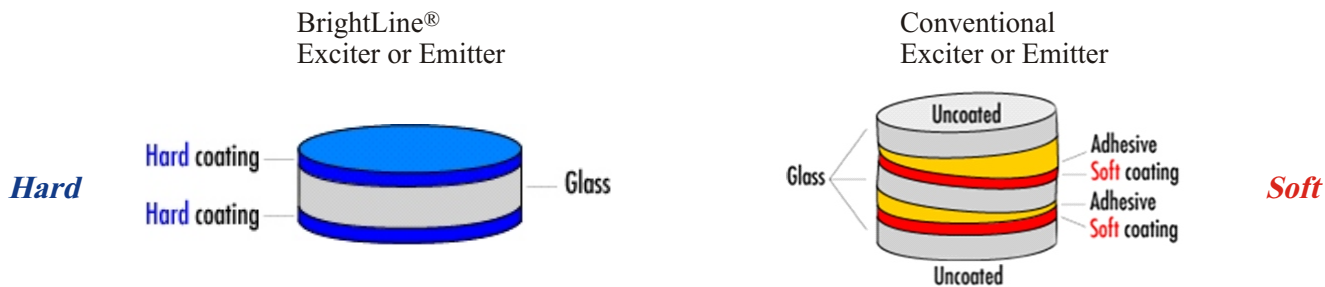*These are the brightest filters I have ever seen!! Kudos."*

Michael W. Davidson
Molecular Expressions™

Semrock Optical Filter

Semrock's durable coatings are as hard as the glass substrate,
permitting a simple one-piece filter construction*

Semrock®
Quality Optical Filters

BrightLine®
Exciter or Emitter

Conventional
Exciter or Emitter

Hard

Hard coating
Hard coating
Glass

Uncoated
Glass
Adhesive
Soft coating
Adhesive
Soft coating
Uncoated

Soft

(Drawings not to scale)

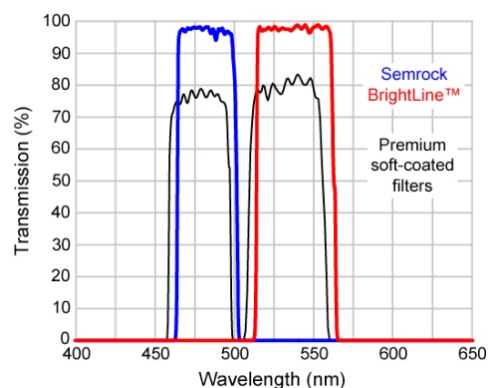*Fewer interfaces to reflect or scatter light → **highest throughput**

***No adhesive** to optically damage, degrade or autofluorescence → **most reliable**

*All optical surfaces may even be cleaned with acetone → **very durable**

**Typical filter set optimized for
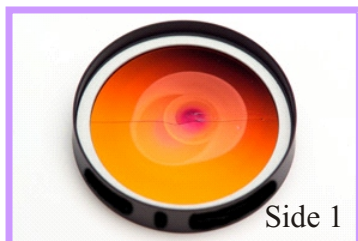Green Fluorescent Protein**
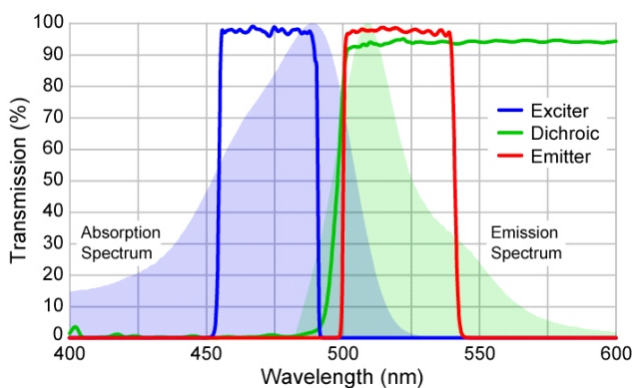
**Spectra versus leading competitor
Exciter / emitter pairs for FITC**

Semrock filters don't "burn out"!

Comparison of two filters after exposure to 2.5 Watts total power over 15 mm diameter from a Xe arc lamp (simulates back port of fluorescence microscope)

Side 1

Side 1

Side 2

Side 2

**Competitor Premium DAPI Exciter
After < 300 hrs**

**Semrock DAPI Exciter
After > 1000 hrs**

Real-Time Confocal Microscope System

CSUX-1/10(Confocal Scanning Unit)   YOKOGAWA

-Fast Scanning Rate at 360(2000) frames/sec

-High-Resolution with High S/N

-Direct Viewing of Clear-Cut Confocal Images

-Easy Operation Without Computer Control

-Mountable on Any Microscope

Unique Mechanism

Confocal scanning method of CSU10/X-1 is based on the Nipkow disk scanner(1884); an optical scanner using rotation of a disk with pinholes to produce an image. While a Nipkow scanner is good at fast scanning, its optical efficiency is too low to capture dark fluorescent image. By placing a microlens array in front of the Nipkow disk, we greatly improved the optical efficiency about two orders. In addition, CSU10/X-1 is designed to minimize the background inside the system thus realized high S/N.

CSU10/X-1 has two disks; one with about 20,000 microlenses, the other with pinholes arranged in the same pattern as the microlenses. Light incident on the upper disk is focused by the microlenses on corresponding pinholes. The two disks rotate together at 1,800rpm by an electrical motor, so that the light beams raster-scan the specimen. The light passing through the pinhole is focused by an objective lens on a spot in the specimen.

Fluorescent light from the specimen returns along the same path through the objective lens and the pinhole, and reflected by the dichroic mirror through a relay lens to the imaging point in a camera or eye.

Both the laser beam and the emitted fluorescent light pass through a pinhole, thus CSU10/X-1 can produce 2D confocal images at such high-speed. The pinhole patter is designed to capture 12 frames per rotation, which means 360 frames per second of confocal images can be captured with CSU10/X-1.
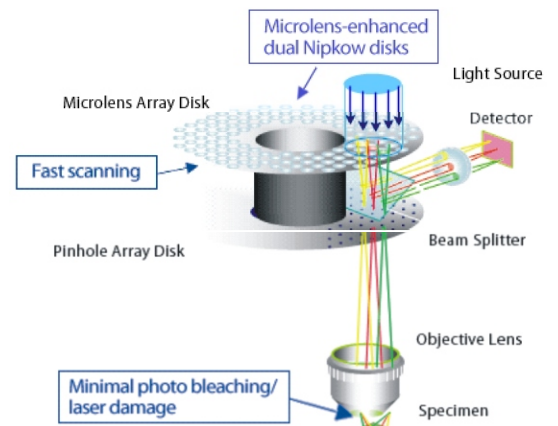
Applications
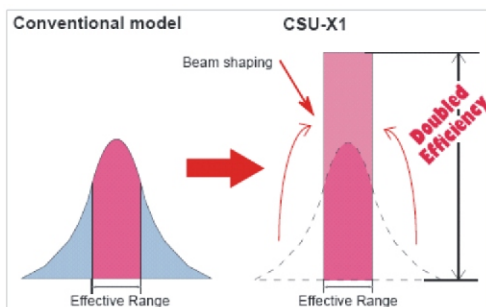
Observation and recording of fluorescent images in real-time of:
-Ca2++ signals in living cells and(or) organs
-blood circulation in living animals
-Movement and reactions in microorganisms or plant cells, especially stained with GFP
 -Functional multineuron calcium imaging

Recording clear-cut cross sections of:
-Whole-mount embryo
-Pathological of histological specimens and MORE!

Specifications

YOKOGAWA ◆

| Model	CSU-X1		CSU10
	High-end	Basic	
Imaging Speed (Max. fps)	2,000	360	360
Excitation	405 uo to 647nm		Standard : 488, 532, 568, 647nm Optional : 405nm
Scanner Motor Rotation Speed(rpm) Recommended camera exposure time	1,500-10,000 (Variable) 0.5msec <	1,800 (Fixed) 33msec <	1,800 (Fixed) 33msec <
Rotation position trigger signal	External signal output possible	None	None
Filters — EX	Option	Option	Supplied 1 filter
Filters — DM	Option (up to 3 filters)	Option (1 filter)	Supplied 1 filter
Filters — EM	Option (up to 6 filters with filter wheel)	Option (1 filter)	Supplied 1 filter
Addition or filters	At user site : DM block and filters (EX, EM.) At Yokogawa factory : DM		At user site

Images
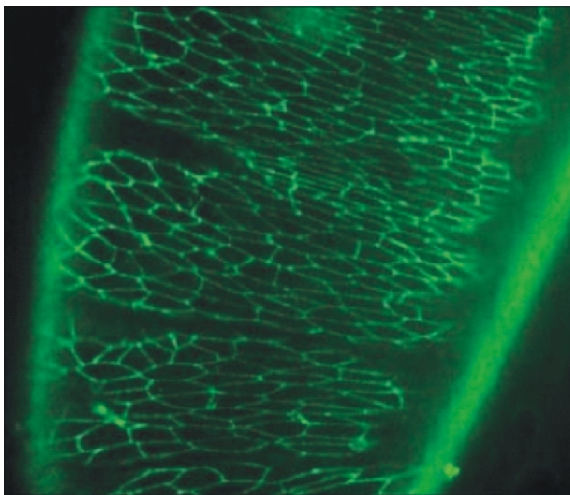
Drosophila embryo actin-GFP
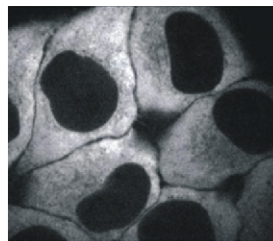
Nuclear translocation of REV-HIV fused to Glucocorticoid receptor-GFP after Corticosterone stimulation in HeLa cells
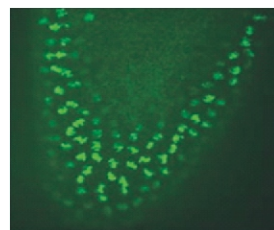
Cell Division in Drosophila Embryo EGFP-Kinetochore, Fhodamine-spindle
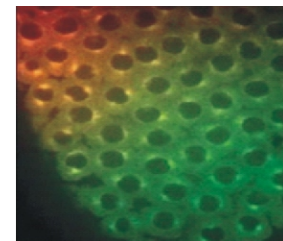
Cell Division in Drosophila Embryo Histone-GFP

Combination with Microscope and Cameras
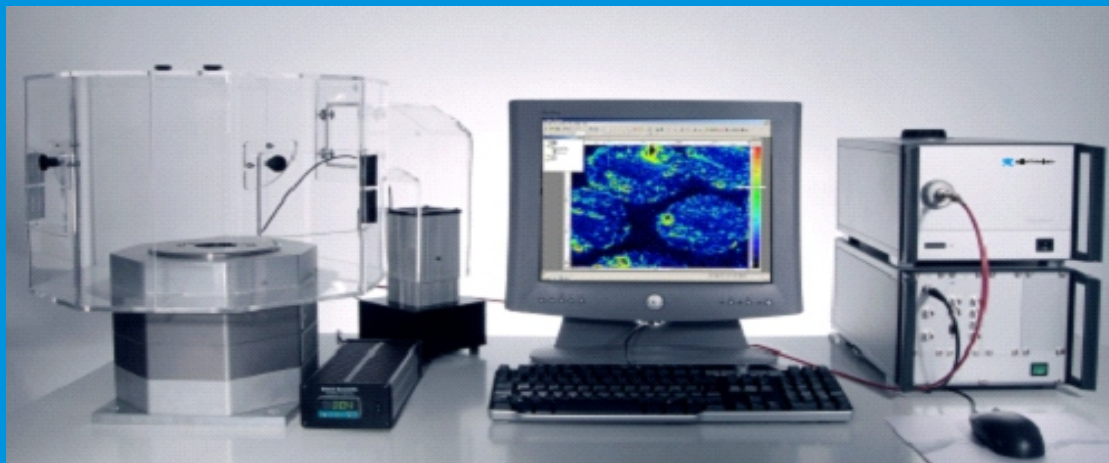

Olympus   Leica   Zeiss   Nikon   Olympus   Zeiss
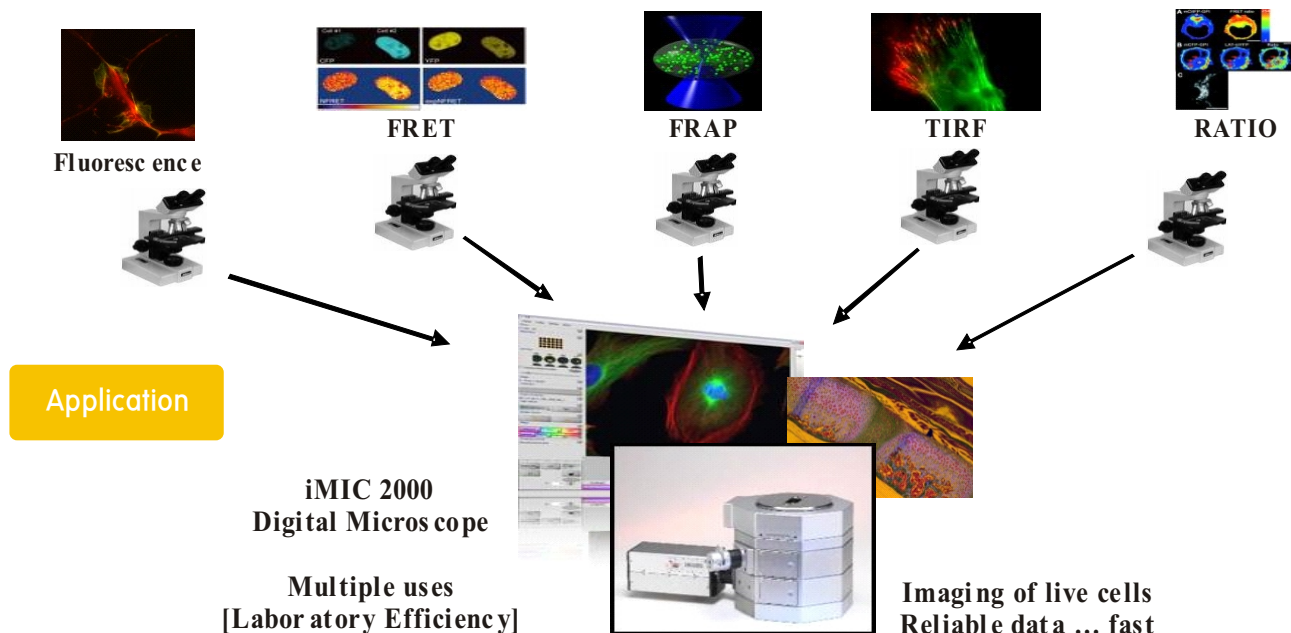
iMIC 2000 Microscope System

TILL PHOTONICS

Get more
out of microscopy!

The Agilent iMIC 2000 digital microscope is a fully integrated system for high-speed. Live-cell fluorescence imaging. An innovative, modular architecture provides a unique combination of advanced fluorescence measurement capabilitie s for quantitative microscopy.

Fully automated and digitally driven. The iMIC2000 performs tasks quickly. Efficiently, and reliably. Its high-speed focus easily follows fast processes, not only saving time but safeguarding sensitive biological specimens from phototoxicity and bleaching.

The iMIC 2000 micorsocpe can be configured for all major fluorescence measurements, including epifluorescence, FRAP, FRET, ratio imaging, TIRF, and sturctured illumination for high-speed 3D sectioning.

Fluoresc enc e　　**FRET**　　**FRAP**　　**TIRF**　　**RATIO**

**iMIC 2000
Digital Micros cope**

**Multiple us es
[Labor atory Efficienc y]**

**Imaging of live cells
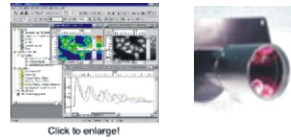Reliabl e dat a ... fast**

TILL PHOTONICS

iMIC Imaging System

iMIC 2000 digital microscope platform
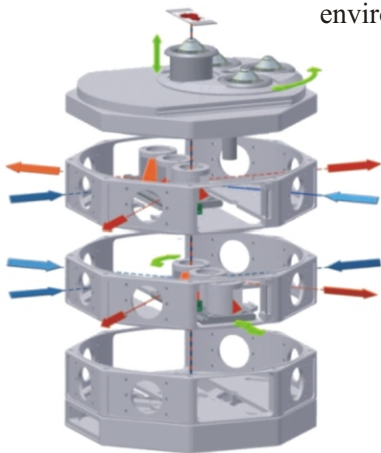Imaging software and workstation
Real time control unit
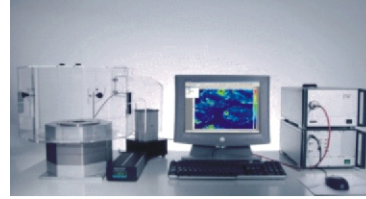
Imaging Systems

for 3rd Party Microscopes
Imaging SW, cameras, ICU

Click to enlarge!

Microscope Accessories

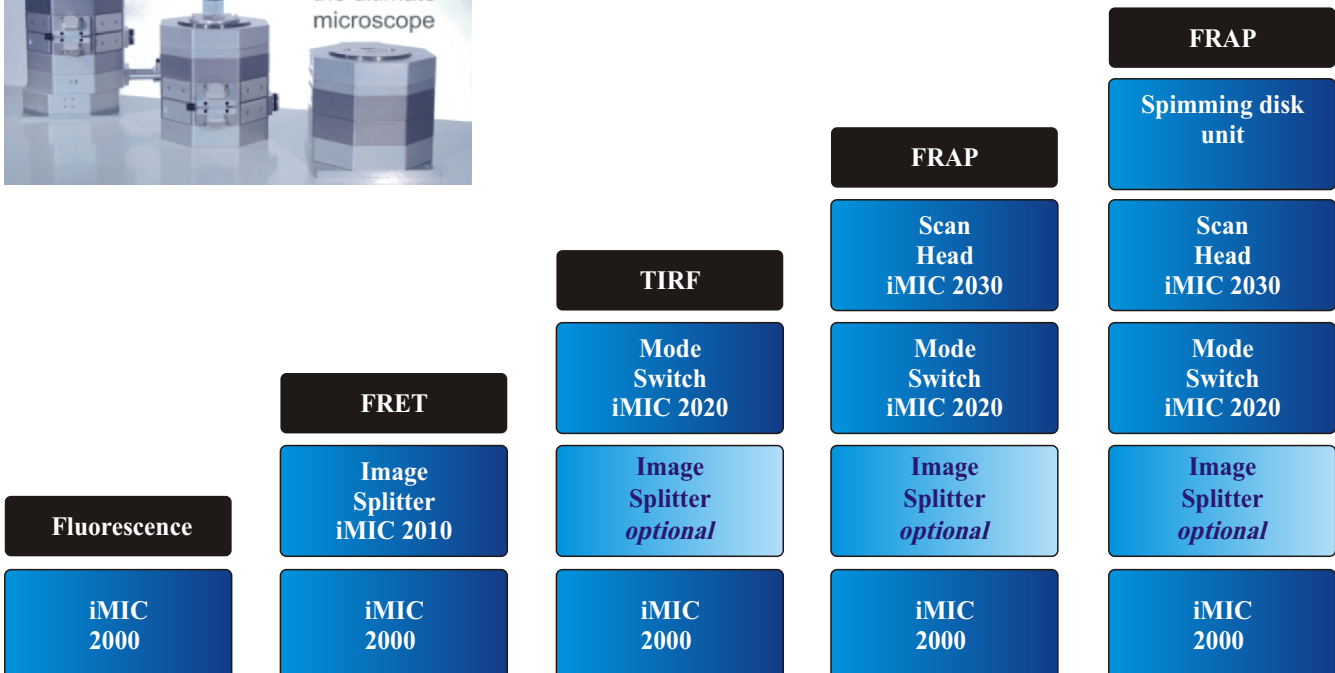Scan head, TIRF condensers, stages,
environmental chamber

Light Sources

Polychrome 5000, Polychrome 3000,
laser line combiner
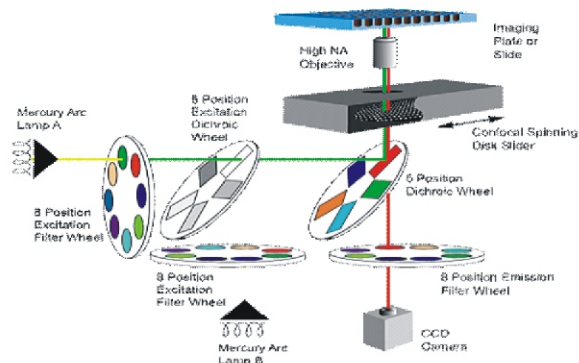
Specification

Software Platform

iMIC
the ultimate
microscope

Fluorescence	FRET	TIRF	FRAP	FRAP
				Spimming disk unit
			Scan Head iMIC 2030	Scan Head iMIC 2030
		Mode Switch iMIC 2020	Mode Switch iMIC 2020	Mode Switch iMIC 2020
	Image Splitter iMIC 2010	Image Splitter *optional*	Image Splitter *optional*	Image Splitter *optional*
iMIC 2000	iMIC 2000	iMIC 2000	iMIC 2000	iMIC 2000

Confocal Based
High-Content Cellular Analysis

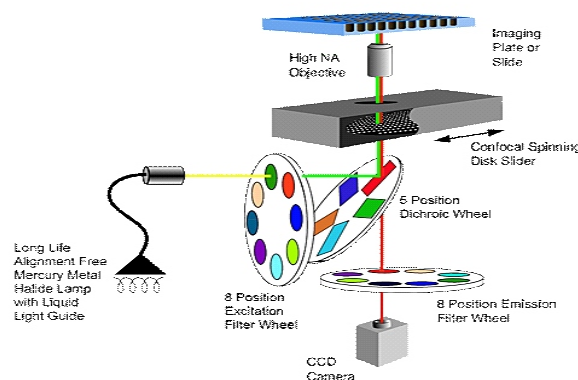**BD Pathway 855 High-Content Bioimager**

BD Pathway 855 system is designed for:

• Core facilities or labs needing a versatile
  solution for live cell and endpoint
  fluorescence imaging
• Researchers conducting live cell assay
  development for which viability of the cells
  is important
• Investigators requiring a variety of dynamic
  imaging modes on live cells with image-
  as-you-add capability.

BD Pathway 435 High-Content Bioimager

BD Pathway 435 system is designed for:

• Labs needing a dedicated high-content image
  acquisition and analysis workstation
• Researchers that primarily work on endpoint
  applications with fixed cells or tissues
• Labs that routinely conduct fluorescence
  image documentation and analysis

The BD Pathway 855 system offers the ultimate in
flexibility for high-content imaging of live and fixed cells.
Equipped with environmental control and liquid handling,
the system has full-spectrum (340–700 nm) illumination,
laser auto focus, and fast filter changers. These powerful
features, along with spinning disk confocal optics and a
cooled CCD camera, enable the BD Pathway 855 system
to rapidly record high-resolution fluorescence images
from multi-well plates and slides. The system comes with
powerful imaging software to perform a broad range
of fluorescence-based kinetic and endpoint biological
assays.

The BD Pathway 435 system is a compact benchtop
for high-content cellular imaging and is ideally suited
for endpoint (fixed cell) biological assays. Light from a
mercury metal halide lamp, introduced through a liquid
light guide, provides full-spectrum illumination. The
lamp is engineered for long life and never needs
alignment. The laser auto focus, fast filter changers,
spinning disk confocal optics, and a high-resolution
CCD camera enable the BD Pathway 435 system to
record high-quality fluorescence images from multiwell
plates and slides. A transmitted light canopy provides
the ability to capture bright-field images that can be
overlaid onto fluorescence images. The system comes
with powerful, flexible imaging processing and analysis
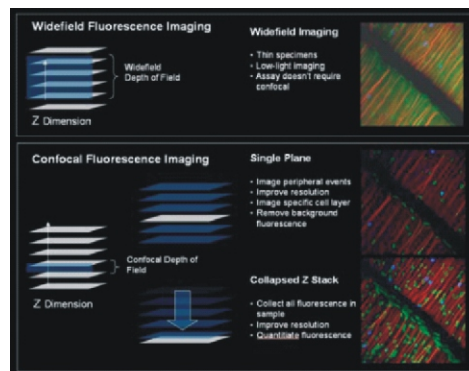software.

Confocal Based
# High-Content Cellular Analysis

The BD Pathway system provides a selectable spinning disk confocal, which allows users to take advantage of both widefield and confocal imaging methods. Based on experimental conditions and imaging requirements, the confocal capability provides the flexibility to remove out-of-focus haze for improved image quality and analysis.
A plate-wide collapsed Z Stack provides the highest quality image while retaining all the fluorescence information throughout the depth of the specimen.


Assay Modes			
	Fluorescence intensity	Fluorescence distribution and colocalization	Morphology	Cell motility and migration
When to use	• Biological response appears as a change in fluorescence intensity but other fluorescence detection methods are ineffective • Few cells are available (e.g. primary cells, stem cells) • Cell population is heterogeneous	• Total fluorescence does not change within a cell following activation • Identify where within a cell an event occurs • Colocalize cellular events	• Biological response measured by changes in cell size or shape	• Biological response is measured as cellular movement
Example of BD Pathway application	• Calcium kinetics • Mitotic index • Live/dead • Cell viability • Cytotoxicity • Cell cycle • Apoptosis • Mitochondrial health (JC-1,TMRE, MitoTracker) • Steatosis • IkB degradation • Reactive oxygen species • Whole organism imaging (c. elegans, arabidopsis, zebrafish) • Tissue arrays	• Cytoplasmic/ nucleus translocation assays • DNA damage (and repair) • Mitotic defects (monopolar spindles) • Apoptosis • Synaptic junction localization • FISH • 3-D cell imaging (stem cells, pancreatic islets) • Transfluor® GPCR (receptor internalization)	• Tube formation (angiogenesis) • Neurite outgrowth • Micronucleus assay • Morphometric analysis (tubulin) • Apoptosis (nuclear size, granularity)	• Cell migration

Modes can be multiplexed to develop unique applications
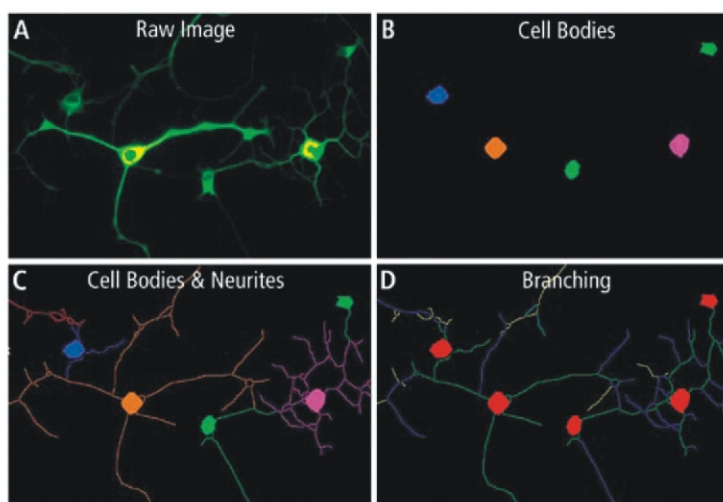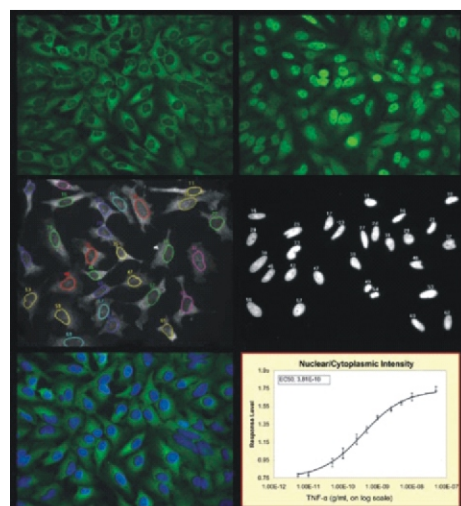
Long Term Live Cell Imaging System

## Time Laps Live Cell Imaging
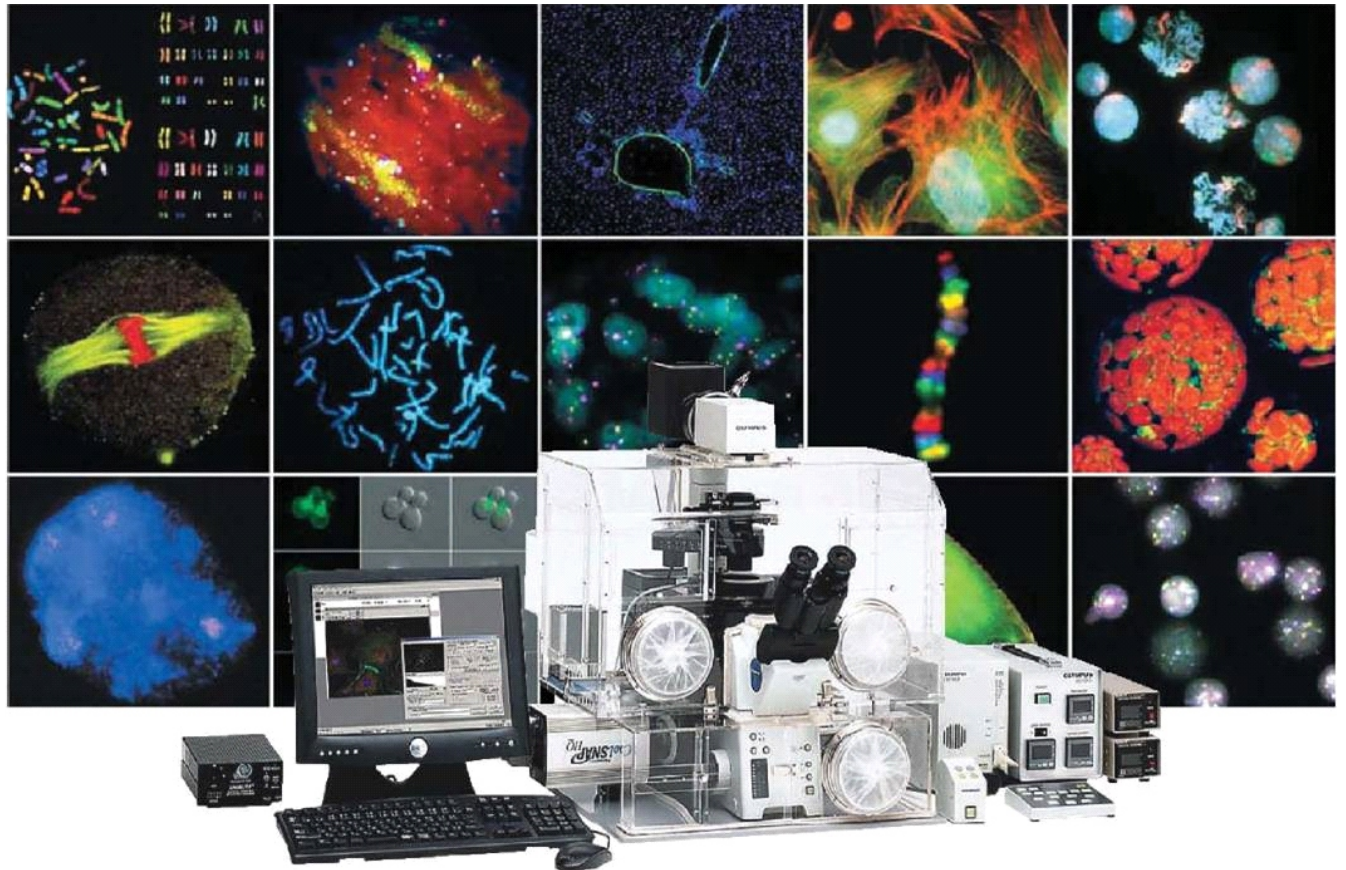
Features

Benefits

-Complete system for Live Cell Imaging
-Long time one sample observation in one to six
 days
-High-end microscope with high degree of
 motorization
 (reflector filter wheel, shutter, motorized Z-drive)
-Predefined combination for controlling temperature,
 moisture and CO_2 supply on the microscope
-Free combination of Z-stack, Multi Channel and
 Time Lapse Imaging
-Reduced photo bleaching to sample by high
 sensitivity cooled digital CCD camera

-Mountable on any microscope

-Powerful function

-Optimized and powerful software
(based MetaMorph or SlideBook)

-High-resolution 6D time-lapse

(optional configuration from 2D to 6D)

-Customizable system

High Sensitive EMCCD Camera – QuantEM:512SC
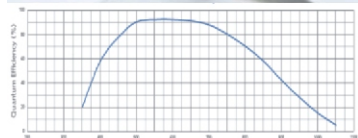
Linearized and quantitative EM gain slider provides a much more intuitive, easily quantifiable EMCCD camera.

Self-calibrating EM gain feature ensures that the camera delivers the proper amounts of user-specified EM gain and that the camera remains quantitative over time.

Stabilized background (bias stability) enabled by intelligent FPGA design allows a constant background with no "drift" during streaming, time lapse, etc.

16-bit A/D conversion on the EM port and very low noise yield a high signal to noise ratio, which is especially important for low-light fluorescence imaging.

Turbo 1394 is a unique implementation of the IEEE1394a(FireWire) interface that enables the camera to provide the fastest parameter-switching image acquisition available on the market.

Powerful Software - MetaMorph

A variety of applications
- Multi-dimensional imaging(time lapse, z-series, multiple stage positions)
- Colocalization and brightness measurements
- 3D deconvolution and reconstruction
- Neurite outgrowth
- Particle tracking and motion analysis
- Fluorescence, FRET, FRAP, FISH
- Morphometry and cell counting
- Calcium ratio imaging and more

Control of Microscope & Device automation
- Automated microscope
- Cooled CCD cameras and video cameras
- Focus motors and Piezo electric focus devices
- Filter wheels and shutters
- Monochromators
- Motorized stages
- Digital auto-focus / Digital and serial IO

Analysis modules
- Angiogenesis, Cell Cycle, Cell Health, Cell Scoring
- Monopole Detection, Multi wavelength Cell Scoring, Neurite Outgrowth
- Count Nuclei, Granularity, Live and Dead, Mitotic Index
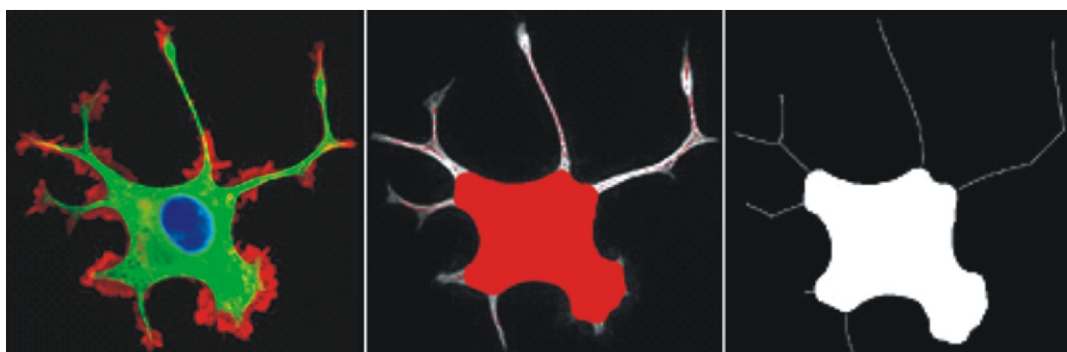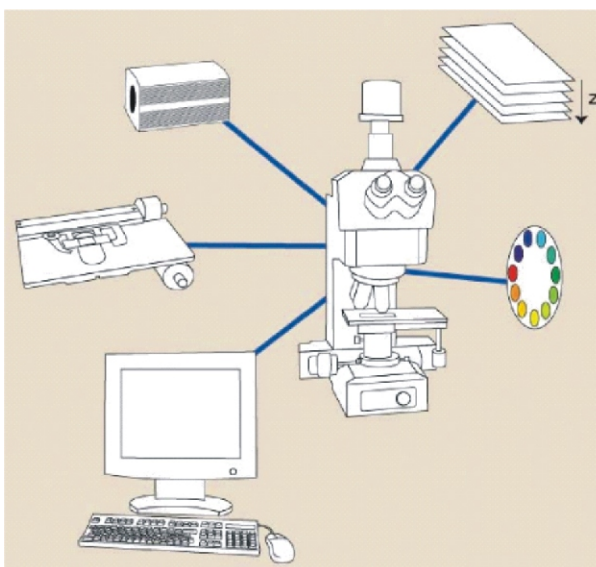
Left: PC-12 cells, middle: the module identifies cell bodies and outgrowths, right: segmentation image.

Intracellular Ion Image Measurement System

Introduction

Designed for single or dual wavelength intracellular ion measurements, IonFluor supports FURA2, BCECF, INDO1, FRET and other common ratiometric indicators. IonFluor provides simultaneous display of the original wavelengths, the ratio images, graphs of intensities, ratios, ion concentrations and a non-ratiometric image such as a bright field or phase contrast image. Two different ratiometric indicators can be imaged and measured at the same time.

Ion Image Measurement System

Calibrations

-Calibrate using the standard Grynkiewicz equation
-Titration calibrations with choice of curve fits
-Generate calibration maps to directly display pH, calcium or other ion concentrations

Image Analysis

-Generate up to two Ratios per cycle from wavelength images
-Log data to text files or to Microsoft Excel or other applications
-Analyze multiple regions of interest ; measure intensity, integrated intensity, threshold area, ratios or calibrated ion concentrations for each region over time
-Thousands of regions, standard shapes or free-form
-Four graphs display any selection of measured values
-Event Marks, Notepad and Image Annotation serve to document the experiment
-IMD, pseudo color and monochrome display modes
-Save images using standard TIFF files
-Making movies, saving them in standard AVI files
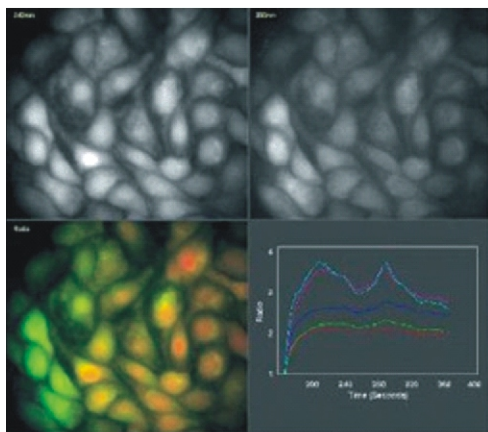
MDCK cells loaded with FURA2 AM

Automation

-Drives multiple shutters, filter wheels, monochromators and other wavelength changing devices
-Trigger external devices such as pumps, valves, strobes or flash lamps using TTL outputs
-Receives triggers from other computers or devices
-Send or receive data through standard serial ports
-Sequence journals to run at specific times during the experiment acquisition cycle
-Automatically run journals every time an acquisition or other task occurs
-Timelapse

SMF Single Molecule Fluorescence Imaging

The technique for imaging single-molecule fluorescence inside a cell has been applied to various samples recently by many researchers. Required for the single-molecule fluorescence imaging is the detection capability of photons at an extremely low level. Hence, the cameras have to possess the performance of high sensitivity and a high S/N ratio for SMF imaging. As the ideal cameras for imaging extremely weak single-molecule fluorescence, Roper Scientific offers the Cascade series, the CCD cameras wit on-chip multiplication gain, and the PI-MAX, the ICCD camera with the enhanced sensitivity by the image intensifier. Both types have the sensitivity of the highest level to achieve the single-photon detection capability.
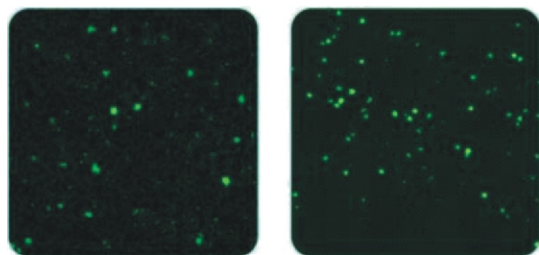
Single Molecule Fluorescence Image
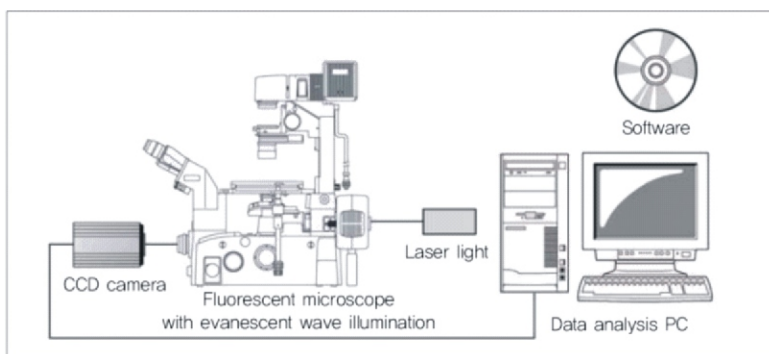
Dual Cam Simultaneous dual-wavelength imaging unit

The unique beamsplitter is integrated into the unit in a compact manner to guide the light to the two output ports where two CCD cameras are mounted to acquire images without compromising the resolution. With the two absorption filters installed inside, this unit is ideal for the simultaneous, dual-wavelength imaging applications as typified by FRET and fluorescence ratio imaging.

Specifications
Attachment thread C-mount for all input and output ports, or C-mount for input port and F-mount for output ports
Wavelength sensitivity : 350 nm to 2.2 mm

System Specifications

SMF Single Molecule Fluorescence Imaging (single wavelength image acquisition)
Best for noiseless single molecule imaging with high-speed framing

Camera	:	Cascade 512B
		Single Amplifier Cooled Digital CCD Camera
Software	:	RS Image Pro imaging software or any equivalent
		StreamPix-PVCAM recording software
Analysis Functions	:	Brightness, area, object tracking etc.
Data Acquisition Speed :		27fps at 512 x 512, long time recording to HDD
Data analysis PC		RS-PC(Windows XP)

SMF-FDV Single Molecule Fluorescence Imaging (dual wavelength image acquisition)
Acquisition of dual wavelength single molecule images with one camera

Camera	:	cascade 512B
		Single Amplifier Cooled Digital CCD Camera
Software	:	RS Image Pro imaging software or any equivalent
		StreamPix-PVCAM recording software
		Dual View(FITC/TxRED Filter mounted)
		beam-splitting optics
Analysis Functions	:	Brightness, area, object tracking etc.
Data Acquisition Speed :		27fps at 512 x 512, long time recording to HDD
Data analysis PC		RS-PC(Windows XP)

*Recommended cameras : Cascade650, Cascade512B, Cascade512F and PI-MAX

In-Vivo Macro Image System

Complete Imaging System

The Lumazone™ system from MAG Biosystems™ has been engineered for quantitative chemiluminescence and fluorescence macroscopic imaging of a variety of samples, including whole plants and animals. This versatile, fully integrated system allows researchers to select the high performance CCD or electron-multiplying CCD (EMCCD) camera best suited to their imaging needs, as well as to choose the appropriate dark box for their work.

Lumazone can be used for a broad set of applications, including:

• Gene expression in plants
• Tissue-specific gene expression in animals
• Gene expression in isolated-cell preparations
• Study of etiological agents and mechanisms
• Visualization of dermatological diseases
• Investigation of circadian rhythms in plants and animals
• Cancer biology (e.g., drug treatment efficacy, metastasis studies, preventative drug regimes)
• Plant development studies
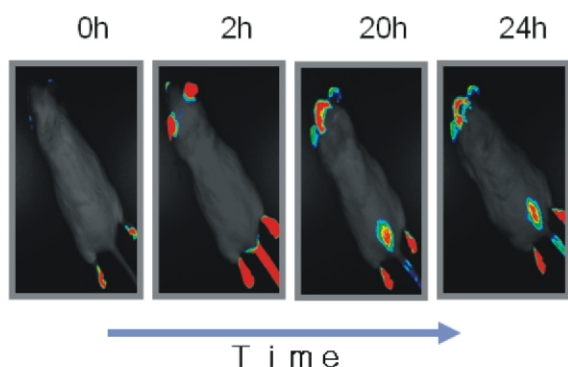
Complete Imaging System

Each Lumazone is tailored to address the specific application requirements of the individual researcher. The system comes in four highly affordable configurations: automated fluorescence (FA), automated chemiluminescence (CA), manual fluorescence (FM), and manual chemiluminescence (CM).
A choice of five industry-leading cameras, three dark box sizes, and multiple lenses enables the Lumazone system to be utilized for all types of macroscopic chemiluminescence and fluorescence imaging.

Industry- Leading Cameras

The Lumazone imaging system features a deeply cooled, back-illuminated 1024B CCD camera that delivers >90% quantum efficiency. This excellent quantum efficiency, combined with very low read noise and dark current, results in high sensitivity.

In addition to high-sensitivity image acquisition, the 1024B camera's dual-speed readout capability provides a faster operation mode for quick setup and focusing as well as a slower mode for low-noise imaging. User-programmable gain levels are calibrated so that a quantitative conversion of electrons to ADUs is possible.

Furthermore, four additional high-performance Lumazone CCD and EMCCD camera options are available, thus giving researchers the flexibility to conduct a wide range of macroscopic imaging experiments — from basic applications such as single-wavelength detection of luciferin to more advanced applications such as time-course investigations using multiple fluorophores.
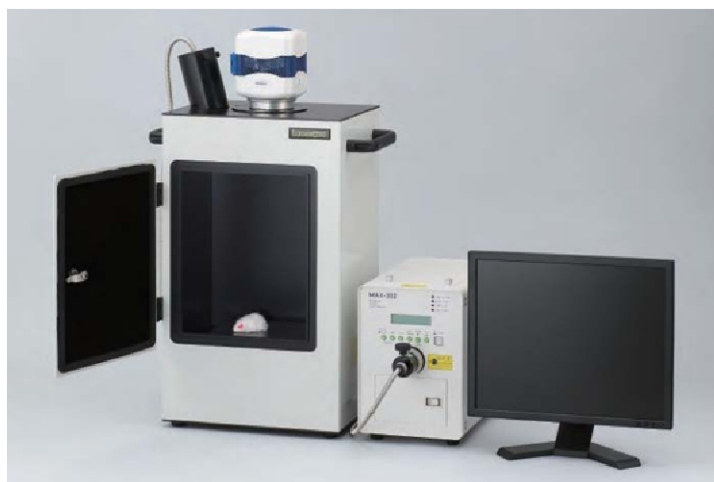
Ultrablack Dark Box

The Lumazone system's dark box has been designed to provide a light-tight environment for imaging both chemiluminescent and fluorescent samples. The availability of three different box sizes supports work with a wide variety of sample sizes, including standard plant trays.

The ultrablack box has a light-tight "camera-to-dark box" adapter that lets samples be observed with negligible background-light contamination. Simple connectivity to the user's anesthesia system or other external devices is provided via light-tight passthroughs.

For ease of use, the dark box has interior LED lights that are externally controllable, making it simple to acquire a brightfield reference image. Multiple imaging lens options are available.

Auto fluorescence Correction

Lumazone software also provides a quantitative subtraction algorithm to make sure that the emission signal can be detected above the sample's naturally occurring auto fluorescence.

Quantitation and Calibration

Every Lumazone system delivers highly linear digital output and calibrated gain performance. In addition, all Lumazone systems include a calibrated luminescence standard that enables the calculation of the exact number of photons emitted from a sample based on the intensity detected by the camera.

Quantitation and Calibration

The Lumazone system includes image acquisition and processing software. Lumazone software optimizes data collection via on-chip binning, various sub region readout methods, and the ability to set exposure times anywhere from milliseconds to hours.

Lumazone software offers an array of image processing and analysis tools, tailored to the needs of macroscopic imaging. The resultant 16-bit data can be saved as a standard TIFF file either for exporting or for formatting for publication.

System Support

The MAG Biosystems applications group includes a number of PhD scientists. These biological imaging specialists not only helped create the Lumazone system but are always ready to assist Lumazone users.

Every Lumazone imaging system is guaranteed to perform to its factory-defined specifications. To best serve Lumazone users, MAG Biosystems maintains a worldwide network of technical support personnel.

Virtual Microscopy System

CLARO

Compact Digital Slide Scanner TOCO

Simple manipulation
Set a glass slide on the stage and push a startbutton, scanning starts.

Superior cost performance
Reasonable price with all advantages derived from the VASSALO.

Compact design
W: 540mm H: 520mm D: 370mm
Small floor space for practical use in laboratory and medical office.

Free slidetypes
The world leading autofocusing technology makes it possible to scan all kinds of slides such as thinner stain slide(Immunostain), uneven thicker slide and even the frozen section slide.

Network Capability
It is possible to observe and share the same Virtual Slide data via network.

OnDemand options
Slide rack loader, focus fusion function, fluorescence scanning and other useful options will be released in the near future.

-Digital slide scanner

-Digital slide scanner
+Specimens management system

Optional functions

Slide rack loader (optional)
It can be set up to 20 glass sldes and scans them automatically.

Fluorescence scanning (optional)
Claro original strobe lights solved the difficulties of exposure time on fluorescence specimen.

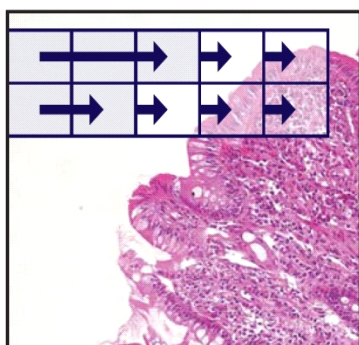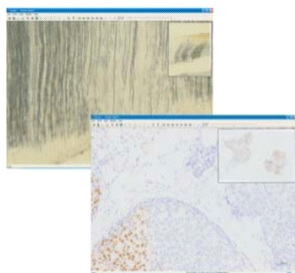### Focus fusion function (optional)

VASSALO

Highend model
for scanning up to 80slide

Automatic scanning up to 80 slides.
Whole regions autofocus.
Scanning with 40x objective lens.

-Automatic Virtual Microscopy

- Automatic Virtual Microscopy
+Specimens management system

Rapid scan and its high quality result

-Area sensor scanning and whole region autofocus, they're the reasons of clearness and sharpness
-With ZEISSmade lens, it provides realistic color and high resolution on 40x image
-With 3axis motor and sturdy design of mechanism, it responds quickly and moves precisely
-With our original algorithm, it focuses quickly and accurately on the specimen
-With our custom tuned USB camera, high sensitivity, low noise, high speed signal reading are available
-With auto judgment scanning system,
-VASSALO automatically skips the area which has no tissue
-With our original image processing algorithm, VASSALO makes a whole image with no dividing lines.

Enhance the possibilities with network system

 CLARO

Finding a certain specimen from a huge stock of glass slides and matching it with a certain medical record. The more glass slides, the more it takes time. Our original database "Acordo" manages virtual slides with their patient's information and other type of images. It is easy to match a virtual slide with the medical record by using patients ID. Also, it can put the data on the internet. It is possible to observe the virtual slide and medical records, add some comments on them from other places. That's quite useful for conference or consultation through the internet.

Acordo manages whole procedure of the virtual slide processing, from patient's information to image data. Acordo works with Internet Explorer.

Specifications

Compact Digiral Slide Scanner TOCO

Glass slide size	W:76mm D:26mm t:2.0mm
Scanning range	70mm x 26mm
Stitch images	Combining images are limitless
Slide loading	Manually loading, 1 glass slide
Microscope	-
Nosepiece	4-positioned nosepiece
Objective	Carl Zeiss A-plan 20x, 40x
Camera elements	½ CMOS(1280 x 1024)
Light source	Claro original flat LED
Accuracies	X axis ±3μm, Y axis ±1μm, Z axis ±0.25μm
Scanning method	Autofocus(Whole region)
Scanning resolution	0.157μm/pixel at 40x
AF mode	Fast/Normal/Precise
Dimensions	W:540mm D:370mm H:520mm
Weight	40kg
Environment	10˚C~45 ˚C(50.0 ˚F~113.0 ˚F) without condensation original Viewer
Software	

Automated Virtual Microscopy VASSALO

|	
	W:76mm D:26mm t:2.0mm
	W:40mm D:26mm
	Combining images are limitless
	Automatically loading, 80 glass slides<20 glass slides>
	Carl Zeiss Axioskop40(Bright-field, Trinocular) <W:530mm D:580mm H:530mm>
	6-positioned nosepiece
	Carl Zeiss A-plan 20x, 40x
	½ IT CCD(1280 x 960)
	Claro original flat LED
	XY axis ±2μm, Z axis ±0.25μm
	Autofocus(Whole region)
	0.229μm/pixel at 40x
	Fast/Normal/Precise
	W:700mm D:600mm H:1440mm <W:530mm D:580mm H:530mm>
	150kg<45kg>
	10˚C~45 ˚C(50.0 ˚F~113.0 ˚F) without condensation original Viewer

TOCO

TC0011BM2

The ultimate design for desktop model. Compact digital slide scanner which derives all advantages from the VASSALO.

VASSALO
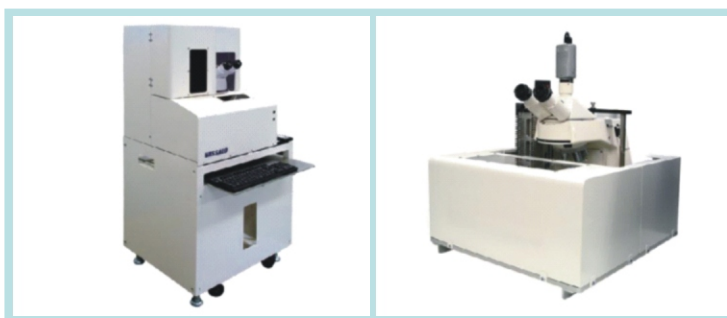
80-slide model
VS0801AS1

Allinone model Autoscanner with 80slide auto loader.

20-slide model
VS0201AS1

Desk top model Autoscanner with 20slide auto loader.

Cytogenetics Analysis System

applied **Spectral Imaging**
Bringing the Details to Light
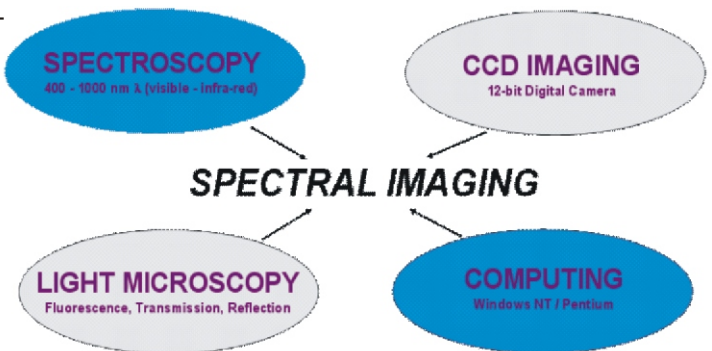
ASI (applied Spectral Imaging)

Company Introduction

Applied Spectral Imaging (ASI) is a leading provider of cytogenetics systems to prestigious clinical and research labs all over the world. Its CytoLabView suite offers a complete solution for all imaging needs in the lab and includes applications for karyotyping, FISH, CGH, SKY® multi-color karyotyping and general spectral imaging.
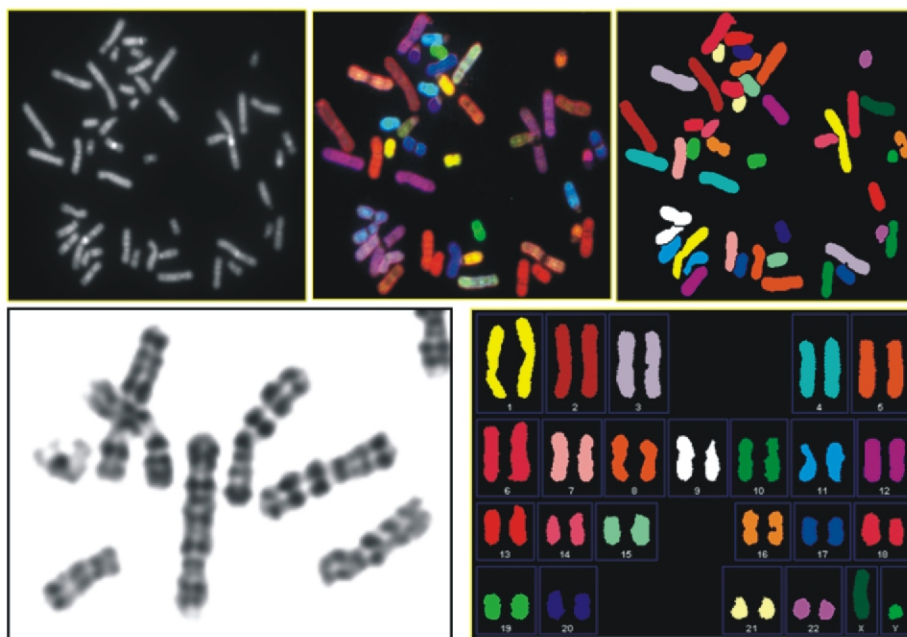
The Company will continue to develop products to expand its competitive offerings in the market to include its new automatic scanning platform, ScanView. ScanView is created on an open and modular platform on which common hardware allows the use of different software modules for a variety of applications in genetics, hematology, pathology and much more.

General

Applied Spectral Imaging LTD (ASI) has developed a light-related platform imaging technology called SpectraCube®. Patented worldwide, SpectraCube® can distinguish between materials that appear identical and provides qualitative and quantitative analysis of light in the visible and NIR spectrum. In 1997, ASI was awarded the European Information Technology Grand Prize for successful commercialization of SpectraCube® — an achievement which revolutionized the entire fields of clinical and research cytogenetics.

Example

Cytogenetics Imaging Modules

Database

Analysis

System   Acquisition   BandView   M. Counting

FISHView

CGHView +Multi-case comparison
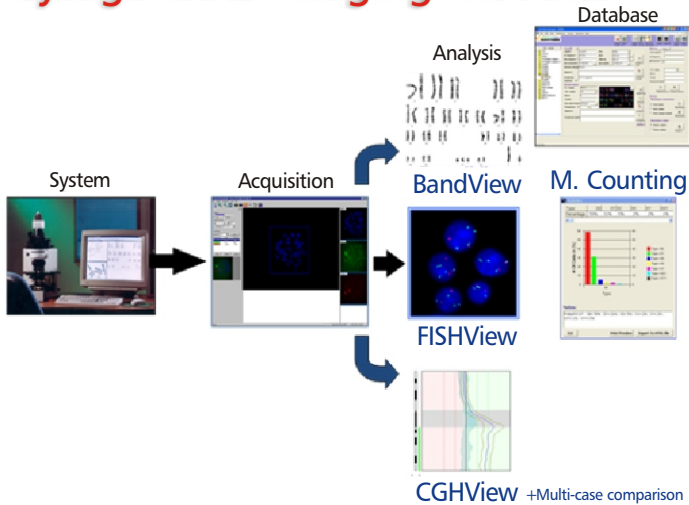
Cost savings with CytoLabView

Designed to enable Paperless lab environment
XY readers and relocation
Multi-microscope coordinate transformation
Multi-application database (reports, statistics)
Acq., Analysis, Server, Management, Laptop stations
True network design, incl. connectivity to hospital DB
Automatic multi scheme backups
  (minimize the need for network administration)
Dual mode functionality – immunity to server crashes
One click acquisition - both B/W and Color camera options
Fastest analysis tools

Spectral Imaging Modules

Database

HiSKY

- Higher accuracy
- Resolve small trans./Ins
- Resolve dual DNA source
- More colors

SpectralFISH

SpectraView
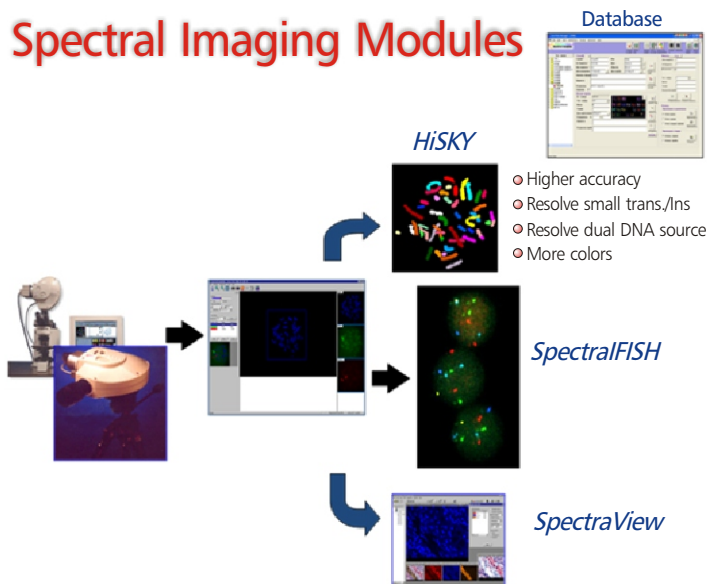
SKY Application

Cancer cytogenetics
   Identification of:
    *Marker chromosomes
    *Translocations
    *Rings, HSRs and DMs
    *Complex karyotypes
Mouse applications:
    *Animal models of human diseases
    *Experimental carcinogenesis
    *Environmental carcinogenesis
Comparative cytogenetics(evolution)
Plant cytogenetics

Scan View Application (Cyto+Patho)

MetScan
SpotScan
ReloScan
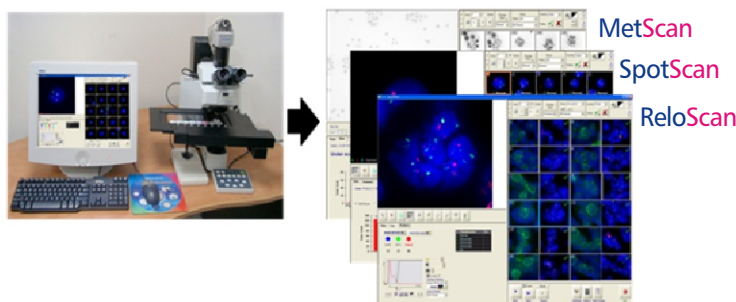
- TBScan
- IHC Scorer (Scan mode)
- RareScan - Rare object detection

Advantages of ScanView

Full coverage of scanning applications in bright-field and
fluorescence Acquisition of:
  ▶Grey level images with microscope filters
  ▶Color imaging for highest speed
  ▶Spectral measurements with the SpectraCube for
   research and advanced feature extraction
Easiest user interface and training
Highly cost effective due to variety of station
Configuration from full automation, semi automation
  and pure review stations
Integrated database with all other patient sample results
Cost effective solutions for automatic spot counting
  with manual acquisition

Cytogenetics Analysis System

applied **Spectral Imaging**
*Bringing the Details to Light*

• Auto**Mate** Tray Loader

-Unattended scan of 81 slides
-Continuous loading/unloading capability to accommodate varying workloads
-User definable scan region or multiple regions to match any sample types
-Supports Pre-Scan for definition of regions of interest in tissues
-High accuracy in cell-relocation
-Rapidly review results of any slide in the tray by a simple click of the mouse
-Ability to work with a full set of six objectives
-Immediate access for review or relocation to each of the 9-slides in a tray

• *Pathology-* PathEx

CDM Database
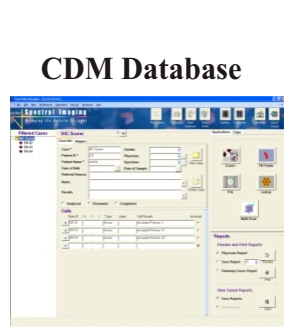
Cell Cal
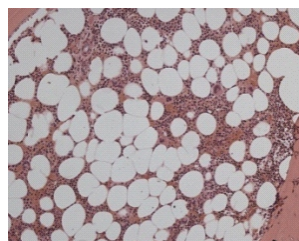
IHC Scorer

Her2

Ki67, p53, ER. PR
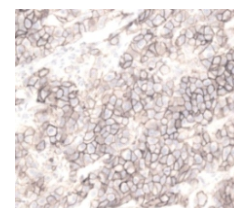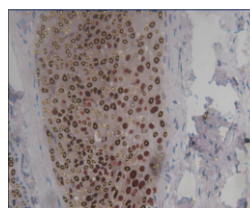
Cytology Evaluator
(Cervical sample, P16)
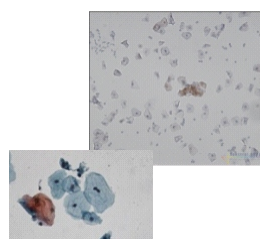
TB-Finder
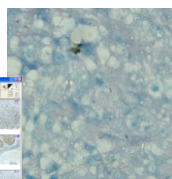
Duo

PathEx Product Line

DOC: Image Capture & documentation of slides
Duo: Automatic Scanning & analysis of dual IHC staining for cytology and Histology
Customized solutions for **Her2** and **Urovision FISH Probes** with Automatic analysis (shared with CytoLabView suite)
IHC-Scorer for automatic scoring of Immuno-histochemically stained tissue for both membrane(e.g., her2Neu) and nucleus(e.g., ER, PR, Ki-67, p53) antibodies
TB-Finder for easy tissue and sputum culture scan in search for T uberculosis bacilli under Ziehl-Nielsen staining
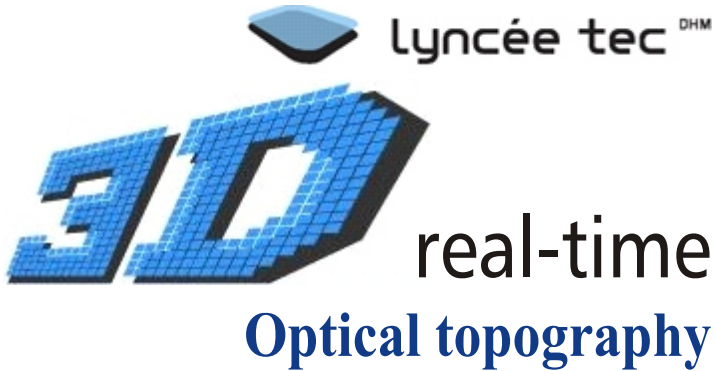**Cytology** dysplasia and IHC assessment tool
Cellularty Automatic Calculator, Mainly for bone tissue sections

PathEx

Digital Holographic Microscopy for 3D Real-time optical topography

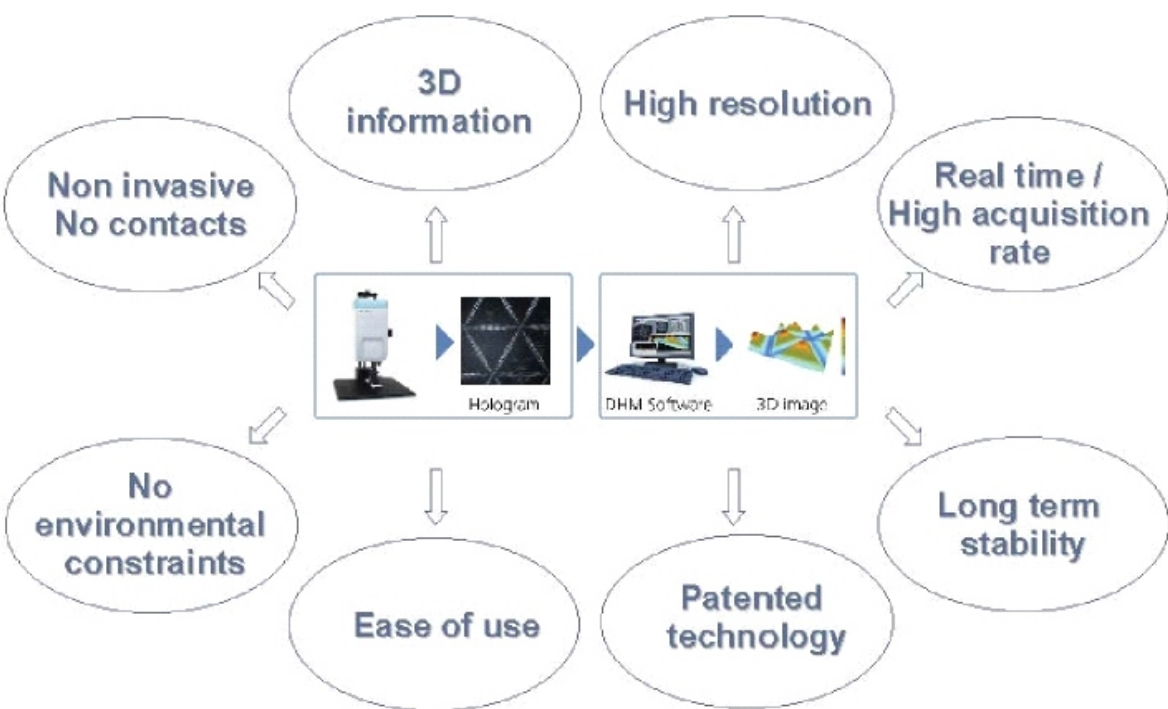Lyncée tec ^{DHM}
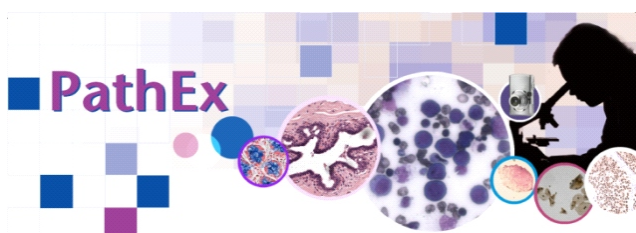
3D real-time
Optical topography

DHM Combines advantages that makes it an unrivaled technology

The ultimate solution in high precision microscopy
combining simultaneously:

3D high resolution
Nanometer vertical resolution
Powerful software for surface topography analysis

Real-time imaging
Very fast screening of your sample
Dynamic measurements

Robust, stable and easy to use
For harsh conditions on factory floor
For demanding R&D applications and routine inspections

3D information

High resolution

Non invasive
No contacts

Real time /
High acquisition
rate

Hologram | DHM Software | 3D image

No environmental constraints

Ease of use

Patented technology

Long term stability

Digital Holographic Microscopy for 3D Real-time optical topography

Applications

lyncée tec DHM

The DHM 1000 family can measure samples of all kinds of materials and shapes down to nanoscale applications in both material and life sciences.
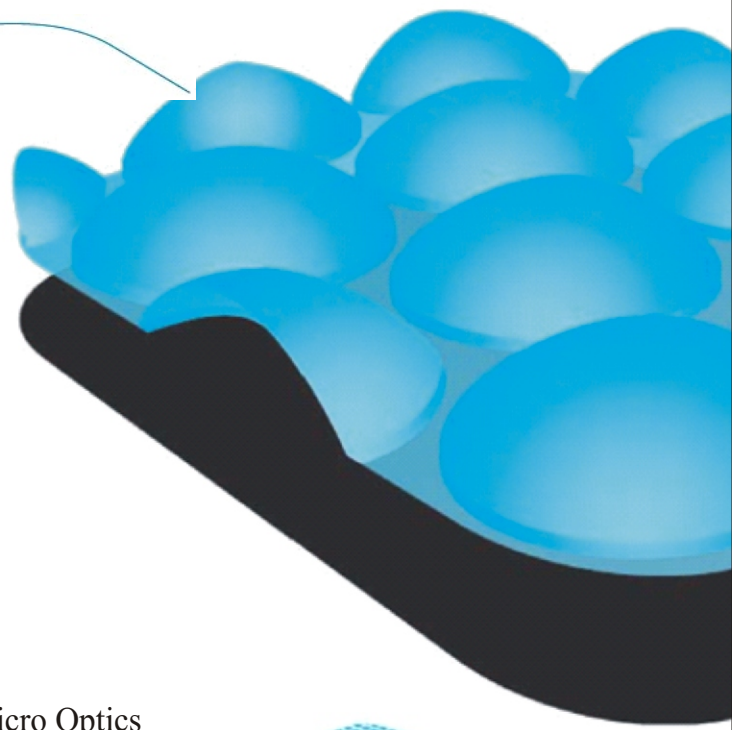
Life Science

Phase contrast imaging
Cellular morphology
HEK cells
Stem cells
Biochips
Pollen
Bacteria

Material Science

MEMS / MOEMS
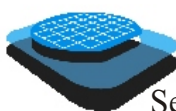
Micro Optics

Nano Technology

Micro Technology

Semi Conductor

Real-time imaging

The acquisition and digital reconstruction rate (15 images per second) allows real-time imaging. Dynamic event viewing and active interaction with the observed phenomena are therefore possible.

Robust & stable

The short acquisition time (a few micro-seconds) makes the method insensitive to external vibrations and avoids the need for a vibration isolation table. Its stability permits prolonged examination sequences.

Non-contact & non-invasive

The technique uses low-power light to illuminate the sample and form the image. The sample surface is never in physical contact with the DHM, thus ensuring the preservation of the sample characteristics.
Biological specimen can be observed without contrast agent.

Cost effective solution

The DHM has low installation and operating costs. Adaptability and flexibility makes it very competitive in the high resolution microscopy domain. All these features make the DHM a cost effective tool for R&D and quality control in production.

User-friendly

No sample preparation, no specific environments (temperature, vacuum, ...),
no high precision positioning or orientation of the sample, the simplicity of DHM makes it a user-friendly tool for quick and reliable measurements. The digital focalizing technique, while increasing the depth of field, simplifies the fine tuning of image sharpness.

Powerful 3D software

The software has a convivial, user-friendly graphical interface combined with the power to make a complete analysis of the surface. The sample can be represented in a large variety of 2D and 3D plots and movie (AVI) formats. Interaction with external software or hardware is possible. An option permits synchronization of the camera for stroboscopic observation of periodic high frequency movements.
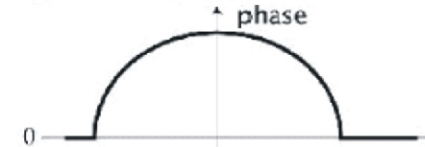
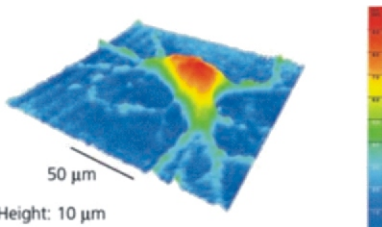**lyncée tec** DHM

Phase Profile
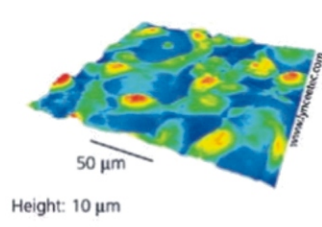

Gross phase profile
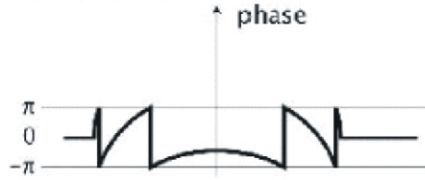
Unwrapped phase profile

modulo 2π

unwrapped

Images

Height: 10 µm

High resolution cellular morphology monitoring

Height: 10 µm

HEK Cells

Heights: 25, 35, 65, 80, 85 nm
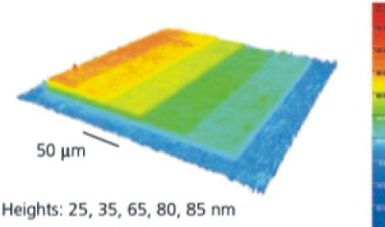
Optical topography at nanometric scale

Period: 5 µm
Height: 40 nm
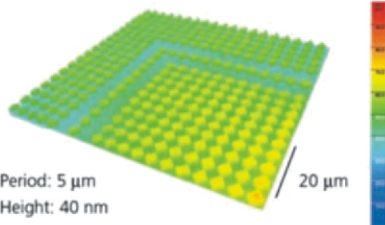
Full wafer quality control

Height: 10 µm
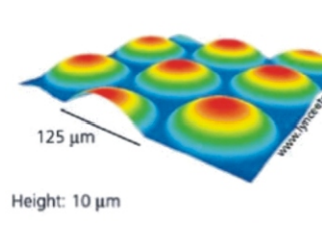
Optical Properties and defect analysis

Height: 120 nm
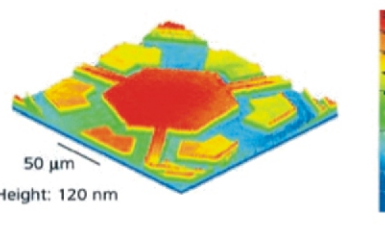
Surface deformation analysis
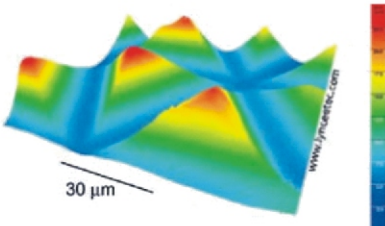
Retro reflectors(Frauenhofer–ISIT):High aspect ratio

Period: 3 µm
Height: 600 nm

Grating

Ra = 248 nm
Rt = 1.55 µm
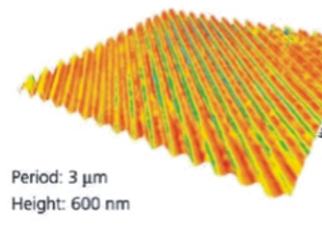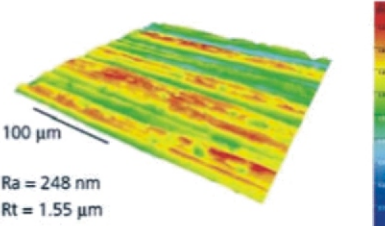
Roughness surface measurements

Scanning Near-field Optical Microscope

WITec
focus innovations

Alpha 300S
(Scanning Near-field Optical Microscope

SNOM System with unique Cantilever Sensors
The alpha300 S is a user friendly Scanning Near-field Optical Microscope (SNOM) that combines in a unique way the advantages of SNOM, Confocal Microscopy and Atomic Force Microscopy in a single instrument. Switching between the different modes can easily be done by rotating the objective turret. The alpha300 S uses unique micro-fabricated SNOM-cantilever sensors for optical microscopy with spatial resolution below the diffraction limit.
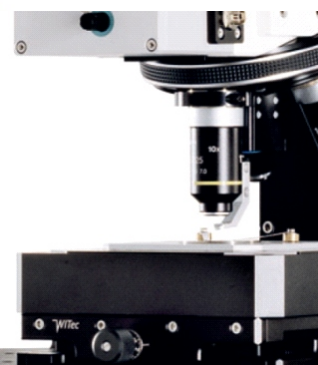
Features

Operating Modes
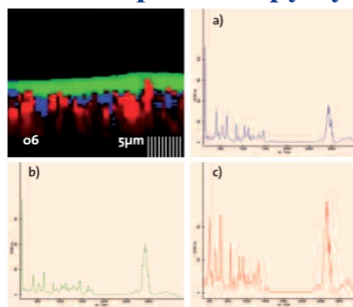*Near-field microscopy, Confocal microscopy and Atomic Force Microscopy*

Linear Scan Stage
- Sample scanning

Detectors
PMT, APD and Optional

Raman Spectroscopy System

A New Dimension in Raman Microscopy: Ultra-fast & high resolution chemical imaging
The confocal Raman microscope alpha300 R offers the unique ability to acquire chemical information non-destructively with a resolution down to the optical diffraction limit (~ 200 nm). This allows you to observe and analyze the distribution of different phases within a sample in ambient conditions without specialized sample preparation. Because of the confocal setup, it is not only possible to collect information from the sample surface, but also to look deep inside transparent samples and even obtain 3D information.

Alpha 300R(Confocal Raman Microscope)

Confocal Raman Microscope with unrivaled resolution and sensitivity
The alpha300 R represents a new generation of Raman imaging systems, focusing on high resolution as well as high speed spectrum and image acquisition. Its sensitive setup allows for the nondestructive imaging of chemical properties without specialized sample preparation. In typical experiments, the acquisition time for a single Raman spectrum is significantly less than 100 milliseconds. This results in complete images consisting of tens of thousands of spectra being collected within a few minutes. Differences in chemical composition, although completely invisible in the optical image, will be apparent in the Raman image and can be analyzed with a resolution down to 200 nm. The confocal setup reduces unwanted background signals, enhances contrast and provides depth information.

Features

Operating Modes
-Spectra along arbitrary lines
-Time series
-Raman Spectral Imaging(XY or XZ))
-Image stacks(optional)
-All modes available for air and liquid measurements
-3D imaging and depth profiling due to confocal configuration

Resolution
-Optical resolution diffraction limited to 200nm laterally and 500nm vertically
-Spectral res. down to 0.02 wavenumbers

Spectroscopy system
-Ultra-high throughput WITec - UHTS300 spectrometer with up to 70% throughput
-High sensitivity, back-illuminated spectroscopic CCD
(deep depletion for NIR excitation)
-Ultrahigh sensitivity, photon counting APD with up 80% QE(optional)

Microscopy Stage
-Highly linear(0.02%), piezo-driven, feedback controlled scan stage
-Capacitive feedback-control on all axes
-4nm lateral positioning accuracy, 0.5nm vertical
-Capacity for large samples

Control Unit alphaControl
-Fully digital system-on-a-chip concept for the highest speed, flexibility, accuracy, expandability and timing precision
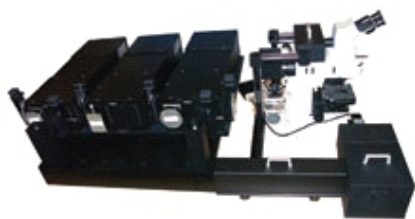-Complete access to internal signals

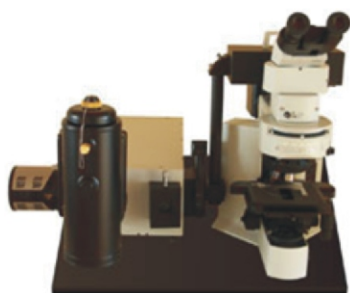# Raman Spectroscopy System

TriVista Confocal Raman System

PI's **new TriVista Confocal Raman Microscope Systems** combine the high resolution, low frequency and tuning capabilities of the renowned Acton triple spectrograph with our extensive range of high performance CCD detectors and Olympus upright and inverted microscopes to bring you dedicated Confocal Raman systems with both macro and micro sampling capabilities. They have been designed to deliver extreme performance, flexibility and return on investment.

Applications : Life science, Cell dynamics, Semiconductor research, Materials analysis, Carbon nanotube characterization

Features and Benefits

-Completely integrated modular systems provide instant results and easy configuration.
-Integration with Olympus Upright and Inverted microscopes provides spectroscopic data with diffraction limited spatially resolved accuracy.
-Rigid coupling ensures long–term stability and repeatable measurements.
-Enhance flexibility with both macro and confocal micro sampling available in a single system.
-The support of multiple lasers and full spectral coverage from the UV to NIR allows easy use of different excitation wavelengths.
-Maximize signal acquisition with our wide range of detector options.
-Increase discrimination of minute structural changes with extreme resolution (up to 0.13cm-1).
-Maximum stray light rejection allows measurements of low frequency modes to within 5cm-1 of the laser line, depending on sample and measuring conditions.
-Switching between additive and subtractive modes is simply a mouse click.
-Imaging spectrographs used for maximum confocal resolution.
-Macro sample chamber available for easy analyses of solid, liquid and gases.
-Motorized z-focus, xyz Raman mapping and auto-focus available.
-Heating and cooling stages for various temperature ranges.

MonoVista Confocal Raman System

The MonoVista series of Confocal Raman Systems integrates Acton's single-stage spectrographs with our extensive range of high-performance CCDs and Olympus Upright BX51 and Olympus Inverted IX71 microscopes, to provide a dedicated and flexible research tool. A high-stability base plate ensures long-term stability and repeatable measurements, while our extensive range of detectors ensures that the system has the best sensitivity and detection limits for your particular application.

Applications : Life science, Biochemistry, Materials analysis

Features and Benefits

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-Integration with Olympus Upright and Inverted microscopes provides spectroscopic data with diffraction limited spatially resolved accuracy.
-Rigid coupling ensures long –term stability and repeatable measurements.
-Enhance flexibility with both macro and confocal micro sampling available in a single system.
-Integrated lasers available providing a complete Raman solution.
-The support of multiple lasers and full spectral coverage from the UV to NIR allows easy use of different excitation wavelengths.
-Maximize signal acquisition with our wide range of detector options.
-Imaging spectrographs used for maximum confocal resolution
-Motorized z-focus, xyz Raman mapping and auto-focus available.
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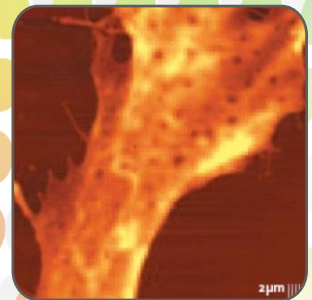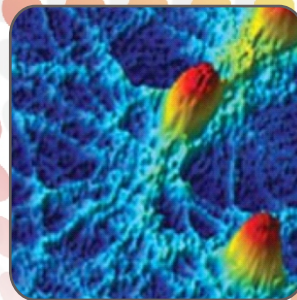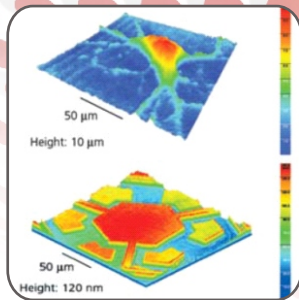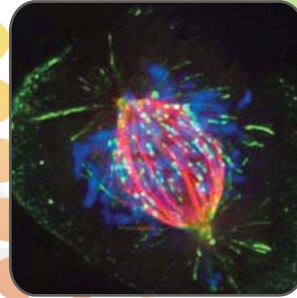
The Ultimate Solution for Biology, Spectroscopy and Industry

(주)케이오에스
KOS,Inc.