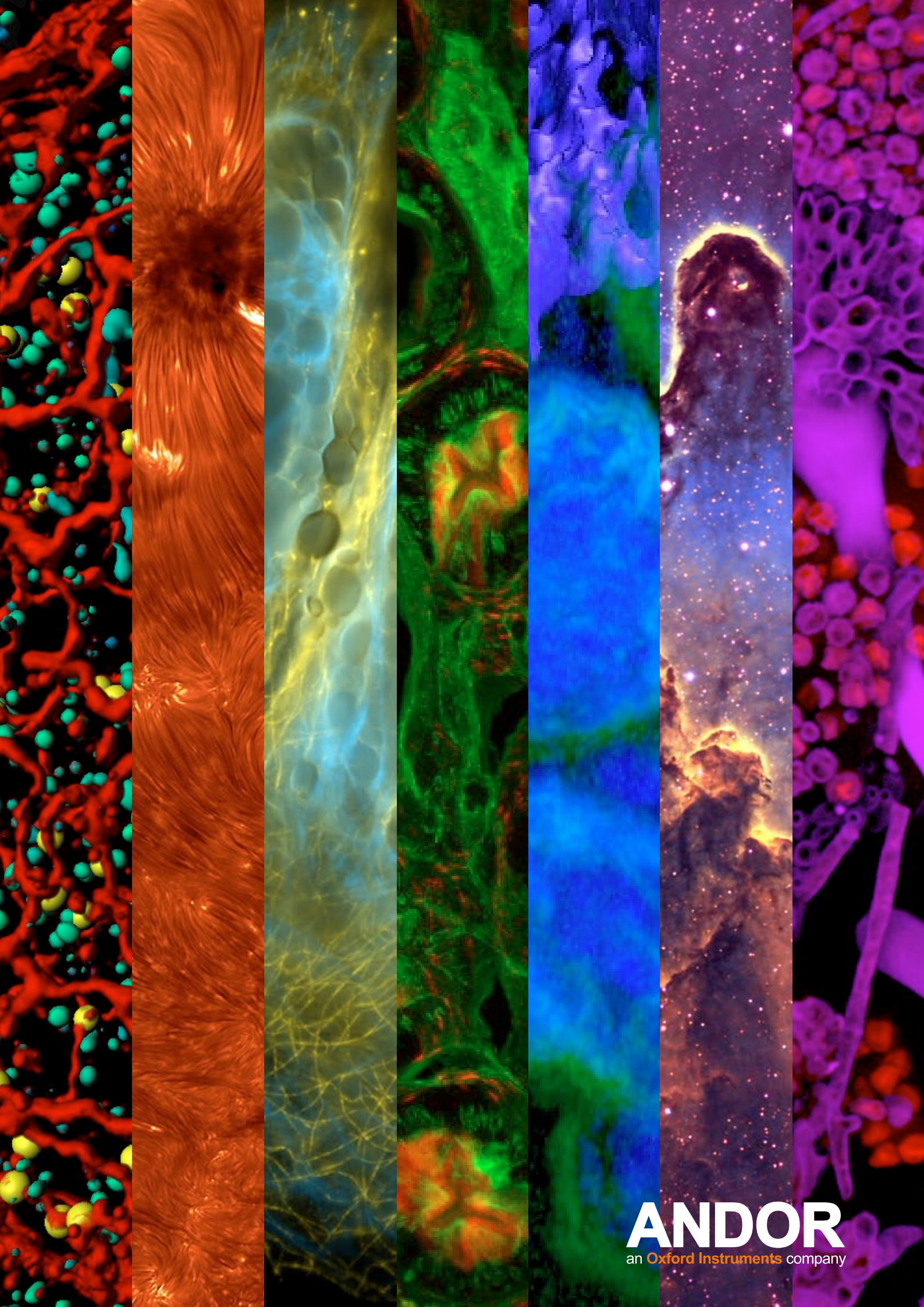

ANDOR
an Oxford Instruments company

NEW WAYS TO DISCOVER

FRAPPA
IMMUNOFLUORESCENCE
SPINNING DISK CONFOCAL MICROSCOPY
ZYLA
UNCAGING
DEVELOPMENTAL BIOLOGY
CLARA
GEL DOCUMENTATION
SOLAR ASTRONOMY
BIOCHIP READING
DSD2
XD
FRAP
DNA DAMAGE
EMBRYOLOGY
STEM CELL RESEARCH
VESICLE TRACKING
LIVE CELL MULTI DIMENSIONAL MICROSCOPY
iXON ULTRA
ADAPTIVE OPTICS
LUCKY IMAGING
TISSUE ANALYSIS
WD
MOSAIC 3
TIRF
SUPER RESOLUTION
SINGLE MOLECULE DETECTION
NEO
SEMICONDUCTOR ANALYSIS
ION IMAGING
iXON3
BEC | COLD ATOM
OPTOGENETICS
FRET
EXOPLANET HUNTING
MICROPOINT
PHOTOBLATION
IN-VIVO IMAGING
iKON
ZYLA HF
iZYLA
IKON-HF
MICRO CT
CRYSTALLOGRAPHY
FAST MULTI TRACK SPECTROSCOPY
HYPERSPECTRAL
HOLOSPEC
NEUTRON TOMOGRAPHY
RAMAN SPECTROSCOPY
LASER INDUCED BREAKDOWN SPECTROSCOPY
SHAMROCK
HARD X-RAY
PLASMA STUDIES
iDUS
X-RAY FLUORESCENCE
PARTICLE IMAGING VELOCIMETRY
TRANSIENT ABSORPTION
LASER INDUCED FLUORESCENCE
MECHELLE
SY SERIES
SO SERIES
ULTRA HIGH-POWERED LASERS
X-RAY DIFFRACTION
SOFT X-RAY
LITHOGRAPHY
iSTAR
RAMAN SPECTROSCOPY
ABSORPTION · TRANSMISSION · REFLECTION
LUMINESCENCE · FLUORESCENCE · PHOTOLUMINESCENCE
ATOMIC EMISSION SPECTROSCOPY
EUV SPECTROMETERY
LASER FLASH PHOTOLYSIS
NEWTON CCD
iDUS InGaAS
NEWTON EMCCD
IN VACUUM SX SERIES

Our portfolio - of over 80 products - enhances scientists' understanding of fields as diverse as drug discovery, astronomy, medical diagnostics, materials characterization and cancer research.

80+ PRODUCTS

Andor pioneered EMCCD technology, and our iXon cameras are the best selling and highest-performance EMCCD products on the market. iXon revolutionized cell analysis, allowing faster analysis at lower light-levels and speeds that were previously unobtainable.

The iXon Ultra, now with a 60% speed boost, is the camera of choice in the super-resolution microscopy field. This innovative camera benefits researchers in TIRF, FRET, single-molecule detection and live-cell confocal microscopy.

Andor also made EMCCD technology affordable to every laboratory with the launch of the Luca^{EM}, a cost-effective yet powerful camera capable of single-photon sensitivity. In addition to widespread use in cell microscopy, the Luca^{EM} is ideal for high-throughput photovoltaic inspection.

Andor offer the scientific researcher the advantage of choice with a comprehensive sCMOS portfolio. In 2010, Andor introduced the first sCMOS camera, the flagship Neo 5.5. Following this in 2012, Zyla 5.5 was launched offering the customer a cost-effective option (Zyla 5.5 3-Tap) or the fastest sustainable frame rate available from sCMOS (Zyla 5.5 10-Tap). The most recent addition to Andor's sCMOS portfolio is the Zyla 4.2 which offers the highest QE (72 %) available from sCMOS technology. Overall sCMOS offers an advanced set of performance features that renders it ideal to high fidelity, quantitative scientific imaging. sCMOS technology can be considered unique in its ability to simultaneously deliver on many key performance parameters, overcoming the 'trade-offs' associated with other scientific imaging technology standards and furthermore eradicating the performance drawbacks traditionally associated with CMOS imagers.

With the Clara, Andor delivers the highest sensitivity achievable from a high-resolution interline CCD camera, which coupled with Andor's iQ live cell imaging software produces superb high-resolution live cell images. The multi-megapixel iKon Slow Scan CCD – with thermoelectric cooling to -100°C – is ideal for long exposure deep-space astronomy and has helped discover many new exoplanets (planets outside our solar system). The iKon CCD is also widely used in the analysis of single super-cooled atoms in Bose-Einstein condensation experiments.

For spectroscopy applications, Newton^{EM}, the world's first Spectroscopic EMCCD, provides single photon sensitivity at rapid spectral rates; making it ideal for Raman / Luminescence Chemical Imaging. Those immersed in the study of Atomic Spectroscopy will find the iStar ICCD and Mechelle spectrograph the perfect combination, reducing experimental time while simultaneously offering high bandpass and spectral resolution.

Our systems and component-oriented microscopy business allow us to meet scientists' requirements in cell and live-cell applications. Our confocal and widefield solutions are optimized for applications such as optogenetics and optophysiology, photo-manipulation (e.g. activation and ablation), calcium and ion imaging in confocal sections, and fluorescent protein dynamics. Andor components are designed to be compatible with our own software and various third-party products.

The Revolution WD and XD is a family of laser microscopy systems providing high-speed multi-point confocal, FRAPPA and TIRF modalities. Used in conjunction with Andor's unique solid state laser combiner (ALC) and Multiport switch, this can deliver a co-linear beam from up to six solid state lasers between three optical pathways.

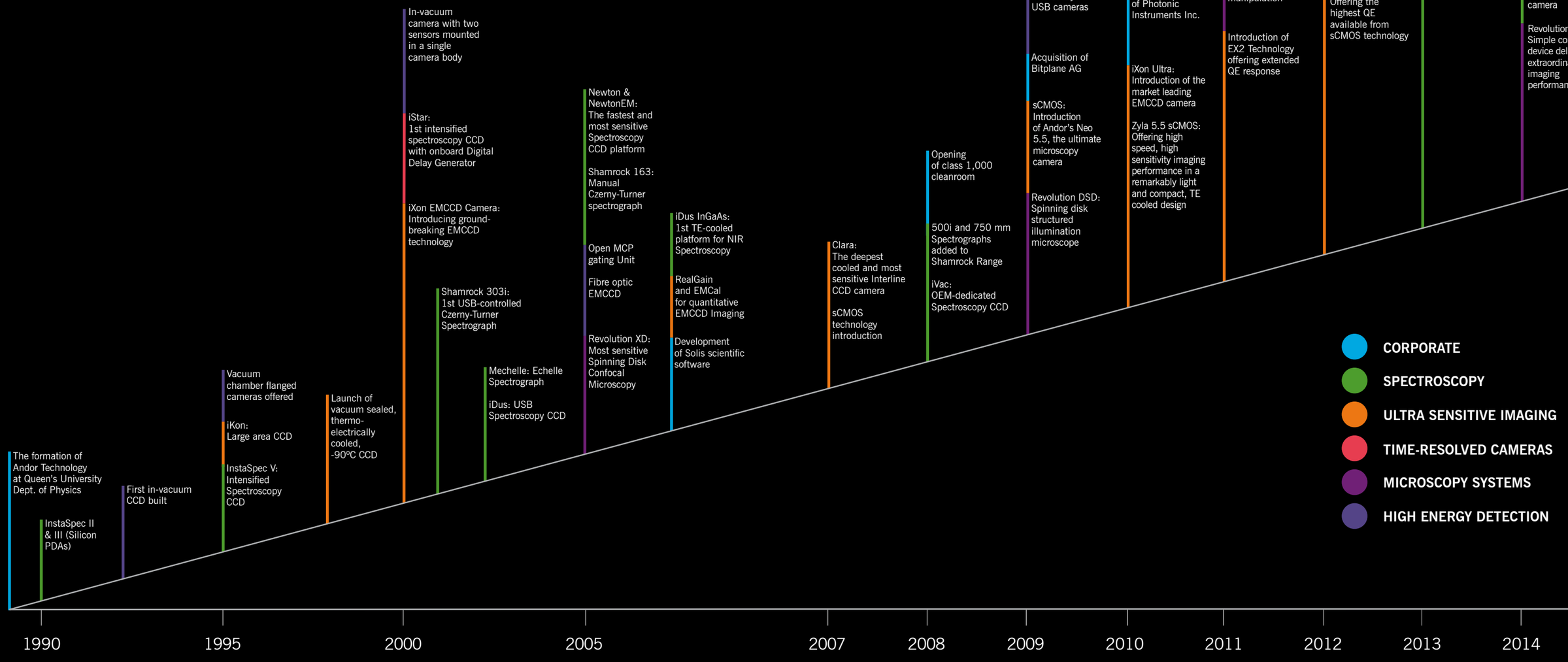
The Revolution DSD is a high-performance confocal microscopy system, using a white light source. This novel technology offers a simple cost-effective device to upgrade a fluorescence microscope into a confocal microscope. It is proven to work well across a broad range of sample types.

We develop and manufacture our cameras, spectrometers and microscopy systems in a purpose-built 50,000 ft^2 (4,650 m^2) factory, which includes state-of-the-art optical, electronic and mechanical workshops, 2,325 ft^2 (215 m^2) class 1,000 and class 100 facility, and vacuum and electronic processing facilities. These provide the best environment for camera-head assembly and exhaustive QC testing of every unit before shipment.

Andor has also implemented 6-sigma manufacturing processes to guarantee the highest possible product-performance and quality.

Since 1998, we have operated a quality management system that currently complies with the requirements of BS EN ISO9001:2008 and has also obtained the ISO14001. Our expertise and facilities are ideally suited to the development of both bespoke and volume-manufacture products, providing the highest performance research and OEM systems.

Much has changed since we developed the world's first non-controller-based scientific camera in 1989. We now have over 400 people in 16 offices worldwide, distributing products to over 10,000 customers in 55 countries. But we are still innovating. We want to keep taking our industry further, to exceed the limits of light-measurement by developing the highest-performing technology possible.



SCIENTIFIC CAMERA TECHNOLOGIES

THE PRINCIPAL FORMS OF HIGH PERFORMANCE DIGITAL CAMERA INCLUDE:

THE POPULAR CHARGE-COUPLED DEVICE (CCD) CAMERA

For all CCD detectors, a silicon diode photosensor (called a pixel) is coupled to a charge storage region that is in turn connected to an amplifier that reads out the quantity of accumulated charge. Incident photons generate electronic charges, which are stored in the charge storage region. This storage charge can be measured, giving rise to an observable signal.

For sCMOS, the sensor features a split readout scheme in which the top and bottom halves of the sensor are read out independently. Each column within each half of the sensor is equipped with dual column level amplifiers and dual analog-to-digital converters (ADC).

THE ELECTRON MULTIPLYING CHARGE COUPLED DEVICE (EMCCD) CAMERA

EMCCD technology, sometimes known as 'on-chip multiplication', is an innovation first introduced to the digital scientific imaging community by Andor in 2001, with the launch of our dedicated, high-end iXon range of ultra-sensitive cameras. Essentially, the EMCCD is an image sensor that is capable of detecting single photon events without an image intensifier. This is achieved by way of a unique electron multiplying structure built into the chip.

THE INTENSIFIED CCD CAMERA (ICCD)

Andor first introduced an Intensified CCD (ICCD) camera into its range in 1995. Andor was the first company to offer a fully integrated ICCD that included a high performance delay generator, a high voltage gating unit in the camera head. Gating and amplification occur in an image intensifier tube similar to those used for night vision applications and allow isolation of phenomena as short as 2 ns.

THE SCIENTIFIC CMOS (sCMOS) CAMERA

sCMOS is a breakthrough imaging technology innovation, introduced by Andor in 2010 with the launch of the flagship Neo 5.5 camera, offering an advanced set of performance features that renders it ideal to high fidelity, quantitative scientific imaging. sCMOS technology can be considered unique in its ability to simultaneously deliver on many key performance parameters, overcoming the 'trade-offs' associated with other scientific imaging technology standards and furthermore eradicating the performance drawbacks traditionally associated with CMOS imagers.

SYSTEM CONSIDERATIONS

In selecting a digital camera, there are certain parameters that should be assessed to ensure the camera can offer the best possible performance for your application(s). These can include:

- Sensor readout optimization options
- Cooling options
- Synchronization signals
- Computer interfacing options
- Sensor format and pixel size
- Time resolution

SENSOR READOUT OPTIMIZATION

To allow the camera to be optimized for the widest range of applications, it is important to have options for the camera readout. These include:

- Sensor pre-amplifier gain
- Variable pixel readout rate
- Variable vertical shift speed
- Binning and sub-imaging

SENSOR TYPES

We offer a range of different sensor types to assist you, as outlined in the table below:

Sensor Type	Description
FI	Front Illuminated CCD
UV	Front Illuminated CCD with UV coating
VP	Front Illuminated Virtual Phase EMCCD, optimized for 600 - 1000 nm
OE	Open Electrode CCD
BV	Back Illuminated CCD / EMCCD, Vis optimized
BVF	Back Illuminated CCD / EMCCD, Vis optimized with fringe suppression
EX2	Back Illuminated EMCCD, dual AR coated
BN	Back Illuminated CCD, uncoated
BU	Back Illuminated CCD, Blue optimized AR coating for Spectroscopy
BU2	Back Illuminated CCD, AR coated for optimized performance in the 250 nm region
UVB	Back Illuminated CCD / EMCCD with UV coating
BEX2-DD	Back Illuminated, Deep Depletion CCD with fringe suppression and dual AR coating
BR-DD	Back Illuminated, Deep Depletion CCD with fringe suppression, optimized for 750 - 1100 nm
TIL	EMCCD Interline
SIL	CCD Interline frame transfer
InGaAs	Indium Gallium Arsenide linear detector array providing performance to 2.2 μm
sCMOS	Scientific Complementary Metal Oxide Semiconductor

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CLARA

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SUPER RESOLUTION

SINGLE MOLECULE DETECTION

BEC / COLD ATOM

NEO

NEUTRON TOMOGRAPHY

EXOPLANET HUNTING

INVIVO IMAGING

iXON3

iKON

HYPERSPECTRAL

Andor manufactures an extensive portfolio of high performance ultra sensitive imaging cameras, each widely considered to be 'best in class'. Andor's Electron Multiplying CCD (EMCCD), scientific CMOS (sCMOS) and CCD imaging detectors are defined not only by superior sensitivity and speed, but also by an outstanding reputation for quality and reliability.

The pioneers of single photon sensitive scientific EMCCD camera technology, Andor have consistently led this field with a solid track record of performance innovation. The recently launched iXon Ultra represents the latest advancements in EMCCD, offering superior speed, low noise sensitivity, application flexibility and user accessibility.

Based on breakthrough sCMOS technology, Andor's Neo and Zyla cameras are uniquely capable of simultaneously offering ultra-low noise, fast frame rates, wide dynamic range, large field of view and high-resolution, and are fast gaining a reputation as the new gold standard 'workhorse' imaging cameras of the 'mid-range' price bracket.

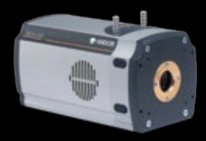
ULTRA SENSITIVE IMAGING CAMERAS

iXon Ultra EMCCD

Neo 5.5 sCMOS

Zyla 5.5 & Zyla 4.2 sCMOS

iKon CCD Series



Clara Interline CCD

iXon Ultra 888 EMCCD

The world's fastest megapixel back-illuminated EMCCD

The iXon Ultra 888 has been fundamentally re-engineered to facilitate 3x overclocking of the pixel readout speed to an unprecedented 30 MHz, whilst maintaining quantitative stability, accelerating the full frame rate performance to video rate. Furthermore, Andor's unique 'Crop Mode' can be employed to further boost frame rates from a user defined sub-region, for example pushing a 512 x 512 sub-array to 93 fps and a 128 x 128 area to 697 fps.

With a 1024 x 1024 sensor format and 13 μm pixel size, the resolving power, field of view and unparalleled speed of the iXon Ultra 888 render it the most attractive and versatile EMCCD option for demanding applications such as single molecule detection, super-resolution microscopy, live cell imaging and high time resolution astronomy.

Additional features of the iXon Ultra 888 include high bandwidth USB 3.0 connectivity, a lower noise CCD mode and an additional Camera Link output, offering a unique ability to directly intercept data for 'on the fly' processing, ideally suited to applications such as adaptive optics. Simultaneously, the iXon Ultra maintains all the advanced performance attributes and rich customer requested feature set that have defined the iXon range to date, such as deep vacuum cooling to -95°C, extremely low spurious noise and EM Gain calibration.

Features
30 MHz readout delivering 26 fps at 1024 x 1024
> 2.6x larger Field of View than '897' model
Optically Centered Crop Mode – Live Cell Super Resolution at 697 fps
Single Photon Sensitive
EX2 Technology for wider QE response
TE Cooling to -95°C

iXon Ultra 897 EMCCD

Ultimate Sensitivity... Supercharged!

Facilitated by a fundamental redesign, the iXon Ultra platform takes the popular back-illuminated 512 x 512 frame transfer sensor and overclocks readout to 17 MHz, pushing speed performance to an outstanding 56 fps (full frame), whilst maintaining quantitative stability throughout.

Ultimate Sensitivity is attained through deep thermoelectric cooling down to -100°C and industry-lowest clock induced charge noise. Additional unique features of the iXon Ultra 897 include USB 2.0 connectivity and direct raw data access for on the fly processing. EMCCD and conventional CCD readout modes provide heightened application flexibility, with a new 'low and slow' noise performance in CCD mode.

The extremely low noise of the iXon Ultra 897 coupled with the new overclocked speed performance will place this model at the forefront of consideration when it comes to upgrading the high end imaging performance of your laboratory.

Features
56 fps @ 17 MHz
Unique ultrafast Optically Centred Crop Mode 569 fps with 128 x 128 ROI
EX2 Technology offers extended QE response
Direct Data Access for 'on the fly' processing
USB 2.0
Fringe Suppression reduces etaloning in NIR
UltraVacTM cooling to -100°C
OptAcquire one-click optimization
Count Convert calibrates in electrons or photons
Lower noise CCD amplifier

Zyla 5.5 and 4.2 sCMOS

Imaging without compromise

Andor's Zyla sCMOS cameras offer high speed, high sensitivity imaging performance in a remarkably light and compact, TE cooled design. Zyla is ideally suited to many cutting-edge applications that push the boundaries of speed, offering sustained frame rate performance of up to 100 fps, faster with ROIs.

A highly cost-effective USB 3.0 version is available offering 40 fps and 1.2 e- rms read noise, representing an ideal low light 'workhorse' upgrade camera solution for both microscopy and physical science applications, in either research or OEM environments.

Rolling and Global (Snapshot) shutter readout inherent to Zyla 5.5 ensures maximum application flexibility. Global shutter in particular provides an important 'freeze frame' exposure mechanism that emulates that of an interline CCD, overcoming the transient readout nature of Rolling shutter mode.

The newest addition to the Andor sCMOS camera portfolio, the Zyla 4.2 utilizes a high Quantum Efficiency (QE), low noise sensor variant, yielding frame rates up to 100 fps (faster from region of interest). A new, industry fastest USB 3.0 version delivers an amazing 53 fps. The Zyla 4.2 is ideal for applications that benefit from optimal sensitivity and speed, such as calcium imaging, light sheet microscopy and super-resolution microscopy.

In addition, LightScan PLUS with FlexiScan and CycleMax is available on Zyla 4.2 designed to maximize signal and confocality in applications such as Scanned Light Sheet Microscopy and Line Scanning Confocal Microscopy.

Zyla 5.5 Features
Compact and light
Engineered for max speed - 100 fps sustained
Rolling and Global shutter modes
Industry fastest USB 3.0 frame rates
Ideal for research and OEM applications

Zyla 4.2 Features	
Engineered for max speed - 100 fps sustained	
> 72% Quantum Efficiency	
Industry fastest USB 3.0 frame rates	
Very low fan vibration	
Ideal for research and OEM applications	
LightScan PLUS mode	NEW

Neo 5.5 sCMOS

Imaging without compromise

In a -40°C vacuum cooled platform, with 1 e- read noise, very low darkcurrent, Rolling and Global Shutter, and loaded with FPGA intelligence, Andor's Neo sCMOS camera is designed to drive optimal performance from this exciting and innovative new technology development.

The Neo 5.5 model is based around a large 5.5 megapixel sensor with 6.5 μm pixels and a 22mm diameter, ideal for applications such as cell microscopy, astronomy, digital pathology and high content screening. The Neo 5.5 can deliver 30 fps sustained or up to 100 fps burst to internal 4GB memory. Extremely low darkcurrent means Neo 5.5 is suited to a range of exposure conditions.

The Rolling and Global shutter flexibility further enhances application flexibility with Global shutter in particular offering an ideal means to simply and efficiently synchronize the Neo with other 'moving' devices such as stages or light switching sources and eliminating the possibility of spatial distortion when imaging fast moving objects.

Features
The ONLY vacuum cooled sCMOS on the market
1 e- read noise
UltraVac™ cooling to -40°C
High dynamic range

iKon CCD Series

Large area, high QE, low noise, -100°C cooled CCD

The iKon slow scan CCDs offer industry-leading low-noise performance, alongside unparalleled thermoelectric cooling to -100°C, enabling better signal-to-noise at longer exposure times than other cameras on the market. The iKon series offers up to 5 MHz readout for rapid frame rate acquisition or fast focusing, along with direct USB 2.0 connectivity to PC.

The iKon-M platform includes a 1 megapixel NIR-enhanced Deep Depletion model, ideal for Bose-Einstein Condensation. The new 'BEX2-DD' deep depletion sensor option provides the most extensive QE coverage available, from UV through to NIR. The iKon-M 'PV Inspector' has been designed specifically for Photovoltaic Inspection.

The iKon-L is a revolutionary 4 megapixel, high-sensitivity CCD platform, delivering outstanding field of view, resolution and dynamic range. The iKon-L is also available with standard deep depletion and new extended 'BEX2-DD' deep depletion sensor options. This platform is used widely across Astronomy and Bio-Imaging OEM applications.

Features
UltraVac™ cooling to -100°C
Up to 2048 x 2048 pixel sensor format
95% peak QE and extremely low noise floor
Multiple digitization rates up to 5MHz
Deep Depletion near-IR version (standard and 'BEX2-DD')
USB 2.0 plug and play connectivity
Windows and Linux compatibility
OEM-friendly design and support

Clara Interline CCD

Pushing interline further

Andor's expertise in scientific camera performance optimization has been harnessed to deliver the highest sensitivity interline CCD on the market. Based around the popular ICX285 sensor from Sony®, the Clara is ideally suited to high-resolution cell microscopy and OEM applications.

Features
UltraVac™ cooling to -55°C
-40°C vibration-free performance
2.4 e- read noise floor
Rapid frame rate
Wide dynamic range
High-resolution
16-bit and 14-bit digitization
USB 2.0 plug and play connectivity

Specifications Overview






	iXon Ultra 888	iXon Ultra 897	iXon3 860	Zyla 4.2 sCMOS	Zyla 5.5 sCMOS	Neo 5.5 sCMOS
Active pixels (H x V)	1024 x 1024	512 x 512	128 x 128	2048 x 2048	2560 x 2160	2560 x 2160
Pixel size (W x H; μm)	13 x 13	16 x 16	24 x 24	6.5 x 6.5	6.5 x 6.5	6.5 x 6.5
Sensor area (mm)	13.3 x 13.3	8.2 x 8.2	3.1 x 3.1	13.3 x 13.3	16.6 x 14.0	16.6 x 14.0
Pixel well depth (e-, typical)	80,000	180,000	160,000	33,000	30,000	30,000
Maximum full frame rate (fps)	26	56	513	100 (sustained)	100 (sustained)	100 (burst)
Read noise (e-, typical)	< 1 to 130 @ 30MHz	< 1 to 98 @ 17MHz	< 1 to 48 @ 10 MHz	0.9 @ 216 MHz	1.2 @ 200 MHz	1 @ 200 MHz
Dark current (e- / pix / sec)	0.0005	0.001	0.002	0.14	0.14	0.015 @ -30°C 0.007 @ -40°C
Vertical clock speeds (μs)	0.6 to 4.33	0.3 to 3.3	0.0875 to 0.45	N/A	N/A	N/A
Minimum sensor temp (°C)	-80	-100	-100	0	0	-40
Digitization	16-bit	16-bit	14 and 16-bit	16-bit (Data Range)	16-bit (Data Range)	16-bit (Data Range)
Pixel readout rates (MHz)	30, 20, 10, 1	17, 10, 5, 1	10, 5, 3, 1	514, 216	560, 200	560, 200
PC interface	USB 3.0	USB 2.0	PCI	Camera Link or USB 3.0	Camera Link or USB 3.0	Camera Link
Sensor QE options	EX2, BV, UVB, BVF	EX2, BV, UVB, BVF	BV, UVB	sCMOS	sCMOS	sCMOS





	Clara	Clara E	iKon-M 934	iKon-M 912	iKon-L 936
Active pixels (H x V)	1392 x 1040	1392 x 1040	1024 x 1024	512 x 512	2048 x 2048
Pixel size (W x H; μm)	6.45 x 6.45	6.45 x 6.45	13 x 13	24 x 24	13.5 x 13.5
Sensor area (mm)	8.98 x 6.71	8.98 x 6.71	13.3 x 13.3	12.3 x 12.3	27.6 x 27.6
Pixel well depth (e-, typical)	18,000	18,000	100,000	300,000	100,000
Maximum full frame rate (fps)	11	11	4.4	8.1	0.95
Read noise (e-, typical)	2.4 @ 1 MHz	3 @ 1 MHz	2.9 @ 50 kHz	3.0 @ 50 kHz	2.9 @ 50 kHz
Dark current (e- / pix / sec)	0.0003	0.0015	0.00012	0.0004 @ -100°C	0.000059
Vertical clock speeds (μs)	6.5	6.5	11.3 to 67.3	11.4 to 45	38 to 76
Minimum sensor temp (°C)	-55	-20	-100	-100	-100
Digitization	14 and 16-bit	14 and 16-bit	16-bit	16-bit	16-bit
Pixel readout rates (MHz)	20, 10, 1	20, 10, 1	2.5, 1, 0.05	2.5, 1, 0.05	5, 3, 1, 0.05
PC interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Sensor QE options	SIL	SIL	BEX2-DD, BU2, BV, FI, BR-DD	BV, FI	BEX2-DD, BU2, BV, FI, BR-DD

Typical Applications Matrix



	iXon Ultra	iXon3 860	Zyla sCMOS
Single Molecule Detection (SMD)	•	•	
Live Cell Multi-Dimensional Microscopy	•		•
Super-Resolution Microscopy	•	•	•
Spinning Disk Confocal Microscopy	•		•
Selective Plane Illumination Microscopy (SPIM)			•
Cell Motility / Ion Signalling	•	•	•
Bioluminescence / Chemiluminescence	•	•	
Total Internal Reflection Fluorescence (TIRF)	•		•
In-Vivo Imaging	•		
Adaptive Optics	•	•	•
Lucky Astronomy	•		•
Photon Counting	•		
Biochip Reading			•
Bose-Einstein Condensation (BEC)	•		•
Neutron Radiography / Tomography	•		•
Fluorescence Microscopy	•	•	•
Comet Assay			
Fluorescence In-Situ Hybridization (FISH)			•
High Throughput / High Content Screening			•
Particle Imaging Velocimetry (PIV)			•
Pressure Sensitive Paints			•
Semiconductor Analysis			•
Spectral / Hyperspectral Imaging	•	•	•
Microfluidics	•	•	•
Genome Sequencing	•		•
Photovoltaic Inspection			•
Ophthalmic Imaging			•
Beam Profiling			•



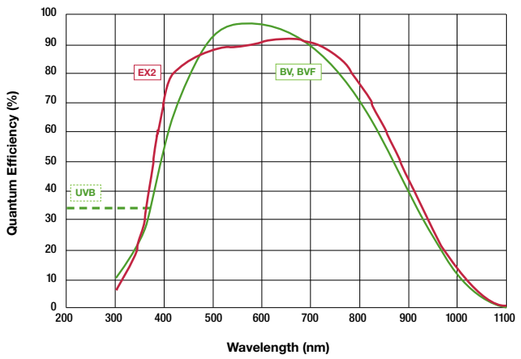

	Neo sCMOS	Clara	iKon-M	iKon-L
Single Molecule Detection (SMD)				
Live Cell Multi-Dimensional Microscopy	•	•		
Super-Resolution Microscopy	•			
Spinning Disk Confocal Microscopy	•			
Selective Plane Illumination Microscopy (SPIM)	•			
Cell Motility / Ion Signalling	•			
Bioluminescence / Chemiluminescence	•		•	•
Total Internal Reflection Fluorescence (TIRF)	•			
In-Vivo Imaging	•	•	•	•
Adaptive Optics	•			
Lucky Astronomy	•			
Photon Counting				
Biochip Reading		•	•	•
Bose-Einstein Condensation (BEC)	•		•	
Neutron Radiography / Tomography	•			•
Fluorescence Microscopy	•	•		
Comet Assay		•		
Fluorescence In-Situ Hybridization (FISH)		•		
High Throughput / High Content Screening		•		•
Particle Imaging Velocimetry (PIV)	•	•		
Pressure Sensitive Paints	•	•		
Semiconductor Analysis			•	
Spectral / Hyperspectral Imaging				
Microfluidics	•			
Genome Sequencing	•			
Photovoltaic Inspection			PV Inspector	
Ophthalmic Imaging		•		
Beam Profiling	•	•		

NOTE: The applications ticked above are those most commonly associated with the device shown.

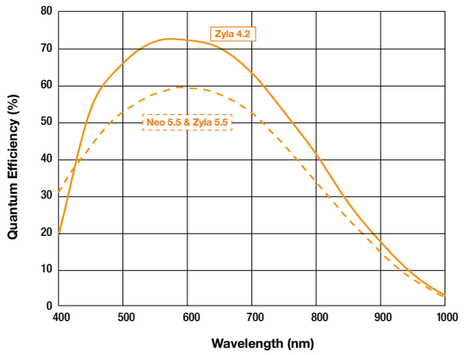
Should you have a particular application that is not listed, please consult with your Andor sales representative who can assist you in selecting the equipment best suited to your needs.

Quantum Efficiency Curves

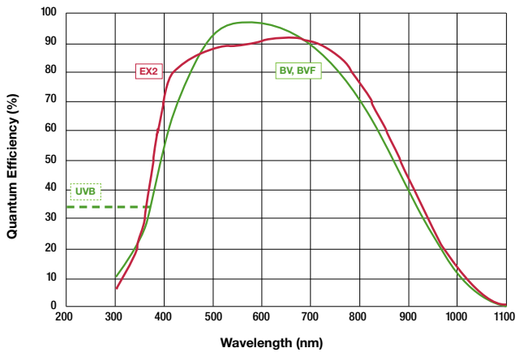
Quantum Efficiency (QE) curves for iXon Ultra



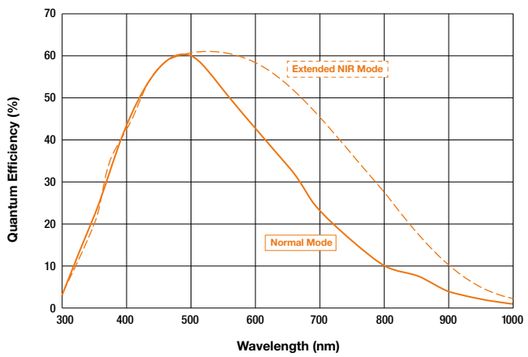
Quantum Efficiency (QE) curves for Neo and Zyla sCMOS



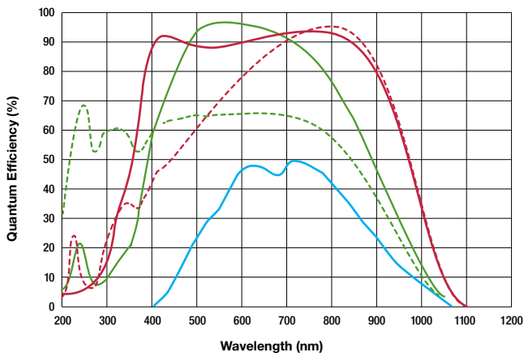
Quantum Efficiency (QE) curves for iXon3



Quantum Efficiency (QE) curves for Clara



Quantum Efficiency (QE) curves for iKon-L and iKon-M



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HIGH ENERGY DETECTION

ULTRA HIGH-POWERED LASERS
ZYLA HF
IKON-HF
HARD X-RAY
MICRO CT
CRYSTALLOGRAPHY
X-RAY FLUORESCENCE
SO SERIES
SY SERIES
LITHOGRAPHY
SOFT X-RAY
EUV SPECTROMETERY
IN VACUUM
SX SERIES
X-RAY DIFFRACTION

S **Direct Detection Cameras**

We have taken our extensive range of high performance camera platforms and optimized them to suit the detection of high energy photons, thus maintaining our lead in this field by continually pushing the boundaries of detection. Our in-depth knowledge base enables us to tailor solutions from standard flanges to 'one off' bespoke solutions, all designed and built with Andor quality and reliability to deliver high camera performance as standard.

In this configuration, the sensor is directly exposed to incoming radiation. This ensures the highest Quantum Efficiency with enhanced spatial and energy resolution compared to indirect detection or X-ray film detection methods.

H **Indirect Detection Cameras**

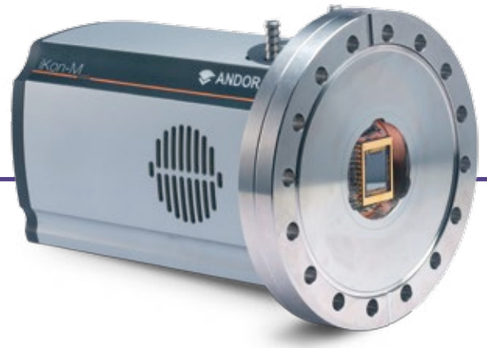
Suitable for High Energy Detection through fibre-optic coupling interface.

SO 'Open Fronted' Systems

SY 'Stand Alone' Systems

HF 'Fiber Fronted' System

S Direct Detection Cameras



O 'Open Front' Systems

For interfacing directly to vacuum chambers

iKon SO Systems

High energy imaging cameras
Andor's iKon-M SO 934 and 4 megapixel iKon-L SO 936 CCD are ideal systems to interface directly to vacuum chambers for X-ray detection. The systems incorporate high-QE back-illuminated sensor options, optimized for direct X-ray detection.

Features	
-100°C TE cooling	Cropped sensor mode for rapid data acquisition
Ultra low noise readout, multi-MHz readout platform	Enhanced baseline clamp
Large area 2048 x 2048 pixel sensor on iKon-L 936	O-ring or knife-edge sealing options
High dynamic range and resolution	Deep Depletion option for enhanced harder X-ray detection
Dual output on iKon-L 936 (high sensitivity or high capacity mode)	Optional filter holder available
	USB 2.0 plug and play connectivity

Newton SO Systems

High energy Spectroscopy cameras
Andor's spectroscopic Newton 920 and 940 CCD cameras are ideal systems to interface VUV spectrographs. The systems incorporate high-QE back-illuminated sensor options, optimized for direct X-ray detection.

Features	
-100°C TE cooling	Enhanced baseline clamp
Ultra low noise readout, multi-MHz readout platform	O-ring or knife-edge sealing options
High dynamic range and resolution	Deep Depletion option for enhanced hard X-ray detection
Dual output on 940 model (high sensitivity or high capacity mode)	Optional filter holder available
Cropped sensor mode for rapid data acquisition	USB 2.0 plug and play connectivity

Y 'Stand Alone' Systems

Incorporate visible photon input window

The 'Stand Alone' cameras windows are designed to block visible light wavelengths and allow through X-rays, while maintain the Ultravac™ permanent vacuum performance.

These industry leading platforms cameras have been designed to maximize soft X-ray detection without compromise on our ground breaking platforms performance. The range has direct USB 2.0 connectivity for ease of use flexibility.

Features
Soft X-ray detection
High spatial resolution
200 μm Beryllium window to block visible and low energy photons
UltraVac™ Technology
Single photon energy resolution
Deep Cooling -100°C
Indirect variants available on request

H Indirect Detection Cameras

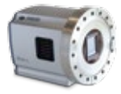
NEW

Suitable for High Energy Detection through fiber-optic coupling scintillator interface

Andor's fiber optic fronted cameras couple to scintillator screen modules for hard X-ray detection. The iKon-L HF allows access to a large field of view, while the new Zyla HF offers the highest resolution, fastest acquisition rate platform.

Features	
High frame rate, high resolution sCMOS options (Zyla sCMOS)	Large area coverage (via magnifying taper)
Single photon sensitivity even with highly demanding tapers (iXon Ultra technology available)	High dynamic range at higher energy levels
Custom relay tapers available on request	Interfaces with imaging relay devices, e.g. streak modules
Range of scintillators / phosphors available	
Detection coverage to beyond the Hard X-ray region	

Specifications Overview

	 iKon-M 934 [SO]	 iKon-L 936 [SO]	 Newton 920 [SO]	 Newton 940 [SO]	 Zyla 5.5 [HF]	 iKon-L [HF]
Active pixels (H x V)	1024 x 1024	2048 x 2048	1024 x 255	2048 x 512	2560 x 2160	2048 x 2048
Pixel size (W x H; μm)	13 x 13	13.5 x 13.5	26 x 26	13.5 x 13.5	6.5 x 6.5	13.5 x 13.5
Sensor area (mm)	13.3 x 13.3	27.6 x 27.6	26.6 x 6.7	27.6 x 6.9	16.6 x 14	27.6 x 27.6
Pixel well depth (e-, typical)	100,000	100,000	500,000	100,000	30,000	100,000
Maximum full frame rate (fps)	4.4	0.95	10	2.5	100	0.95
Read noise (e-, typical*)	2.9 @ 50 kHz	2.9 @ 50 kHz	4 @ 50 kHz	3.5 @ 50 kHz	1.2 @ 200 MHz	4.9 @ 50 kHz
Dark current (e-, typical)	0.00012	0.00059	0.0001	0.0009	0.14	0.09
Vertical clock speeds (μs)	11 to 44	38 to 76	12.9 to 154	14.5 to 58	-	38 to 76
Minimum sensor temperature (°C)	-100	-100	-100	-100	0	-35
Digitization	16-bit	16-bit	16-bit	16-bit	12- and 16-bit	16-bit
Pixel readout rates (MHz)	5, 3, 1, 0.05	5, 3, 1, 0.05	3, 1, 0.05	3, 1, 0.05	560, 200	5, 3, 1, 0.05
PC interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	Camera Link	USB 2.0
Sensor options	BN, BR-DD, FI	BN, BR-DD, FI	BN, BR-DD, FI	BN, FI	FO	FO, FB

* All values based on BN variation of sensor (except Zyla HF)

Typical Applications Matrix

	DIRECT DETECTION S			INDIRECT DETECTION H
	'Open Front' O		'Stand Alone' Y	'Fiber-Optic' F
	iKon-M and L	Newton	SY Series	HF Series
Soft X-ray Imaging	•	•	•	
Hard X-ray Imaging				•
X-ray Diffraction (XRD)	•	•	•	
X-ray Fluorescence (XRF)	•	•		
Plasma Diagnostics	•	•	•	
Lithography EUV [UHV]	•	•	•	
Crystallography				•
X-ray Tomography / Tomography				•
Image Relay Systems (e.g. slit scanners, streak tubes)				•
Laser X Development	•	•	•	

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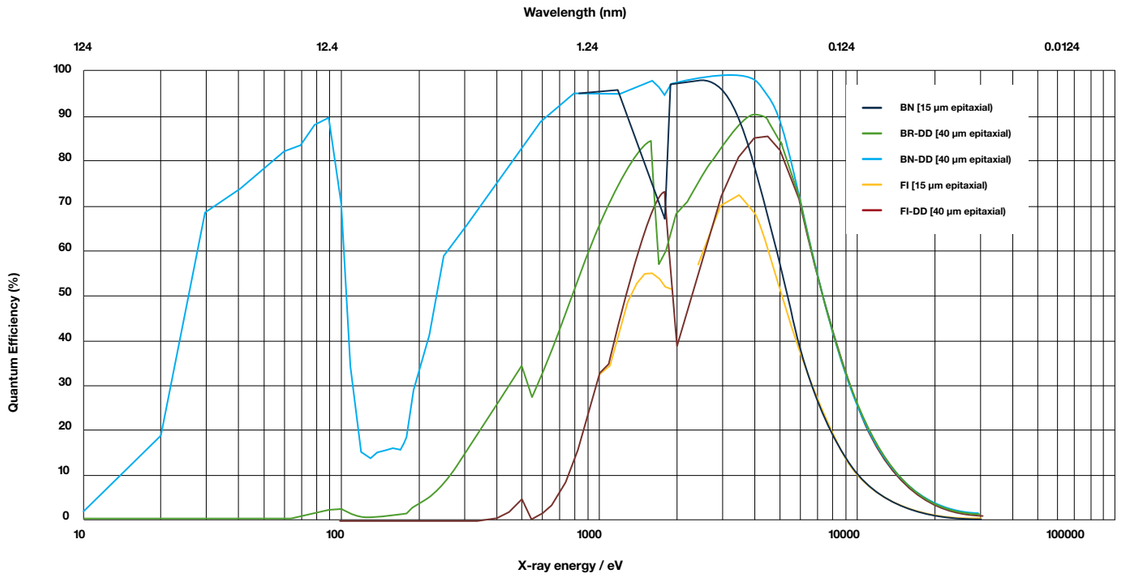
Quantum Efficiency Curves

Quantum Efficiency (QE) curves for direct detection high energy cameras



High Energy Camera Capabilities

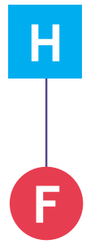
The following diagram can be used as a guide to Andor's broad capabilities in the area of high energy photon detection, demonstrating our ability to adapt our various high-performance camera platforms to meet a broad gamut of specific application and set-up requirements.

Many of the camera types represented are available as standard products but please use Andor's Customer Special Request (CSR) service to discuss other options within this diagram.

S Direct Detection Cameras
H Indirect Detection Cameras

O Open Front Systems
Y Stand Alone Systems
F Fiber Optic Interface

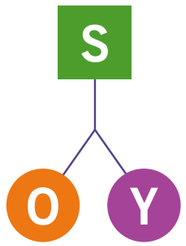
Zyla sCMOS

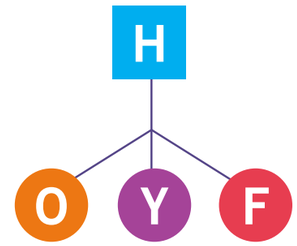


iStar ICCD

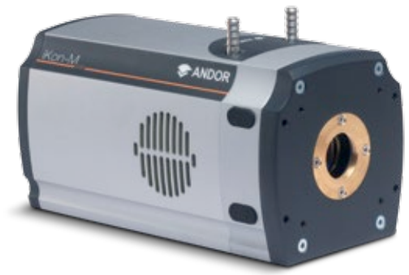
iXon EMCCD

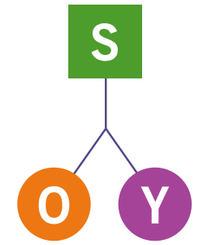
iKon-L CCD

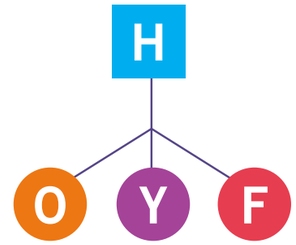




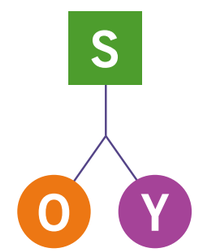
iKon-M CCD

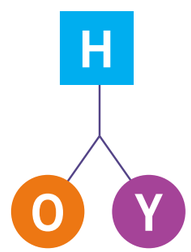




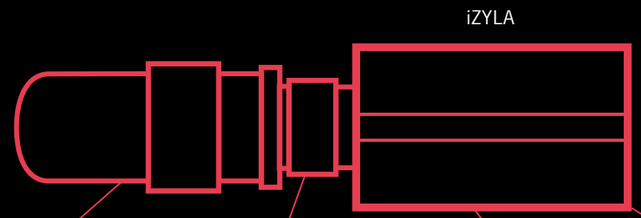


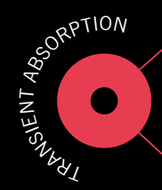
Newton CCD

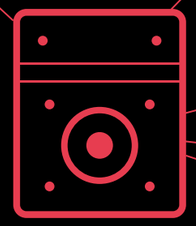




INTENSIFIED CAMERA SERIES







The iStar is Andor's flagship intensified CCD platform for fast-gated, nanosecond, time-resolved imaging and spectroscopy, offering a feature-rich and yet robust tool to the research and industrial communities.

The iStar extracts the very best from CCD sensor and gated image intensifier technologies, achieving a superior combination of rapid acquisition rates, exceptional sensitivity down to a single photon and high timing and shuttering accuracy with a unique software-controlled, ultra-low jitter on-board Digital Delay Generator (DDG™).

The iZyla scientific CMOS-based platform combines nanosecond gating capabilities with ultra-high frame rates to tackle the challenges of fast Plasma Imaging or Combustion studies.

iStar

iZyla

iStar

Industry gold-standard for high-resolution, nanosecond time-resolved Imaging and Spectroscopy.

The iStar stands for speed with a 5 MHz readout platform, and sensitivity with high QE image intensifiers from 120 nm to 1100 nm, low-noise electronics, deep TE cooling to -40°C, 500 kHz photocathode repetition rate and photocathode EBI reduction interface. Superior time-resolution is achieved with Andor's ultra-low jitter, fully integrated, software-controlled Digital Delay Generator, as well as true optical gating < 2 ns. The iStar's USB 2.0 connectivity and comprehensive multi input/output triggers provide unrivalled capabilities for complex experiment control and ultra-precise synchronization.

Combined with Andor Mechelle spectrograph, the iStar 334T provides a unique detection solution for broadband, high-resolution LIBS spectroscopy.

Features
USB 2.0 connectivity
5 MHz readout platform
Crop and Fast Kinetics ultrafast modes
High-resolution sensors
VUV-IR high QE, high-resolution Gen 2 and 3 Image Intensifiers
True optical gating < 2 ns
Low jitter, on-board Digital Delay Generator (DDG)
Insertion delay as low as 19 ns
Intelligate™ for > $1{:}10^8$ On/Off ratios in UV
500 kHz sustained photocathode gating
Thermo-Electric deep cooling to -40°C
Ruggedized design for high shock and vibration sustaining conditions

iZyla

Nanosecond Time-Resolved scientific CMOS.
Fast gating, fast frame rate and modularity.

The iZyla brings together the unique acquisition rates and dual-imaging (PIV mode) features of the scientific CMOS, as well as the nanosecond time-resolved capability of a C-mountbased, lens-coupled, gated image intensifier unit.

- Market leading high speed, high resolution and large field-of-view scientific CMOS
- Nanosecond time resolution with compact, high throughput, high resolution gated image intensifier units
- Maximizing signal-to-noise: high QE Gen2 and Gen3 photocathodes, low read noise floor and high repetition rate photocathode
- Ideal for fast Plasma Imaging, Combustion studies including LIF/ PLIF and Particle Image Velocimetry (PIV)

Features
Rapid frame rates - 100 fps full frame sustained
1.2 e- read noise - Lower detection limit than any CCD or interline-based ICCD
6.5 μm pixels - Extremely high resolution over a 16.6 x 14 mm field of view
High-resolution Gen 2 and 3 Image Intensifiers
Photocathode gating rate up to 30 kHz
Minimum photocathode gating ≤ 3 ns
C-mount coupling - two cameras-in-one - seamless switch between ns time-resolved imaging and non-gated low-light imaging
PIV Mode - as low as 300 ns interframe
Dynamic Baseline Clamp - ensures quantitative stability

iStar Specifications Gen 2 and Gen 3 Image Intensifiers

Gen 2

	18*-03	18*-04	18*-05 †	18*-13	18*-83	18*-E3	25*-03
Useful aperture (mm)	ø 18	ø 18	ø 18	ø 18	ø 18	ø 18	ø 25
Input window	Quartz	Quartz	MgF2	Quartz	Quartz	Quartz	Quartz
Photocathode type	W-AGT	W-AGT	W-AGT	WR	UW	WE-AGT	W-AGT
Peak QE @ room temperature	18	18	15	13.5	25	22	16
Wavelength range	180 - 850 nm	180 - 850 nm	120 - 850 nm	180 - 920 nm	180 - 850 nm	180 - 850 nm	180 - 850 nm
Image intensifier resolution limit	25 μm	30 μm	25 μm	25 μm	25 μm	25 μm	35 μm
Phosphor type [decay time to 10%]	P43 (2 ms)	P46 (200 ns)	P43 (2 ms)	P43 (2 ms)	P43 (2 ms)	P43 (2 ms)	P43 (2 ms)
Minimum optical gate width (ns)							
U (Ultrafast)	< 2	< 2	< 5	-	-	< 2	< 3
F (Fast)	< 5	< 5	< 10	-	-	< 5	< 7
H (High QE)	-	-	-	< 50	< 100	-	-
Relative intensifier gain	> 1,000	> 500	> 1,000	> 850	> 500	> 300	> 1,000
Maximum photocathode repetition rate with Intelligate™ OFF	500 kHz						
Maximum photocathode repetition rate with Intelligate™ ON	5 kHz (continuous)						
Equivalent Background Illuminance (EBI)	<0.2 e/pix/sec			<0.4 e/pix/sec			

Gen 3

	18*-63	18*-73	18*-93	18*-A3	18*-C3
Useful aperture (mm)	ø 18	ø 18	ø 18	ø 18	ø 18
Input window	Glass	Glass	Glass	Glass	MgF2 +F/0 + Lumogen
Photocathode type	HVS	VIH	NIR	EVS	EVS
Peak QE @ room temperature	> 47.5	> 25.5	> 4	> 40	> 40
Wavelength range	280 - 760 nm	280 - 910 nm	380 - 1090 nm	280 - 810 nm	< 200 - 910 nm
Image intensifier resolution limit	30 μm	30 μm	30 μm	30 μm	40 μm
Phosphor type [decay time to 10%]	P43 (2ms)				
Minimum optical gate width (ns)					
U (Ultrafast)	< 2		< 3		< 3
F (Fast)	< 5				
Relative intensifier gain	< 200				
Maximum photocathode repetition rate (with Intelligate™ OFF)	500 kHz				
Maximum photocathode repetition rate (with Intelligate™ ON)	5 kHz (continuous)				
Equivalent Background Illuminance (EBI)	<0.2 e/pix/sec	<0.3 e/pix/sec	<2 e/pix/sec	<0.2 e/pix/sec	<0.3 e /pix/sec

* Substitute with appropriate gate width option, e.g. 18F-03 (please refer to specification sheets for detailed ordering information)

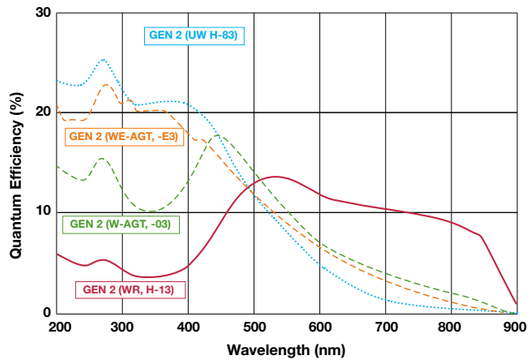
† Available with VUV-compatible spectrograph interface

iStar CCD Specifications Overview

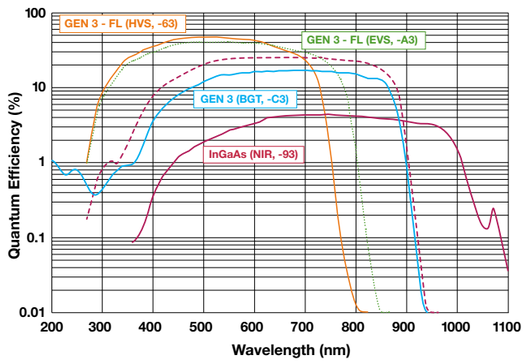
	DH312T	DH320T		DH334T		DH340T	
Interface	USB 2.0	USB 2.0		USB 2.0		USB 2.0	
Pixel matrix	512 x 512	1024 x 255		1024 x 1024		2048 x 512	
Fiber optic taper magnification	ø 18 mm	ø 18 mm	ø 25 mm	ø 18 mm	ø 25 mm	ø 18 mm	ø 25 mm
	1:1	1:1		1:1	1.5:1	1:1	
Effective CCD pixel size (μm)	24 x 24	26 x 26		13 x 13	19.5 x 19.5	13.5 x 13.5	
Effective active area (mm)	12.3 x 12.3	18 x 6.7	25 x 6.7	13.3 x 13.3		18 x 6.9	25 x 6.9
Pixel well depth (e-, typical)	320,000	500,000		100,000		100,000	
Read noise (e-, typical)	5.4 @ 50 kHz	7 @ 50 kHz		5 @ 50 kHz		6 @ 50 kHz	
Acquisition rate							
FVB (spectrum per second)	291	322		145		135	
Crop mode (10 rows, spectrum per sec)	5,556	2,941		3,450		1,825	
Full frame (frame per second)	15.8	15.8		4.2		2.5	
Crop mode (10 rows, frame per sec)	633	320		333		184	
Minimum CCD temperature (°C)	-40	-40	-35	-40	-35	-40	-35

iStar Quantum Efficiency Curves

Photocathode Quantum Efficiency (QE) curves for iStar Gen 2 models



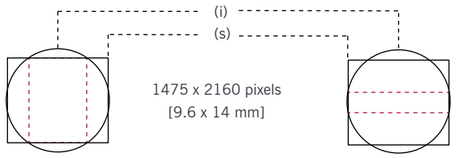
Photocathode Quantum Efficiency (QE) curves for iStar Gen 3 models



iZyla Specifications - Image Intensifier Units

	18F-03	18F-04	18F-63	18F-64	18F-E3	18F-E4
Effective aperture (mm)	ø 17	ø 17	ø 17	ø 17	ø 17	ø 17
Input window	Quartz	Quartz	Glass	Glass	Quartz	Quartz
Accessible active area on Zyla sensor (rectangular, W x H)	1475 x 2160 pixels [9.6 x 14 mm] or 2560 x 535 pixels [16.6 x 3.5 mm] (refer to sensor active area below)					
Photocathode type	W	W	HVS	HVS	WE	WE
Photocathode QE @ room temperature (%)	18	18	> 47.5	> 47.5	22	22
Wavelength range (nm)	180-850	180-850	280-760	280-760	180-850	180-850
Phosphor type [decay time to 10%]	P43 [2 ms]	P46 [200 ns]	P43 [2 ms]	P46 [200 ns]	P43 [2 ms]	P46 [200 ns]
Minimum optical gate width (ns)	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
Intensifier resolution limit (Lp/mm)	> 57	> 57	> 50	> 50	> 57	> 57
Maximum photocathode repetition rate (kHz)	30	30	30	30	30	30

iZyla Sensor Active Area



1475 x 2160 pixels
[9.6 x 14 mm]

2560 x 535 pixels
[16.6 x 3.5 mm]

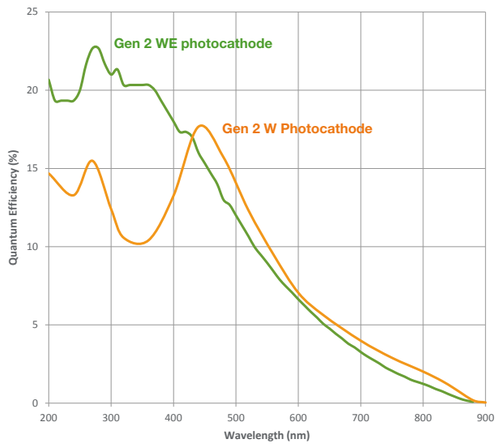
(i) Intensifier effective aperture: Ø 17 mm
(s) Zyla Sensor: 2560 x 2160 pixels

iZyla Specifications Overview

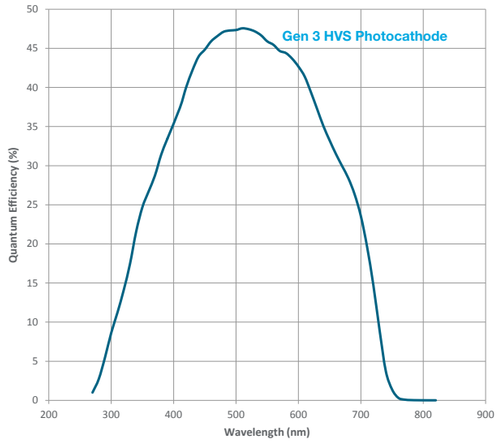
For more information and specifications on the Zyla sCMOS camera and sensor platform, please see page 8.

iZyla Quantum Efficiency Curves

Quantum Efficiency (QE) curves for Gen 2 image intensifiers



Quantum Efficiency (QE) curves for Gen 3 image intensifiers



Typical Applications Matrix

	DH312T (USB 2.0)	DH320T (USB 2.0)	DH334T (USB 2.0)	DH340T (USB 2.0)	iZyla (Camera Link)
Plasma Studies	•	•	•	•	•
Laser Induced Fluorescence (LIF, PLIF)	•		•		•
Time-Resolved Luminescence and Photoluminescence	•	•	•	•	•
Laser Induced Breakdown Spectroscopy (LIBS)		•	•	•	•
Transient Absorption	•	•	•	•	•
Particle Image Velocimetry					•
Laser Flash Photolysis		•		•	
Time-Resolved Resonance Raman Spectroscopy (TR^3)		•		•	

NOTE: The applications ticked above are those most commonly associated with the device shown.

Should you have a particular application that is not listed, please consult with your Andor sales representative who can assist you in selecting the equipment best suited to your needs.

Scientific User's References

Radial-profile and divergence measurements of combustion-generated soot focused by an aerodynamic-lens system Jeffrey M. Headrick et al, Journal of Aerosol Science, volume 58	2014
Nanoparticle detection in aqueous solutions using Raman and Laser Induced Breakdown Spectroscopy Maria Sovago et al, Spectrochimica Acta Part B: Atomic Spectroscopy, volume 87	2014
Sensing combustion intermediates by femtosecond filament excitation He-Long Li et al, Optics Letters, Vol. 38, Issue 8	2014
Sterilization of Staphylococcus Aureus by an Atmospheric Non-Thermal Plasma Jet Liu Xiaohu et al, Plasma Science and Technology, volume 15, issue 5	2013
Towards a two-dimensional laser induced breakdown spectroscopy mapping of liquefied petroleum gas and electrolytic oxy-hydrogen flames Seok Hwan Lee et al, Spectrochimica Acta Part B: Atomic Spectroscopy, volume 88	2013
Laser induced breakdown spectroscopy of human liver samples with Wilson's disease Zuzana Grolmusová et al, The European Physical Journal Applied Physics, Volume 63, Issue 2	2013
A Shack–Hartmann laser wavefront sensor for measuring electron density in low-current arc Yuki Inada et al, Electrical Engineering in Japan, volume 181 issue 4	2012
An investigation of Laser Induced Breakdown Spectroscopy for use as a control in the laser removal of rock from fossils found at the Malapa hominin site, South Africa D.E. Roberts et al, Spectrochimica Acta Part B: Atomic Spectroscopy, volume 73	2012
Detection of Toxic metals (Lead and Chromium) in the Talcum Powder using Laser Induced Breakdown Spectroscopy Mohammed Gondal et al, Applied Optics, volume 51, issue 30	2012
Real-Time Imaging of Quantum Entanglement Robert Fickler et al, Scientific Reports, Volume 3	2013
Measuring interactions and conformational changes of DNA molecules using electrochemiluminescence resonance energy transfer in the conjugates Mingyue Li et al, Electrochimica Acta, volume 80	2012
Spectroscopic detection of carbon particulates from a high speed jet stream with extended plasma visualization Seok Hwan Lee et al, Spectrochimica Acta Part B: Atomic Spectroscopy, volume 74-75	2012
CO concentration and temperature measurements in a shock tube for Martian mixtures by coupling OES and TDLAS X. Lin et al, Applied Physics B, November 2012	2012
Remote sensing of seawater and drifting ice in Svalbard fjords by compact Raman LIDAR Alexey Bunkin et al, Applied Optics, volume 51, issue 22	2012
Scanning lidar fluorosensor for remote diagnostic of surfaces Luisa Caneve et al, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment	2012

SPECTROSCOPY SOLUTIONS

LASER INDUCED BREAKDOWN SPECTROSCOPY

PLASMA STUDIES

MECHELLE

HYPERSPECTRAL

SHAMROCK

FAST MULTI TRACK SPECTROSCOPY

HOLOSPEC

iDUS

RAMAN SPECTROSCOPY

ABSORPTION · TRANSMISSION · REFLECTION

LUMINESCENCE · FLUORESCENCE · PHOTOLUMINESCENCE

ATOMIC EMISSION SPECTROSCOPY

NEWTON CCD

iDUS InGaAS

NEWTON EMCCD

Our experience has enabled us to bring together the latest cutting-edge technology in the fields of sensors, electronics, optics, vacuum technology and software to deliver world-class, market-leading scientific Spectroscopy detection systems.

Andor's experience in manufacturing high-performance Spectroscopy systems spans over 20 years, with thousands of detectors in the field and a proud history of remarkable advances in a wide variety of research areas, truly helping scientists all over the world to "Discover new ways of seeing".

Spectroscopy Solutions Cameras

Newton and Newton^{EM}

iDus

iDus InGaAs

iVac

Newton and Newton^{EM}

Ground-breaking technology
for Spectroscopy

Andor's Newton cameras are ideally suited to high performance spectroscopic applications. They feature high-resolution spectroscopy sensors with up to 95% QE, USB 2.0 connectivity, multi-MHz low-noise electronics, TE cooling and UltraVac™. Also available with Electron Multiplying CCD (EMCCD) technology for unsurpassed sensitivity.

Features

- Peak QE of 95%
- Multi-megahertz Readout
- Minimum operating temp of -100°C with TE cooling
- UltraVac™ guaranteed hermetic vacuum seal technology
- High-resolution sensor matrix - 13.5 and 16 μm pixel options
- EM sensor (970 and 971 models) for detection down to single photon level
- Crop Mode operation for ultra-fast spectral acquisition
- Dual output amplifiers (940 models) providing 'High Sensitivity' or 'High Capacity' modes
- Front and Back-Illuminated sensors including Deep-Depletion option for enhanced NIR detection (920 model only)
- Dual-AR technology - broadband UV-NIR, virtually etalon-free spectroscopy (920 model only)
- 16-bit digitization
- USB 2.0 plug and play connectivity
- Anti-fringing back-illuminated, back-thinned options (970 and 920 models only)

iDus

Workhorse platform
for Spectroscopy

Andor's Scientific grade iDus CCD cameras are ideally suited to rapid analysis, multi-channel and low-light applications including Fluorescence and Raman Spectroscopy. They provide thermoelectric cooling to -100°C with plug and play USB connectivity and sensitivity from UV to NIR.

Features

- Peak QE of 95%
- Minimum operating temp of -100°C with TE cooling
- UltraVac™ guaranteed hermetic vacuum seal technology
- 16-bit digitization
- Fringe Suppression Technology™ (401 & 420 BVF, BR-DD and BEX2-DD models)
- Range of Front or Back-Illuminated, Open-Electrode or Deep-Depletion sensors
- Low dark current, deep depletion, high resolution 15 μm pixel array, 30 mm wide sensor (416 model only)
- Dual-AR technology - broadband UV-NIR, virtually etalon-free spectroscopy (420 model only)
- USB 2.0 plug and play connectivity
- Software selectable pre-amplifier gain
- Anti-fringing back-illuminated, back-thinned options

iDus InGaAs

InGaAs detector array
for Spectroscopy

Andor's iDus InGaAs detector array systems feature USB 2.0 connectivity, low noise and high QE in the NIR wavelength region, with a detection limit of 1.7 or 2.2 μm. The TE-cooled, in-vacuum sensors reach cooling temperatures of -90°C, where best Signal-to-Noise ratio can be achieved.

Features

- Peak QE > 85% (1.7 μm version) and > 70% (2.2 μm version)
- Minimum operating temp of -90°C with TE cooling
- UltraVac™ guaranteed hermetic vacuum seal technology
- 16-bit digitization
- Software selectable output amplifiers
- USB 2.0 plug and play connectivity
- Exposure times as low as 1.4 μs
- Lowest propagation delay of 2.95 μs

iVac

Compact, research-grade
OEM Spectroscopy platform

Andor's iVac combines NIR enhanced front and back-illuminated sensors, high resolution sensor matrix, Andor's reknowned UltraVac™, TE cooling interface, and USB 2.0 connectivity to ensure high performance and reliability over time.

Features

- NIR infrared front-illuminated and back-illuminated deep-depletion sensor
- NII peak QE of up to 60% (front-illuminated) and 95% (back-illuminated)
- UltraVac™ guaranteed hermetic vacuum seal technology
- High resolution 16 and 15 μm pixels (iVac 324 and 316 models respectively)
- -60°C air cooled performance
- Ruggedized shake-proof connectors
- 16-bit digitization
- USB 2.0 plug and play connectivity

Typical Applications Matrix





		Newton CCD	Newton EMCCD	iDus	iDus InGaAs	iVac
Absorption / Transmittance / Reflection	UV-VIS	•	•	•		
	VIS-NIR	•		•		•
	SWIR				•	
Raman Spectroscopy (including SERS, TERS, CARS, SORS, stimulated)	244 – 488 nm	•	•	•		
	514 – 633 nm	•	•	•		•
	785, 830 nm	•		•		•
	1064 nm				•	
Luminescence / Fluorescence / Photoluminescence	UV-VIS	•	•	•		
	VIS-NIR	•	•	•		•
	SWIR				•	
Atomic Emission Spectroscopy		•	•	•		
Plasmonics		•	•	•		

NOTE The applications ticked above are those most commonly associated with the device shown. Should you have a particular application that is not listed, please consult with your Andor sales representative who can assist you in selecting the equipment best suited to your needs.

Specifications Overview





	Newton CCD DU920P	Newton CCD DU920P-Bx-DD	Newton CCD DU940	Newton EMCCD DU970P	Newton EMCCD DU971P
Active pixels	1024 x 255	1024 x 256	2048 x 512	1600 x 200	1600 x 400
Pixel size (W x H; µm)	26 x 26	26 x 26	13.5 x 13.5	16 x 16	16 x 16
Sensor area (mm)	26.7 x 6.7	26.7 x 6.7	27.6 x 6.9	25.6 x 3.2	25.6 x 6.4
Register well depth (e-, typical)					
Standard mode	1,000,000	1,000,000	-	-	-
High sensitivity mode	-	-	150,000	400,000	400,000
High capacity mode	-	-	600,000	-	-
Electron multiplying Mode	-	-	-	800,000	800,000
Maximum spectra per sec (Hz)					
FVB	273	272	122	649	396
Crop mode (20 rows)	1612	1587	943	1515	1515
Maximum full frames per sec	10.1	9.8	2.2	8.7	4.4
Read noise (e-, typical)					
Standard mode @ 50 kHz	4.0	4.0	-	-	-
Standard mode @ 3 MHz	18.0	18.0	-	-	-
High sensitivity mode @ 50 kHz	-	-	2.5	-	-
High sensitivity mode @ 3 MHz	-	-	11	8.5	8.5
Electron multiplying mode @ 3 MHz	-	-	-	< 1	< 1
EM gain (typical highest)	-	-	-	x1000	x1000
Minimum sensor temperature (°C)	-100	-100	-100	-100	-100
Dark current (e- /pix/s typical)					
BU, BU2, BV, UVB	0.0003	-	0.0002	0.0002	0.0002
FI, OE, UV	0.0003	-	0.0001	0.00007	0.00007
BVF	0.0002	-	-	0.0001	-
Bx-DD	-	0.003	-	-	-
PC interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Sensor options	BU, BU2, BV, BVF, OE	BR-DD, BEX2-DD	BU, BU2, BV, FI, UV	BV, BVF, FI, UV, UVB	BV, FI, UV, UVB

Specifications Overview







	iDus CCD DV / DU401A	iDus CCD DU401A-BR-DD	iDus CCD DV / DU420A	iDus CCD DU420A-Bx-DD	iDus CCD DU / DV416A	iVac 324	iVac 316
Active pixels	1024 x 127	1024 x 128	1024 x 255	1024 x 256	2000 x 256	1650 x 200	2000 x 256
Pixel size (W x H; µm)	26 x 26	26 x 26	26 x 26	26 x 26	15 x 15	16 x 16	15 x 15
Sensor area (mm)	26.6 x 3.3	26.6 x 3.3	26.6 x 6.7	26.6 x 6.7	30 x 3.8	26.4 x 3.2	30 x 3.8
Register well depth (e-, typical)	1,000,000	1,000,000	1,000,000	1,000,000	300,000	500,000	300,000
Maximum spectra per sec (FVB)	81	81	75	75	30	269	88
Read noise (e-, typical)	3 @ 33 kHz	5 @ 33 kHz	4 @ 33 kHz	4 @ 33 kHz	4 @ 33 kHz	5.8 @ 35 kHz	3.5 @ 35 kHz
Minimum sensor temperature (°C)	-70 / -100	-100	-70 / -100	-100	-70 / -95	-60	-60
Dark current (e- /pix/s typical)							
FI	0.0035 / 0.0005	-	-	-	-	0.0028	
OE	-	-	0.0014 / 0.0004	-	-	-	
Bx-DD	-	0.013	-	0.008	-	-	
BU, BU2, BV	-	-	0.03 / 0.002	-	-	-	
BVF	0.006 / 0.003	-	0.03 / 0.002	-	-	-	
LDC-DD	-	-	-	-	0.0006 / 0.025	-	0.1
PC interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Sensor options	BVF, FI	BR-DD	BU, BU2, BV, BVF, OE	BR-DD, BEX2-DD	LDC-DD	FI (red-enhanced)	LDC-DD

Specifications Overview

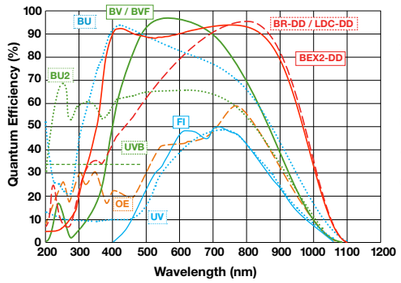




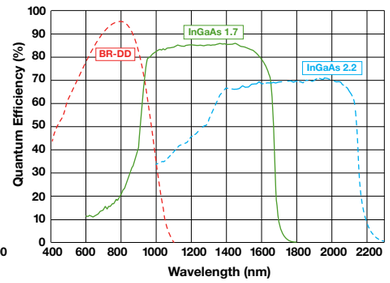

	iDus InGaAs DU490A - 1.7	iDus InGaAs DU490A - 2.2	iDus InGaAs DU491A - 1.7	iDus InGaAs DU491A - 2.2	iDus InGaAs DU492A - 1.7	iDus InGaAs DU492A - 2.2
Active pixels	512	512	1024	1024	512	512
Pixel size (W x H; µm)	25 x 500	25 x 250	25 x 500	25 x 250	50 x 500	50 x 250
Read noise (e-, typical)						
High dynamic range mode	8150	8150	8150	8150	8150	8150
High sensitivity mode	580	580	580	580	580	580
Maximum spectra per sec (FVB)	193	193	97	97	193	193
Pixel readout rate in kHz (µs)	100 (10)	100 (10)	100 (10)	100 (10)	100 (10)	100 (10)
Minimum sensor temperature (°C)	-90	-90	-90	-90	-90	-90
Dark current (ke- /pix/s typical)	10.1	5000	10.1	5000	18.9	12200
PC interface	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0	USB 2.0
Sensor options	1.7 µm	2.2 µm	1.7 µm	2.2 µm	1.7 µm	2.2 µm

Quantum Efficiency Curves

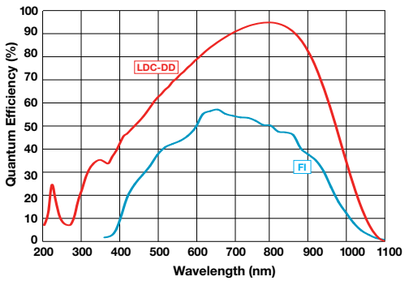
Quantum Efficiency (QE) curves for Newton and iDus



Quantum Efficiency (QE) curves for iDus InGaAs



Quantum Efficiency (QE) curve for iVac



ANDOR TECHNICAL KNOW-HOW EXTENDS FAR BEYOND MARKET-LEADING PERFORMANCE DETECTORS WITH A COMPREHENSIVE RANGE OF HIGH-END SPECTROGRAPHS.

AT THE HEART OF THIS PORTFOLIO IS THE SHAMROCK FAMILY, WHICH OFFERS ULTIMATE FLEXIBILITY AND PERFORMANCE WITH ITS "OUT-OF-THE-BOX", PRE-ALIGNED AND PRE-CALIBRATED APPROACH AND SEAMLESS COMBINATION WITH ANDOR'S HIGHLY SENSITIVE SPECTROSCOPY CAMERAS. THE MECHELLE 5000 IS ANDOR'S DEDICATED DETECTION SOLUTION FOR BROADBAND AND HIGH RESOLUTION LIBS, WHILE THE HOLOSPEC OFFERS A HIGH THROUGHPUT PLATFORM WITH HIGH-DENSITY MULTI-TRACK CAPABILITIES.

These instruments can be seamlessly integrated with Andor's world-class range of CCDs, Electron-Multiplying CCDs, Intensified CCDs, InGaAs cameras and single point detectors to offer both versatility and by far the most sensitive modular solutions on the market. Andor Solis software offers the most user-friendly and state-of-the-art, real-time control of detectors, spectrograph and motorized accessories at the touch of a button.

Spectroscopy Solutions Spectrographs

Shamrock 163

NEW

Shamrock 193i

Shamrock 303i

Shamrock 500i

Shamrock 750

HoloSpec

Mechelle 5000

NEW

Shamrock 193i

Intelligent, modular and compact imaging spectrograph

Andor's compact imaging spectrograph boasts Active Focus technology, fully motorized, RFID-tagged dual grating turret, dual detector output ports and seamless interfacing to microscopes for modular micro-spectroscopy setups integration.

Features

- Adaptive Focus (patent pending)
- Dual-grating turret with RFID technology
- Astigmatism-corrected optical design
- Dual detector outputs
- USB interface
- Silver-protected coated optics options
- Pre-aligned, pre-calibrated instrument
- Seamless connection to microscopes
- Compact and rugged design
- μManager software integration
- High repetition rate shutter
- Monochromator capabilities

Shamrock 303i, 500i and 750

High-resolution, research-grade spectrograph series

The longer focal length Shamrock series is designed for working with demanding low-light applications, but equally suited to day-to-day routine measurements. It offers highly versatile platforms with multiple input/outputs, large range of field-replaceable and motorised accessories configurable at the touch of a button.

Features

- Pre-aligned, pre-calibrated spectrograph systems
- Image astigmatism correction with toroidal optics (303i and 500i)
- All-in-one interactive and dedicated Solis software
- USB 2.0 interface
- Single Point Detectors for scanning applications up to 15 μm (Shamrock 500i & 750)
- Triple exchangeable grating turret
- Double detector outputs
- Wide range of accessories inc. shutters, filter wheel, fibre optics and microscope coupling interfaces
- Gold and Silver optics coating options for NIR detection

Shamrock 163

Versatile compact benchtop spectrograph

The Shamrock 163 is the most compact research-grade Czerny-Turner spectrograph on the market. Its 163 mm focal length, high F/3.6 aperture and wide range of seamlessly interchangeable gratings, slits and light coupling accessories make it the ideal tool for general benchtop spectroscopy measurements.

Features

- Compact and rugged design with horizontal and vertical mounting positions
- Imaging configurable platform
- Wide range of interchangeable gratings for optimization of wavelength range and resolution
- Variety of fixed slits for optimization of resolution
- Large choice of light coupling interfaces
- Calibrated micrometer drive for wavelength tuning

HoloSpec

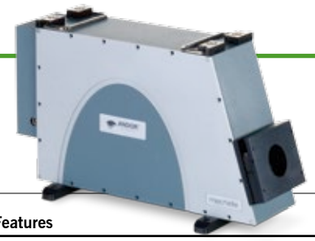
On-axis high throughput imaging spectrograph

High throughput spectrograph with superb high-density multi-track spectroscopy capabilities. Robust and compact design based on low stray-light transmission virtual phase holographic (VPH) grating.

Features

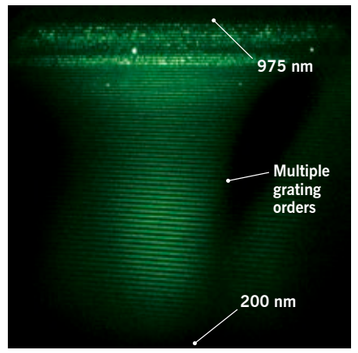
- High collection efficiency ultrafast F/1.8 aperture
- On-axis imaging-corrected design
- High throughput optical design
- Low scattered light
- Compact and rugged design
- Easily interchangeable accessories
- Specialized Raman grating options
- Optional integrated Rayleigh filtering unit

Mechelle 5000



High bandpass Echelle spectrograph for LIBS

Andor's Mechelle spectrograph provides simultaneous recording of a wide wavelength range (200 - 975 nm) with high spectral resolution in one acquisition. Based on the echelle grating principal, its patented optical design provides extremely low crosstalk. It is designed to operate with both Andor's DU934 iKon camera and the DH334T iStar intensified camera in applications such as LIBS and plasma studies.



Echellogram of Deuterium-Tungsten light source acquired with Mechelle 5000 and Andor iStar ICCD

Features

- 200 - 975 nm bandpass
- Resolution power of up to 6,000 for entire bandpass
- Compact and robust design with no moving components
- Patented optical design
- Auto-temperature correction
- N_2 purged
- Pre-aligned detector / spectrograph solution
- Peak labelling with NIST table

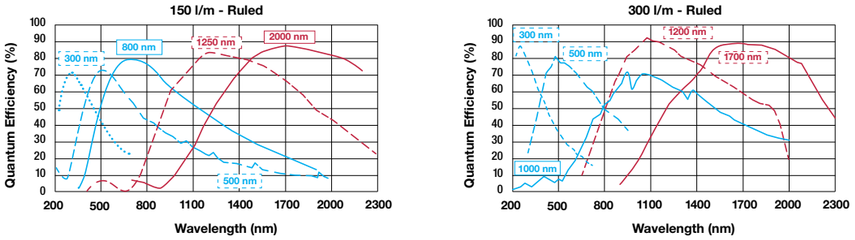
Typical Applications Matrix

	Shamrock 163	Shamrock 193i	Shamrock 303i, 500i and 750	HoloSpec	Mechelle 5000
Absorption-Transmission-Reflection	•	•	•	•	
Raman (Stimulated, Resonance, CARS, SERS, SORS, TERS)	•	•	•	•	
Luminescence / Fluorescence / Photoluminescence	•	•	•	•	
Micro-Fluorescence and Micro-Raman	•	•	•	•	
Single Molecule Spectroscopy	•	•	•	•	
Multi-track Spectroscopy	•*	•	•*	•	
Laser Induced Breakdown Spectroscopy (LIBS)	•	•	•	•	•
Plasma Studies	•	•	•	•	•

NOTE The applications ticked above are those most commonly associated with the device shown. Should you have a particular application that is not listed, please consult with your Andor sales representative who can assist you in selecting the equipment best suited to your needs.

* With lens-based correction accessories for Shamrock 163 and 750

Shamrock Spectrograph Grating Efficiency Curves *



* Please note other gratings are available on request.

Specifications Overview

	Shamrock 163	Shamrock 193i	Shamrock 303i	Shamrock 500i	Shamrock 750
Focal length (mm)	163	193	303	500	750
Aperture	F/3.6	F/3.6	F/4	F/6.5	F/9.8
Focal plane size (mm, W x H)	28 x 10	30 x 16	30 x 14	30 x 14	30 x 14
Multi-track capabilities	Yes*[1]	Yes	Yes	Yes	Yes*[1]
Resolution (nm) *[2]					
1200 l/mm @ 500 nm	0.25	0.21	0.10	0.07	0.04
Slit sizes					
Fixed	10 μm - 200 μm	10 μm - 2.5 mm	-	-	-
Manual	10 μm - 2.5 mm	10 μm - 2.5 mm	-	10 μm - 2.5 mm	10 μm - 2.5 mm
Motorized (wide aperture option)	-	10 μm - 2.5 mm (16 mm manual)	10 μm - 2.5 mm (12 mm manual)	10 μm - 2.5 mm (16 mm manual)	10 μm - 2.5 mm (16 mm manual)
Grating turret	Single grating (interchangeable)	Dual grating (interchangeable)	Triple grating (interchangeable)	Triple grating (interchangeable)	Triple grating (interchangeable)
Communication	Manual	USB 2.0	USB 2.0	USB 2.0	USB 2.0

	Mechelle 5000
Focal length (mm)	195
Aperture	F/7
Wavelength range (nm)	200 - 975
Spectral Resolution (λ/Δλ)	6,000
Wavelength accuracy (nm)	< ± 0.05
Adjacent order crosstalk	< 1 X 10^{-2}
Stray light	< 1.5 X 10^{-4}
Slit size (μm)	10 x 50 to 200 x 50

	HoloSpec F/1.8(i) VIS	HoloSpec F/1.8(i) NIR
Focal length (out/in) (mm)	85/75	85/75
Wavelength range (nm)	450-730	800-1060
Aperture	F/1.8	F/1.4 @ edges F/1.8 @ center
Resolution (nm)*[6]	0.07*[8] 0.17*[9]	0.1*[10] 0.3*[11]
Bandpass (nm)*[7]	32*[8] 83*[9]	4.7*[10] 161*[11]
Slit sizes	25 μm - 4 mm interchangable	
Shutter rate max. (Hz)	2 Hz	
Communication	Manual	

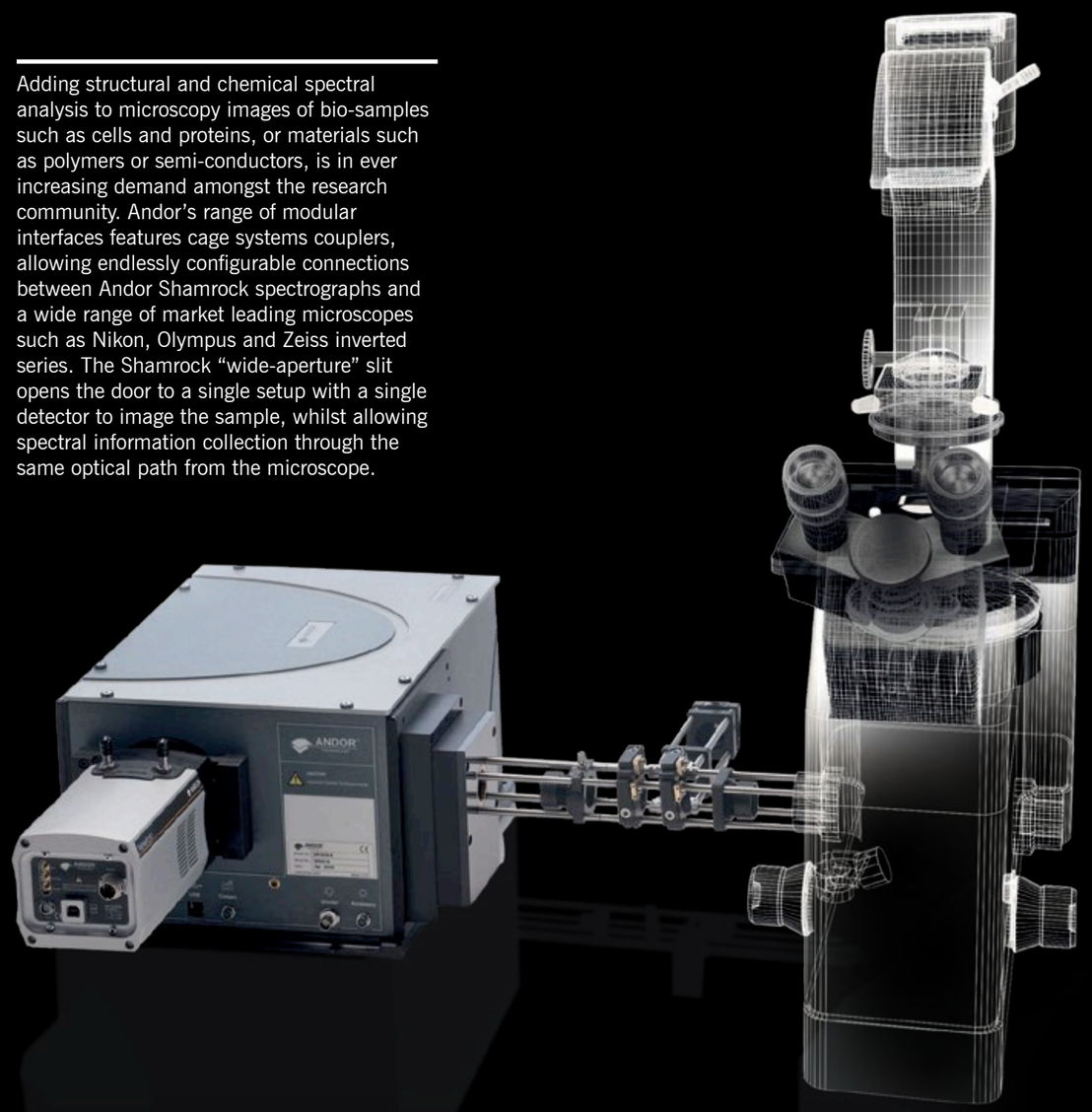
Specifications Overview

Grating (l/mm)	150	300	600	1200	1800 (Holo)	2400 (Holo)
Shamrock 163						
Bandpass (nm) *3,*4	1072	529	256	117	68	56*[5]
Resolution (nm) *2,*4	2.33	1.15	0.55	0.25	0.15	0.12*[5]
Shamrock 193i						
Bandpass (nm) *3,*4	902	445	215	98	56	46
Resolution (nm) *2,*4	1.96	0.96	0.47	0.21	0.12	0.1
Shamrock 303i						
Bandpass (nm) *3,*4	600	297	144	67	39	32*[5]
Resolution (nm) *2,*4	0.88	0.43	0.21	0.10	0.06	0.05*[5]
Shamrock 500i						
Bandpass (nm) *3,*4	364	183	92	46	29	23*[5]
Resolution (nm) *2,*4	0.53	0.27	0.13	0.07	0.04	0.03*[5]
Shamrock 750						
Bandpass (nm) *3,*4	245	123	61	30	19	14*[5]
Resolution (nm) *2,*4	0.36	0.18	0.09	0.04	0.03	0.02*[5]

*1 With optional correction lens accessory
*2 Typical values quoted with 10 μm slit and 13.5 μm pixel CCD, e.g. Newton DU940. Useful signal is assumed to be imaged on the entire height of the 6.9 mm sensor and fully vertically binned.
*3 Typical values quoted with 27.6 mm wide CCD, e.g. Newton DU940.
*4 Typical values quoted @ 500 nm centre wavelength
*5 Typical values quoted @ 300 nm centre wavelength
*6 With 50 μm input slit and 13.5μm pixel CCD e.g. Newton DU940
*7 With 27.6 mm wide CCD e.g. Newton DU940
*8 With high dispersion "532 nm Stokes / Anti-Stokes" grating
*9 With "532 nm low frequency" grating
*10 With high dispersion "785 nm Stokes / Anti-Stokes" grating
*11 With "785 nm low frequency" grating

MODULAR APPROACH TO COMBINED MICROSCOPY AND SPECTROSCOPY

Adding structural and chemical spectral analysis to microscopy images of bio-samples such as cells and proteins, or materials such as polymers or semi-conductors, is in ever increasing demand amongst the research community. Andor's range of modular interfaces features cage systems couplers, allowing endlessly configurable connections between Andor Shamrock spectrographs and a wide range of market leading microscopes such as Nikon, Olympus and Zeiss inverted series. The Shamrock "wide-aperture" slit opens the door to a single setup with a single detector to image the sample, whilst allowing spectral information collection through the same optical path from the microscope.



Features

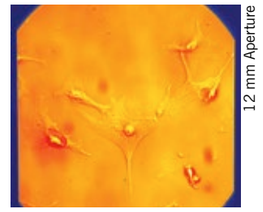
C-mount interfaces
Shamrock spectrograph integration to market leading upright and inverted microscopes

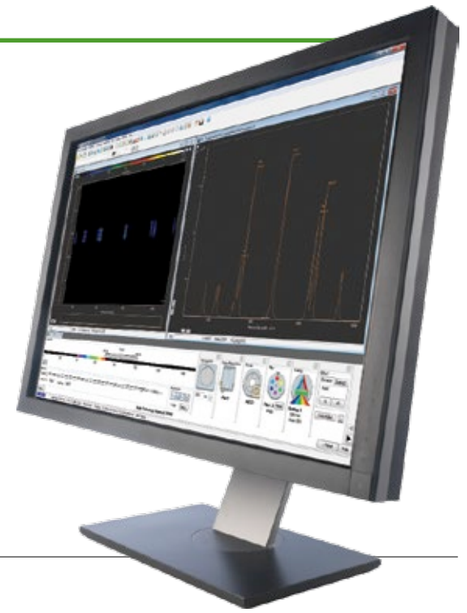
Microscope feet
Precisely match Shamrock spectrograph optical height for accurate opto-mechanical coupling

Wide aperture slit
Allows high-quality sample image relay through Shamrock imaging spectrographs, and collection of spectral information through the same optical channel

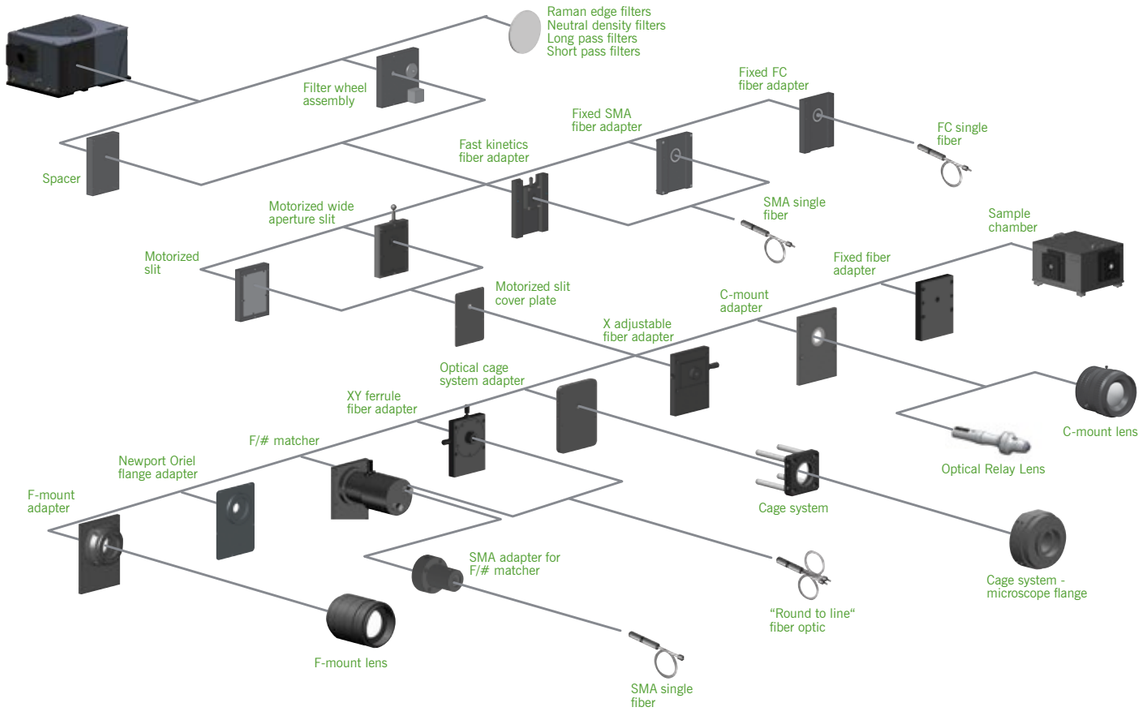
'Cage System' Compatibility
Thorlabs or Linos 'cage systems' compatible interfaces

EMCCD compatible
Andor Newton^{EM} and iXon Ultra enable a unique combination of single photon sensitivity and high spectral rate and frame rate for challenging low-light Spectroscopy





Accessory Tree
Shamrock 193i, 303i, 500i, 750



Scanning Monochromator Accessories

This addition to the Andor Spectroscopy portfolio provides a perfect complement to Andor's extensive range of market leading CCD, InGaAs ICCD and EMCCD detectors.

Shamrock spectrograph dual detector output configurations allow a combination of multiple detectors for acquisition from 180 nm to 12 μm in one single setup. Solis scanning software is a dedicated single interface for seamless setup and synchronization of single point detectors, spectrographs, monochromators data acquisition unit and lock-in amplifiers, with an intuitive interface for complex experiment acquisition sequences.

Features

- Extended detection to LWIR region - up to 12 μm sensitivity
- Plug-and-play controllers
- User-friendly detection configuration - in-field upgradability with Shamrock spectrograph series
- Comprehensive software experiment builder - pre-acquisition programming of complex wavelength scanning sequences including synchronization of gratings and filters, shutters and up to two detectors and monochromators
- Dedicated software for scanning monochromator application
- Three main software acquisition modes - scanning, photon counting and time-resolved / lifetime analysis
- Software-controlled lock-in amplifier and chopper options
- Monochromator IR optics coatings - optional silver-protected coated mirrors and gratings for maximum efficiency in the near-infrared and infrared region
- Standard gold-plated focusing optics for MCT and InSb

Specifications Summary

Detector Type	Wavelength Coverage	Active Area (mm)	Cooling
MCT*	2 - 12 nm	1 x 1	LN_2
InSb *	1 - 5.5 nm	Ø 2	LN_2
PbS	0.8 - 2.9 nm	4 x 5	Uncooled
InGaAs	0.8 - 1.9 nm	Ø 3	-40°C TE
Si	0.2 - 1.1 nm	Ø 11.28	Uncooled
PMT (R928)	185 - 900 nm	8 x 24	Uncooled
PMT (R1527P)	185 - 680 nm	8 x 24	Uncooled

Function	Features
HV power supply for PMT	Software-controlled, 0 to 1.5 kV
Photon counting unit for PMT	Software-selectable discrimination thresholds
Data acquisition unit	USB 2.0 interface, 2x SPD acquisition channels, 2x analog outputs for PMT HV power supply control and connections to lock-in amplifiers**

* Including gold coated focusing mirror for maximum collection efficiency

** Recommended models include SRS SR830 with associated SR540 chopper

Scientific User's References

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MICROSCOPY SOLUTIONS

Our microscopy systems business is focused on providing best-in-class performance within a modular architecture. We design and manufacture Andor products to integrate with our own and third-party software, and in combination with high quality products from other manufacturers.

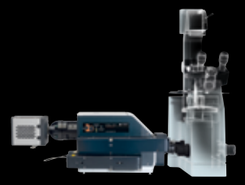
Solutions include laser-based spinning disk confocal microscopy for live cell imaging, a simple laser-free confocal solution and devices for photo-bleaching, activation, conversion and ablation. We also support techniques such as TIRF, calcium ratio imaging, FRET, anisotropy and bioluminescence.

A dedicated “specials” engineering team will develop custom configurations and components to address your specific requirements, and our field support infrastructure now has a global presence.

Microscopy Systems

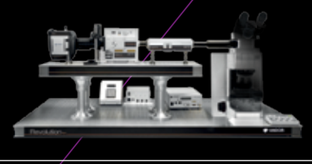
Revolution WDi

The versatile live cell confocal solution



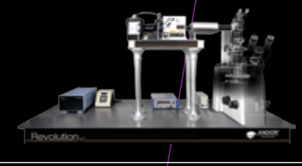
Revolution XD Family

The Andor Revolution XD is a family of flexible system solutions focused on multidimensional live cell imaging



Custom Imaging Systems

Configure systems for a range of applications with our component-oriented approach



Revolution DSD2

The personal confocal imaging unit

Microscopy Systems Components

iXon Ultra and iXon3 EMCCD
Neo and Zyla sCMOS
CSU-W1
CSU-X1
Borealis upgrade for CSU10, 21/22 & X **NEW**
DSD2 **NEW**
Laser Combiner and Multi-Port Unit
Precision Controller Unit
iQ3 and Imaris Workstation
Camera port adapters
Filter wheels and splitters
Motorized XYZ Control
Stage Incubator

Active Illumination Devices

MicroPoint
Mosaic3 **NEW**
FRAPPA

UV / Vis Light Sources

AMH-200 Series (Metal Halide)
XLED1
405 nm Highpower Laser
DG-4

Diskovery

NEW

Multi-modal Imaging System

Different tools are required to answer different questions. Now you can answer more questions about a sample during the same experiment. The multi modal Diskovery platform combines options for imaging the same areas in your samples:

- Multi-point confocal
- Dual color TIRF
- Widefield imaging
- Single molecule imaging

...with Borealis illumination.

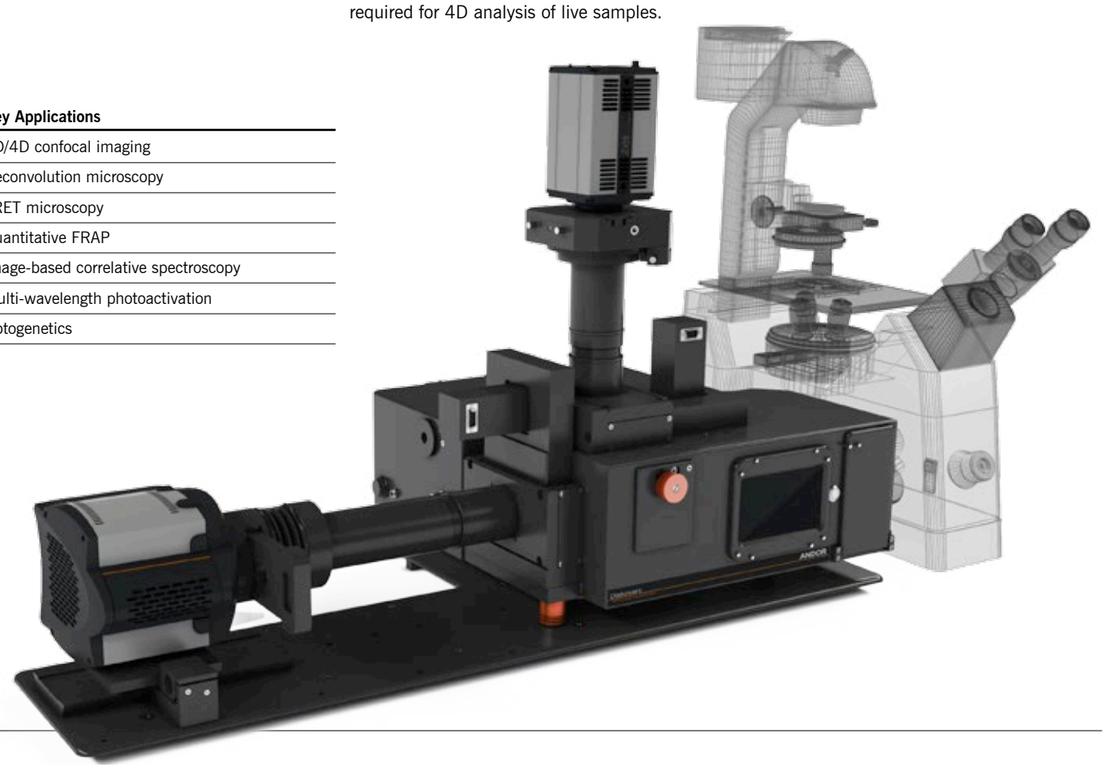
- Highly uniform illumination
- Optimized for low photo-toxicity
- Dual-camera ready
- Field-of-view optimized for both EMCCD and sCMOS

Stable and reliable illumination sources and detectors are the backbone of all imaging systems. Diskovery is available with up to seven lasers ranging from the blue to the near infrared, selected from a broad range of Lasers to meet the needs of any application. Diskovery's dual camera functionality offers up to 14 x 14 mm field of view, enabling optimized use of high resolution large area sCMOS detectors or ultra high sensitivity EMCCDs.

Multi-point confocal imaging is not limited to fast 2D confocal imaging of photo sensitive samples. When implemented properly, multi point confocal is capable of highly confocal, quantitative imaging in a wide range of samples producing superb 2D images and stunning 3D sectioning while still exhibiting the hallmark sensitivity required for 4D analysis of live samples.

Features
Two pinhole sizes and patterns per disk
4 different sized fields of illumination
Motorized widefield bandpass
Confocal imaging up to 1000 fps
Borealis quality illumination with < 10% variation across image
Any laser combinations possible with no excitation dichroic
Dual-camera ready
18mm diagonal field-of-view optimized for EMCCD and sCMOS
Low laser power at sample
Low phototoxicity
Easily removable and interchangeable disk assemblies

Key Applications
3D/4D confocal imaging
Deconvolution microscopy
FRET microscopy
Quantitative FRAP
Image-based correlative spectroscopy
Multi-wavelength photoactivation
Optogenetics



Total Internal Reflection Fluorescence

Diskover the dynamic world of activity 100 nm from your coverslip with Diskovery's multi-channel TIRF functionality.

What is TIRF?

Total Internal Reflection Fluorescence microscopy is a well-established tool for examining molecular activity at the cell membranes / coverslip interface giving very high contrast and 100 nm resolution. As it is often necessary to study these molecules in the context of their surrounding environment the Diskovery system combines its unique methods of Borealis widefield Illumination with its multicolor TIRF imaging mode with only 3 ms switch times. This provides a virtually instantaneous representation of TIRF imaging overlaid with the high quality Borealis widefield illumination.

Unique TIRF Features
Single fiber and one pathway for imaging multiple wavelengths without changing alignment
Patented Control of TIRF depth without moving the fiber
One command places all wavelengths at the same TIRF penetration depth for simultaneous or sequential imaging
Precise alignment and control with superb repeatability
Reflected laser excitation is captured to reduce stray light and reduce noise
Supports polarized excitation and emission separation
TIRF performance optimized from excitation to emission
Does not require specialized TIRF filter cubes
System designed with all TIRF applications in mind

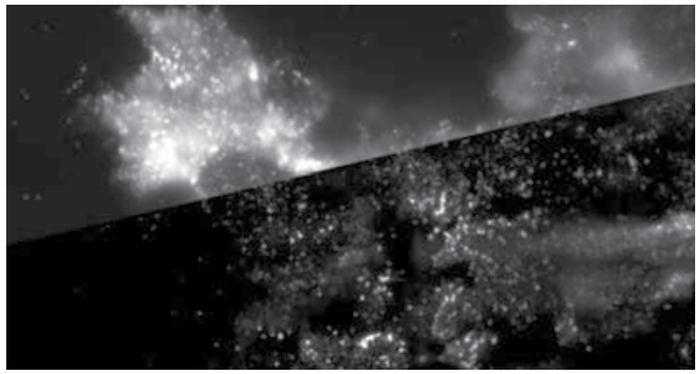
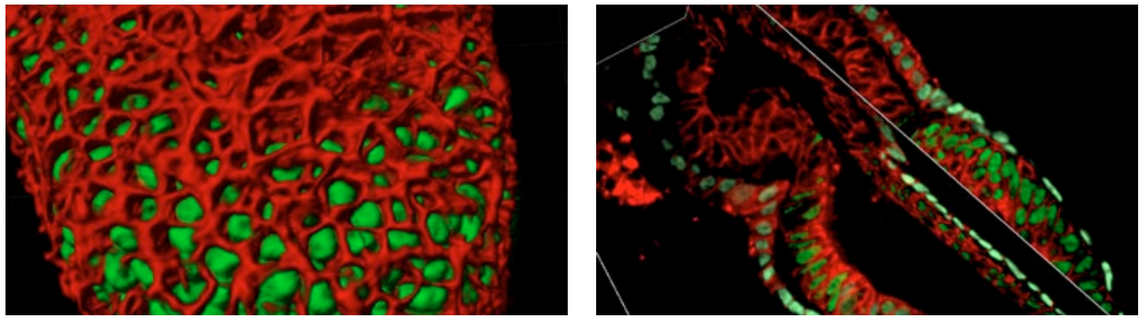


Image showing Widefield imaging (top) and TIRF imaging (bottom) from the same sample, system switchover between widefield and tirf modalities is at the push of a button.



Mouse embryo imaged using Diskovery with an Andor iXon EMCCD. The image on the left was further rendered using Imaris software from Bitplane.

Borealis

NEW

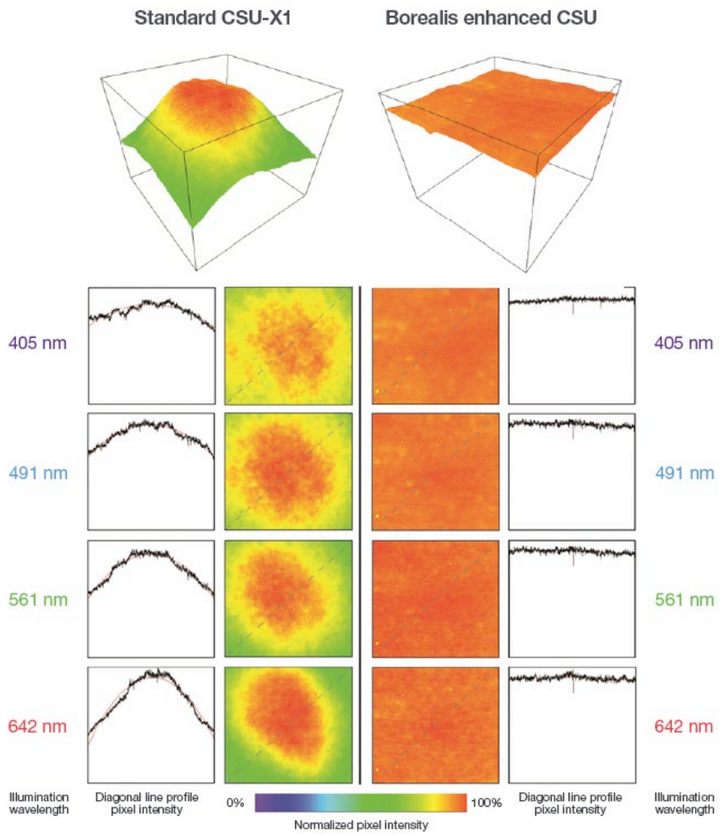
Critical Illumination Solution

Exclusive to Andor, Borealis is revolutionizing laser illumination for a broad range of imaging techniques including spinning disk confocal, TIRF, and super-resolution. Critically Borealis is delivering a highly uniform field of illumination across a broad spectrum range into the near infra-red, previously unseen in the aforementioned techniques.

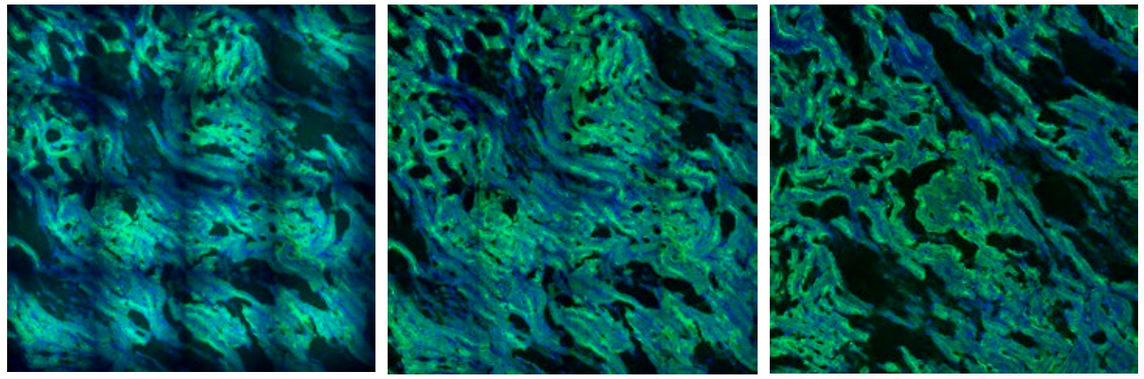
The benefit of a highly uniform illumination is a significant improvement in image analysis across the entire field of view. It is also critical to algorithm-based techniques such as super-resolution and accurate interpretation of the entire image. Qualitatively, Borealis delivers superior image quality in terms of full field visualization and montage imaging of large samples.

Features
Uniformity improvements of up to 10x
Throughput improvements up to 3x (for some CSU models)
Improved optical sectioning
Broader range of magnification
Extended wavelength range
400-750 nm excitation
Flexible bellows coupling
Optimal, strain-free alignment and vibration isolation (e.g. for AFM)

Benefits
Best in class image quality
Better performance for quantitative analysis and image montaging
Improved signal to noise for higher contrast images
Deeper imaging
Broader choice of fluorescence probes
Avoid autofluoresence
Lower laser powers required
More power for high power applications
Vibration isolation for image stability (e.g. for AFM)



The benefit of Borealis on intensity and illumination uniformity. The intensity profile across the field of view with a standard CSU is clearly uneven; Borealis delivers uniform image illumination with higher intensity. As the wavelength increases, so does the degree of non-uniformity seen with a conventional CSU. Borealis remains consistently uniform across the spectrum.



The figure above shows the impact of Borealis when imaging a real sample. Each of the three images above are in fact created from a tiled capture of 4 x 4 fields of view. In the left hand image you can see that a standard Yokogawa CSU-W1 has an uneven field of illumination, resulting in a patchwork appearance to the final tiled image. In the middle image, the Andor Borealis microscope coupling optimization reduces this patchwork effect to a reasonable extent, with some artifact still evident. However, the full Borealis illumination enhancement results in no evidence of uneven illumination, and also a higher contrast image when you look at the balance of the red and green signal in the third image.

Backwards Compatibility

Borealis can be retrospectively fitted to Revolution WD and XD, and third party systems using Yokogawa's CSU-W1, CSU-10, 21, 22 and X1.

Upgrade your system to extend its capabilities and enhance your research. Capture clearer images, image deeper, and use more of the spectrum.

Revolution XD Family

The Andor Revolution XD is a family of flexible system solutions focused on high-speed, high-sensitivity imaging.

The Revolution XD is the ultimate solution for high speed, high sensitivity live cell confocal imaging at high magnifications. Perfect for applications such as ion imaging, vesicle tracking and other detailed fast cellular dynamics. The inclusion of Borealis illumination further enhances image quality and more choice over experimental design.

Andor's award winning iXon EMCCD cameras and our own laser combiners are the perfect partners to the Revolution series, delivering outstanding sensitivity and speed. When you need the highest resolution available, then choose one of our Zyla sCMOS cameras. In manufacturing the core components we can ensure optimum performance and reliability.

Experience tells us that almost every customer is unique in their application requirements. We pride ourselves in flexible hardware configurations in order to deliver the best system solutions.

Features
Highest speed and/or resolution with iXon Ultra and Neo sCMOS
Ultimate sensitivity with iXon3 EMCCD and Yokogawa® CSU-X1 spinning disk
Study live specimens with reduced fluorophore concentrations or expression levels
Minimal perturbation of physiological events
Fast multi-dimensional image capture
Dual-camera and optical splitters for simultaneous multi-channel imaging and anisotropy
Micro-plate, multi-field and montage imaging
Ultimate multi-dimensional visualization and analysis with Imaris from Bitplane

Key Applications
Cell Division
Cell Motility
Ion Imaging
Neurophysiology
Cell Signaling

Revolution XDh
Combine full system choice with an upright microscope.

Revolution WD

The Confocal Solution For Deeper Understanding

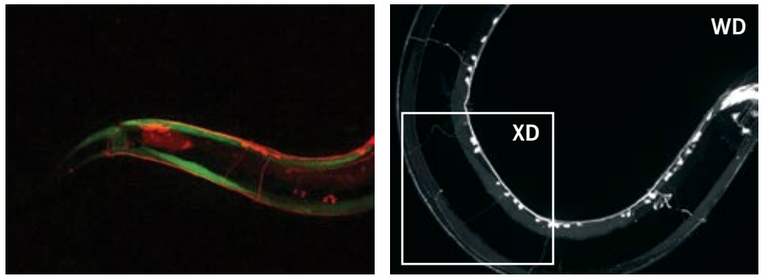
The Revolution WD is the ultimate solution for the diverse range of samples used in live cell imaging. Equipped with Andor's Borealis illumination, the Revolution WD offers more than the standard Yokogawa® unit, delivering better imaging results for your research.

Versatility
With 4x the field of view of the Revolution XD, and optimized pinholes, the Revolution WD delivers outstanding performance and versatility. It is the perfect solution for imaging large as well as small samples, and capturing deep into your specimens. The Revolution WD is the perfect match for core facilities that handle a broad range of samples from the researchers they serve.

Diversity
With a choice of pinhole size, the Revolution WD now delivers confocal imaging at low magnifications as well as high. This benefit means that we can offer stunning image performance in research fields such as developmental biology, stem cell research, embryology and neuroscience. These fields often require low power objectives due to the size of sample, and need to image deep whilst maintaining high contrast confocal images.

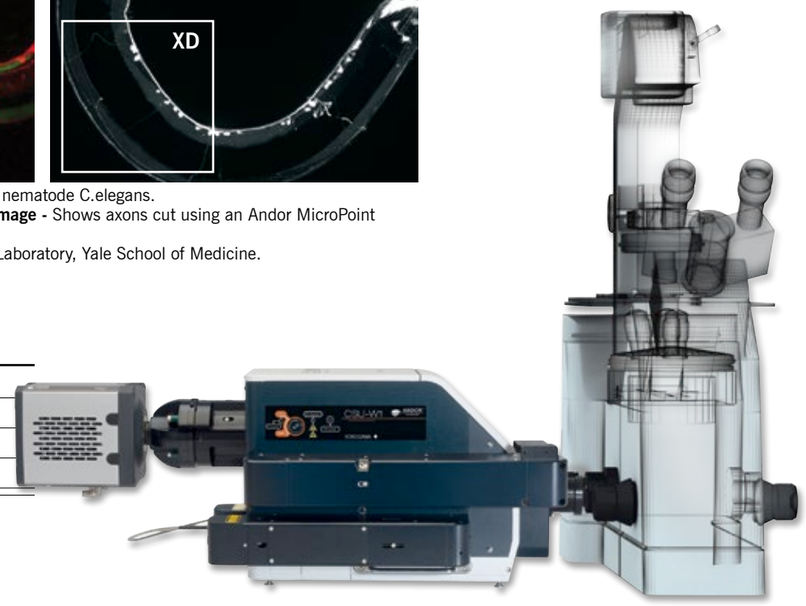
The Revolution WD can rival the more traditional point scanners for deep imaging, whilst delivering higher dynamic range and faster imaging speeds. This is truly a new confocal experience for your research.

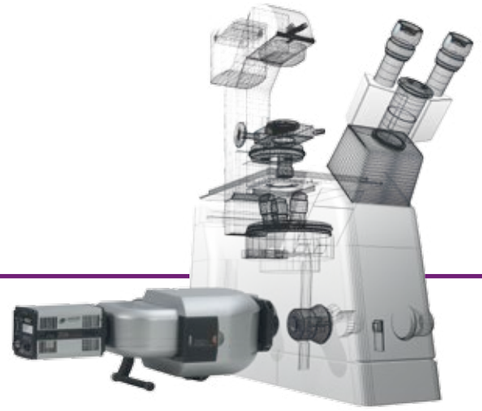
Features
Fast confocal imaging for live cell studies
4x field of view for larger sampling
Confocal imaging at low and high magnification
High contrast imaging of thick samples
Simple bypass mode for brightfield or widefield imaging
Variable aperture to match field of illumination to camera
Minimal perturbation of physiological events due to low illumination powers required
NIR imaging port for deeper imaging and far red fluorophores
Photo-bleaching and activation - study diffusion and transport of labelled molecules
Photo-ablation of cells, organelles and filaments - perturb and observe



Regenerating cholinergic motorneurons in the nematode C.elegans.
Left Image - Dual labelled nematode. **Right Image -** Shows axons cut using an Andor MicroPoint pulsed dye laser.
Collaboration with T. Edwards, Hammarlund Laboratory, Yale School of Medicine.

Key Applications
Developmental Biology
Stem Cell Research
Neuroscience
Embryology
Intra-Vital Imaging





Revolution DSD2

The Personal Confocal Imaging Unit

Andor's Revolution DSD2 is an innovative hybrid of spinning disk technology and structured illumination. This unique approach is laser-free and delivers a budget friendly confocal solution to your laboratory, offering less dependency on laser based solutions that are often restricted to core facilities.

A simple device, which can even be added to an existing fluorescence microscope in your lab, the Revolution DSD2 will benefit your research by delivering confocal images as a routine technique in your work.

Whilst laser-free, the Revolution DSD2 can still achieve the optical sectioning and image quality you expect of a complex laser scanning confocal system, but with low maintenance costs. Furthermore, it does not need an expert to run it!

Andor has designed the Revolution DSD2 system with our best-in-class sCMOS camera, Zyla, the AMH 200 W DC-stabilized metal halide source and Andor iQ workstation with optional Piezo Z stages. These components are integrated seamlessly to perform 5D and 6D imaging, and the system can be fitted to most makes and models of inverted and upright microscopes.

Features
Real-time control and viewing
Full spectrum, laser-free (380-650 nm)
Excellent confocality
High dynamic range
Cost effective
Suitable for live and fixed tissues, cells and embryos
Integrates with most microscopes
Zyla sCMOS – best-in-class camera
Macroscope compatible

Active Illumination Devices

FRAPPA

Photo-Bleach and Activate

Andor's FRAPPA uses a dual galvanometer scan head to provide a computer-steered laser beam delivery system. By utilizing the ALC's range of lasers the FRAPPA provides unrivalled Fluorescence Recovery After Photo-bleach (FRAP) and Photo Activation (PA) flexibility.

The FRAPPA provides diffraction limited performance and can be configured in-line with a CSU or on other ports.

Features
All ALC laser lines available for FRAP and PA actions
<10 ms switch over from Imaging to FRAP
Arbitrary multi-region scanning of points, rectangles and polygons
Integration with flexible protocols for 3D FRAPPA localization and analysis

Mosaic3

Simultaneous multi-region light targeting

The Mosaic3 active illumination system utilizes digital mirror device(DMD) technology to control the illumination field of a fluorescence microscope. Using a choice of illumination sources, Mosaic3 achieves real time and near diffraction limited resolution.

Unlike traditional galvoscanning systems, where pixels are addressed sequentially, Mosaic3 can simultaneously and precisely excite multiple regions of interest with complex geometries and allow simultaneous imaging.

Operating from 365-800 nm, Mosaic is unique yet flexible. Mosaic3 SDK offers access to software independent high speed pattern sequencing, ideal for applications such as optogenetics that mimic high speed cell signaling. Greyscaling is also available for detailed pattern illumination such as required in photolithography.

Typical applications include optogenetics, optophysiology, photoactivation, photobleaching and uncaging.

Features
Unlimited flexibility in shape and complexity of illumination mask
No scanning - simultaneous illumination of multiple regions of interest
Create complex pattern sequences with software independent recall (e.g. TTL)
High speed pattern recall (up to 5,000 fps)
Greyscaling capability
Applications include channelrhodopsin, glutamate uncaging and photoactivation
Available with 475 mW 405 nm laser

MicroPoint

Laser Illumination and Ablation

MicroPoint is a pulsed laser delivery, which utilizes a pulsed N2 laser to pump a dye cell resonator, yielding pulsed laser output at more than 20 user-exchangeable wavelengths ranging from 365 to 656 nm.

MicroPoint's variable wavelengths and diffraction limited output makes it an excellent photo-stimulation tool, providing ablation, uncaging, activation and bleaching capabilities.

Features
Simultaneous laser delivery and image acquisition
Ablation, uncaging, activation and bleaching
365 - 656 nm - adapt to specific targets
Incremental control of pulse energy

Microscopy Systems Components

iXon Ultra EMCCD

The market leading back-illuminated EMCCD
...Supercharged!

Facilitated by a fundamental redesign, the iXon Ultra platform takes the principal back-illuminated, single photon sensitive EMCCD sensors and overclocks readout up to an amazing 30 MHz, whilst maintaining quantitative stability.

The '888' model is the largest field of view EMCCD available, delivering an outstanding 26 fps from 1 megapixel resolution. This makes it the perfect match for the Revolution WD confocal system.

The '897' model pushes the popular 512 x 512 sensor to 56 fps. iXon reputation for 'Ultimate Sensitivity' is preserved, through deep thermoelectric cooling down to -100ºC and industry-lowest Clock Induced Charge noise. EX2 technology offers extended Quantum Efficiency performance.

Additional unique features of the iXon Ultra include USB connectivity and direct raw data access for 'on the fly' processing. EMCCD and conventional CCD readout modes provide heightened application flexibility, with a new 'low and slow' noise performance in CCD mode.

Features
26 fps @ 30 MHz ('888')
56 fps @ 17 MHz ('897')
Unique ultrafast Optically Centred Crop Mode 697 fps with 128 x 128 ROI ('888')
EX2 Technology offers extended QE response
Direct Data Access for 'on the fly' processing
USB 3.0 ('888') & USB 2.0 ('897')
Fringe Suppression reduces etaloning in NIR
UltraVac™ cooling to -100ºC
OptAcquire one-click optimization
Count Convert calibrates in electrons or photons
Lower noise CCD amplifier

Clara Interline CCD

Pushing interline further

Andor's expertise in scientific camera performance optimization has been harnessed to deliver the highest sensitivity interline CCD on the market. Based around the popular ICX285 sensor from Sony®, the Clara is ideally suited to high-resolution cell microscopy and OEM applications.

Features
UltraVac™ cooling to -55ºC
-40ºC vibration-free performance
2.4 e- read noise floor
Rapid frame rate
Wide dynamic range
High-resolution
16-bit and 14-bit digitization
USB 2.0 plug and play connectivity

Zyla 5.5 and 4.2 sCMOS

Imaging without compromise

Andor's Zyla sCMOS cameras offer high speed, high sensitivity imaging performance in a remarkably light and compact, TE cooled design. Zyla is ideally suited to many cutting-edge applications that push the boundaries of speed, offering sustained frame rate performance of up to 100 fps, faster with ROIs.

A highly cost-effective USB 3.0 version is available offering 40 fps and 1.2 e- rms read noise, representing an ideal low light 'workhorse' upgrade camera solution for both microscopy and physical science applications, in either research or OEM environments.

Rolling and Global (Snapshot) shutter readout inherent to Zyla 5.5 ensures maximum application flexibility. Global shutter in particular provides an important 'freeze frame' exposure mechanism that emulates that of an interline CCD, overcoming the transient readout nature of Rolling shutter mode.

The newest addition to the Andor sCMOS camera portfolio, the Zyla 4.2 utilizes a high Quantum Efficiency (QE), low noise sensor variant, yielding frame rates up to 100 fps (faster from region of interest). A new, industry fastest USB 3.0 version delivers an amazing 53 fps. The Zyla 4.2 is ideal for applications that benefit from optimal sensitivity and speed, such as calcium imaging, light sheet microscopy and super-resolution microscopy.

In addition, LightScan PLUS with FlexiScan and CycleMax is available on Zyla 4.2 designed to maximize signal and confocality in applications such as Scanned Light Sheet Microscopy and Line Scanning Confocal Microscopy.

Zyla 5.5 Features	
Compact and light	
Engineered for max speed - 100 fps sustained	
Rolling and Global shutter modes	
Industry fastest USB 3.0 frame rates	
Ideal for research and OEM applications	

Zyla 4.2 Features	
Engineered for max speed - 100 fps sustained	
> 72% Quantum Efficiency	
Industry fastest USB 3.0 frame rates	
Very low fan vibration	
Ideal for research and OEM applications	
LightScan PLUS mode	NEW

Neo 5.5 sCMOS

Imaging without compromise

In a -40°C vacuum cooled platform, with 1 e- read noise, very low darkcurrent, Rolling and Global Shutter, and loaded with FPGA intelligence, Andor's Neo sCMOS camera is designed to drive optimal performance from this exciting and innovative new technology development.

The Neo 5.5 model is based around a large 5.5 megapixel sensor with 6.5 μm pixels and a 22mm diameter, ideal for applications such as cell microscopy, astronomy, digital pathology and high content screening. The Neo 5.5 can deliver 30 fps sustained or up to 100 fps burst to internal 4GB memory. Extremely low darkcurrent means Neo 5.5 is suited to a range of exposure conditions.

The Rolling and Global shutter flexibility further enhances application flexibility with Global shutter in particular offering an ideal means to simply and efficiently synchronize the Neo with other 'moving' devices such as stages or light switching sources and eliminating the possibility of spatial distortion when imaging fast moving objects.

Features
The ONLY vacuum cooled sCMOS on the market
1 e- read noise
UltraVac™ cooling to -40ºC
High dynamic range

Laser Combiner and Multi-Port Unit

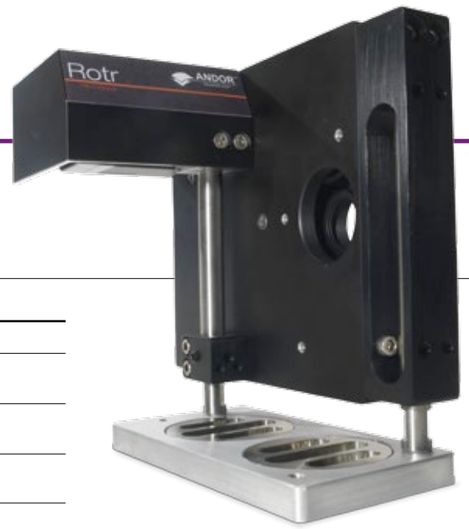
Compact, flexible robust

The new ALC-601 introduces a number of improvements and feature additions to meet the demands of a developing market. The ALC can house up to six solid state laser lines from 405 - 640 nm, and the optional Multi-Port Unit facilitates fast switching between up to three channels permitting use of the laser combiner with confocal imaging, FRAPPA and TIRF.

The ALC has the best ever light throughput for maximum power output, with high stability ensured for the new six laser line capacity.

New features include FLIM capability, a wider choice of lasers, and direct TTL laser control for advanced techniques requiring AOTF-independent control.

Features
Hardware blanking minimizes specimen exposure
Long life solid state lasers with excellent stability (typical ± 0.5% peak to peak)
Up to six solid state lasers (from 405, 445, 488, 491, 515, 532, 561, 594, 640 nm)
Powers from 50 - 250 mW depending on wavelength
Individual on/off power control of lasers to maximize laser life if not being used.
Up to three output ports for multiple devices FLIM capability
Direct TTL control available for selected wavelengths
Compact 19” rack mount enclosure



Filter Wheels and Splitters

Emission Discrimination

Our systems use filter wheels or splitters to select by wavelength or polarisation. Our high-speed Rotr filter wheel offers wavelength switching up to nine frame pairs/sec when fully loaded with filters (manufacturers quote unloaded times). Multiple filter wheels are sequential.

Filter Wheel Features
6, 10 and 12 position, ø25 filter wheels
Matched to CSU or microscope C-mount coupler
Infinity optical path for optimum filter performance
External controller allows support of Sutter Smartshutter
Filter switching up to nine frame pairs/sec

Field Splitter Features
Optosplit II and III which use 25 mm filters
Field splitting for simultaneous two or three color imaging
Matched to CSU or microscope C-mount coupler

Camera Port Adapters

Andor couplers are designed to ensure optimal throughput, minimal aberrations, magnification options and flexible detection configurations. Our couplers match our CSU enhancements and can also be configured with a broad range of imaging optics including microscope C-mount, ‘C’ and ‘CS’ mount lenses.

Single Port Coupler Features
Magnification X = 1.0, 1.2, 1.5, 2.0 (others by request)
Compatible with filter wheel or CSU+ filter wheel
Achromatic 450-650 nm
AR-coated
Transmission > 98%
Adjustable XY centering
Sliding barrel focus control

TuCam - Dual Camera Features
Enables simultaneous two-camera exposure with discrimination by wavelength or polarisation
A 100% mirror for easy camera switching
Magnification X = 1X, 1.2, 1.5, 2
Compatible with, C-mount or CSU+filter wheel
Kinematic cassettes for robust precise alignment
“Bypass” mode built-in

Stage Incubator

The CO2 Microscope Stage Incubator (MSI) is a very compact solution to create a suitable environment for cell cultures right on the microscope stage, allowing cells to proliferate as well as they do in a regular bench-top incubator. Humidifying and preheating options prevent medium evaporation and avoid condensation.

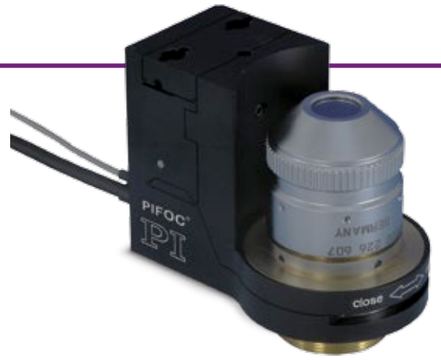
Features
Available for Piezo inserts
Electric, water, and cryo options
Options include heating and cooling between 10 to 50°C and regulation down to ±0.1°C
CO2 range adjustable between 0% and 100%

APZ-X00 Piezo Z-Stage

Specifically designed for researchers utilizing deconvolution and 3D imaging, the APZ-X00 offers 100 μm, 200 μm, 250 μm and 500 μm travel models. The APZ-X00 provides rapid and precise movement of the specimen container. The 250 μm and 500 μm versions can accept a micro-plate insert for multi-well scanning.

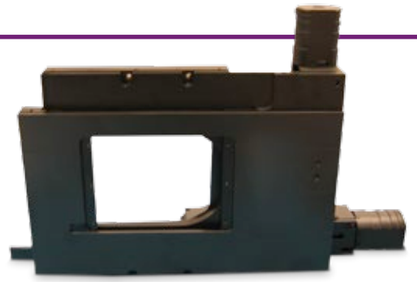
Features
100 μm, 200 μm, 250 μm and 500 μm travel range
Accuracy / Linearity of 0.5% of travel
Stage Control via Analog (0 - 10 VDC), USB and RS232
Settling time of 10-20 ms
Inserts for slide, Petri dishes and microtiter plates
Output-Position Signal 0.0 - 10.0 V

Piezo Objective Control



Features
PI PIFOC® P721 - 100 μm travel
PI PIFOC® P725 - 400 μm travel
Setting time can be tuned to < 10ms
1.25 nm resolution
Analogue or digital control
Oil and water objectives

Motorized XY Control



Features
Open and closed loop stages
Typical travel >100 x 75 mm, with 0.02 μm resolution
30 mm / sec travel speed
Perform multi-field scans for 6D imaging
Create 4D mosaics using iQ software
Repeatability 0.2 to 0.3 μm rms

UV / Vis Light Sources

XLED1

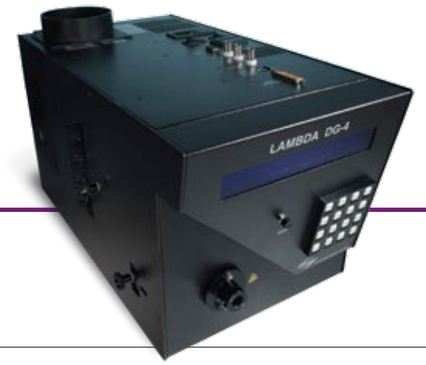
LED light source for fluorescence microscopes

The XLED1 light source from Lumen Dynamics is the perfect solution for live cell applications. With high speed on/off cycling, fine intensity control and the ability to synchronize with other image capture devices for multiparameter imaging, you can be sure of protecting your live samples from phototoxicity and bleaching.

The XLED1 is the ideal partner for the Andor Mosaic device used for applications such as optogenetics, photoactivation, switching/conversion.

Features
Wavelength range 360 – 750 nm
Switching time: TTL 10 μs; USB 1 ms
Intensity control 0-100% - 1% resolution
Optional touch screen controller
Easy switch LED/Dichroic for additional wavelengths

DG-4



Fast switching filter-based Xenon source

The Lambda DG-4/DG-5 is a complete illumination system offering speed and versatility for experiments requiring rapid wavelength switching. The instrument retains all the advantages of interference filter based systems, yet eliminates temporal constraints imposed by traditional filter changing devices like filter wheels.

Switching between any two wavelengths is achieved in less than 1.2 ms. This facilitates the ability to follow fast changes in ion concentrations in dual wavelength ratio imaging applications and to monitor changes in the studied system at additional wavelengths.

Features
Wavelength range 340 - 700 nm (Xenon 150 or 300 W)
1.2 ms switching time and 500 μs shutter
Synchronized operation with Fast LZ imaging
Liquid Light Guide coupling
Choice for fast Calcium ion imaging
Compatible with DSD2
TTL, RS232, Parallel control interfaces

Microscopes

Diverse Compatibility

Andor products are compatible with modern infinity corrected microscopes from Leica, Nikon, Olympus or Zeiss to meet your preferred configuration. If you require environmental control we recommend temperature and CO2 control incubators from Okolab.

Focus drift can severely affect timelapse movies and is especially important in confocal and TIRF imaging, where focus and illumination are tightly constrained. Andor iQ software supports all manufacturers focus drift correction (FDC) solutions, providing long-term drift-free imaging of live cell samples.

Although microscope manufacturers produce quality solutions, it is possible toimprove speed and convenience of some features with third-party devices. One example is the transmitted light source, which is traditionally a quartz halogen (WH) incandescent lamp.

WH lamps produce heat, so they affect thermal stability as well as transmit extreme wavelengths harmful tocell health. In addition, they have slow shutters and short life spans. We recommend replacing these with an LED (white or narrow band), which can be switched on and off in microseconds without any vibration.

Features
Support for Leica, Nikon, Olympus and Zeiss
Configurations for inverted and upright instruments
Specials for fixed stage “physiology” platforms
Focus drift compensation support – PFS, ZDC, ZDC2
Control microscope motorization
Motorized TIRF illumination for multi-channel imaging
Vibration isolation tables

Supported Microscopes Include
Leica DMI range
Nikon TiE, inverted
Nikon TE2000, T300 - legacy inverted
Nikon F1 fixed stage
Olympus IX71, 81 inverted
Olympus IX73, 83 inverted
Olympus BX51, BX61 upright
Olympus BX51WI, BX61WI - upright physiology
Zeiss AxioObserver - inverted
Zeiss AxioImager II - upright
Zeiss Axiovert 200MOT - legacy inverted
Zeiss AxioImager, Axioskop II MOT - legacy upright

iQ3 and Imaris Workstation

Optimized PC Workstation for Live Cell Work

Handling, processing and visualizing multidimensional images is very computer intensive. The Andor iQ3 and Imaris workstation is a high-end desktop PC optimized for use with iQ3 and Imaris as well as handling large data sets that arise from experiments employing Andor systems and cameras.

Features
High speed 4D, 5D and 6D imaging
Industry-leading 3D visualization and analysis
Acquisition bandwidth for dual camera support
ImageDisk removes dependency on RAM for huge datasets
Control and analysis of photo-stimulation experiments

Typical Applications Matrix

	Revolution WD	Revolution XD	Revolution DSD	Andor CIS
Calcium and Ion Imaging (Note: Fura 2 ratio imaging is only possible with Andor CIS)	◦	•	◦	•
Fluorescent Protein Dynamics e.g. Translocation	◦	•	◦	•
Development e.g. C. elegans, Zebrafish and Drosophila	•	◦	•	•
Cytoskeleton and Membrane Dynamics	◦	•	◦	•
Fast Cell Component Tracking (e.g. vesicles)	◦	•		
Membrane Trafficking, Endo and Exo-Cytosis				•
Nuclear Organization and Dynamics	◦	•		
New Methods With Q Dots and Nano-Particles	◦	•		•
Imaging Combined With Electrophysiology	•	•		•
Viral Infection and Translocation	◦	•		
Motility and Chemotaxis Assays	•	•	◦	•
Bioluminescence				•
Immunofluorescence	◦	◦	•	•
Super-Resolution Localization Microscopy, e.g. PALM, STORM				•
Stem Cell Research (e.g. colonies and 3D cultures)	•	◦		
Embryology	•	◦	•	
Tissue Slice Preparations (e.g. neuronal)	•	◦	•	
Intra-Vital Imaging	•	◦		
Plant Tissue	•	◦	•	

• Optimal ◦ Suitable

Active Illumination Application Matrix

	FRAPPA	Micropoint	Mosaic3
FRAP GFP, RFP, YFP	•	◦	◦
Channel Rhodopsin = 400, 480, 540nm			•
Dendra, Kaede, EOS = 400nm	•		•
Photoactivatable GFP	•	•	•
Photouncaging (cAMP, Calcium, FITC)	•	•	•
Ablation = 365nm		•	
DNA Damage	◦	•	

• Optimal ◦ Suitable

Scientific User’s References

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Parallel prefrontal pathways reach distinct excitatory and inhibitory systems in memory-related rhinal cortices Bunce J.G. et al., Journal of Comparative Neurology. Volume 521, 4260-4283	2013
The Role of Actin Turnover in Retrograde Actin Network Flow in Neuronal Growth Cones Van Goor D. et al., PLoS ONE 7(2): e30959. doi:10.1371/journal.pone.0030959	2012
Compartmentalized calcium transients trigger dendrite pruning in drosophila sensory neurons Kanamori T. et al. Science, Volume 340, 1475-1478	2013
An inverse relationship to germline transcription defines centromeric chromatin in C. Elegans Gassmann R. et al., Nature (Letters), Volume 484, 534-537	2012
Drosophila neuroblasts retain the daughter centrosome Januschke J. et al., Nature Communications, Volume 2, article 243	2011

SOFTWARE

Research imaging and spectroscopy applications demand powerful software tools to provide everything from instrument control to acquisition, visualization and analysis of large data volumes. Andor has invested heavily in software over recent years and offers a range of world-class software solutions targeting our core markets of imaging, spectroscopy and multi-dimensional microscopy.

SDK

BOSE EINSTEIN

PHYSICAL SCIENCES IMAGERY

CELL MOTILITY

DATA VISUALISATION

SURFACE AND VOLUME RENDERING

DATA ACQUSITION

LIVE CELL CONFOCAL MICROSCOPY

FILAMENT TRACING

IMARIS

SOLIS

LASER INDUCED BREAKDOWN SPECTROSCOPY

SINGLE MOLECULE DETECTION

3D DECONVOLUTION

DATA VISUALISATION

DEVELOPMENT EMBRYOLOGY

RAMAN SPECTROSCOPY

FLUORESCENCE · LUMINESCENCE · SPECTROSCOPY

IQ

MICROSCOPE SYSTEM CONTROL

METAMORPH

DNA DAMAGE

CALCIUM IMAGING

Komet 7

NEW

Acquisition and Analysis Software for the Comet Assay - Research and GLP

Komet software allows the capture and analysis of images from the Comet Assay. The Comet Assay permits the quantification of DNA damage and repair in single cell preparations and is applicable to any eukaryotic cell.

The assay can be used in both in-vitro and in-vivo testing and has been shown to be a powerful and sensitive predictor of genetic toxicity.

Komet is available as a standard research product and a GLP product.

Komet 7-GLP ensures FDA 21CFR part 11 compliance: electronic signatures safeguard your data and audit trails certify scoring for quality assurance. Komet Datasets fulfill the recommendations of OECD Testing Guideline 489 for the In-Vivo Alkaline Comet Assay.

Features
Flexible - Software control of wide range of cameras from sCMOS to video, Firewire (IEEE1394) and USB
Large Field of View options with Andor sCMOS integration - faster scoring option
“Virtual Camera” - scores live images from any camera you already own
LED light sources - replace mercury bulbs with safe, efficient, long-life illumination
Certified Windows 7 compatibility - Windows 8.1 coming soon
Fast and easy to use - pop-up controls accelerate scoring and minimize fatigue
Fully automatic or interactive computation of Head/ Tail %DNA, Tail Length, Olive Tail moment, etc.
Background correction for every cell scored
User-friendly, freely distributed Database Viewer (DBV) application
Databases include all comet images, parameters and audit trails

Solis 64

Camera control and analysis

Solis 64 is Andor’s camera control and analysis software platform, with versions specifically designed to run Imaging, Spectroscopy and Time-Resolved cameras as well as their associated accessories. All camera parameters can be configured through the straightforward setup dialogues. Solis 64 provides considerable ease of use, state-of-the-art data acquisition, display and processing capabilities with a minimal learning curve. The 64-bit architecture can make use of all available PC RAM for storing image frames. This increases the total number of frames captured to memory by orders of magnitude.

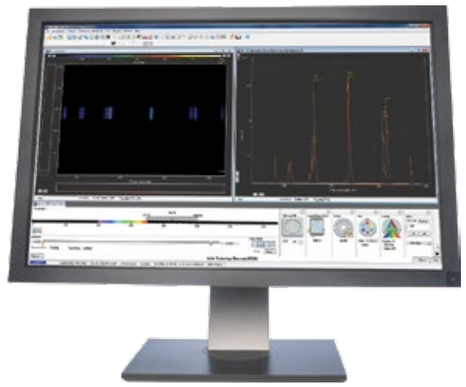
Solis Imaging
Solis Imaging is optimized for image capture and analysis and is used in a wide range of scientific fields including fluorescence imaging, Bose-Einstein Condensation, single fluorophore labelling, upper atmosphere studies and X-ray studies.

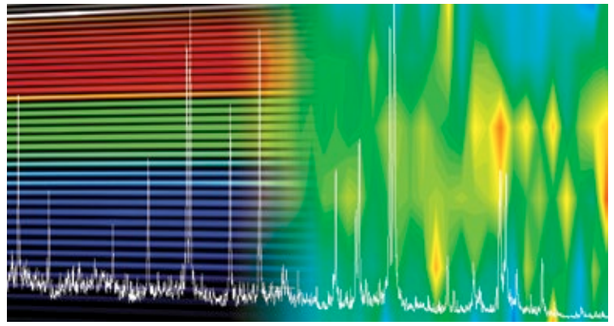
Solis Spectroscopy
For Raman, LIBS, photoluminescence, plasma diagnosis or other spectroscopic applications. Solis Spectroscopy has been tailored to enable quick configuration of acquisition, including exposure time, number f exposures, readout rates and binning parameters. Data capture, display and processing is all performed though this user-friendly package.

Solis Scanning
Solis Scanning offers a dedicated platform for scanning monochromator applications. Monochromators, detectors, data acquisition unit, lock-in amplifier / chopper and motorized accessories can all be conveniently synchronised through a series of intuitive interfaces.

Solis Time-Resolved
Solis Time-Resolved enables specific control of the iStar camera range. Applications include Laser Induced Breakdown Spectroscopy (LIBS), Laser Induced Fluorescence (LIF), combustion and Time-resolved Resonance Raman Spectroscopy.

Features
Real-time image / spectral display, ideal for aligning experiments
Advanced data spooling direct to hard disk, allowing large data sets to be acquired
Increase your signal above the read noise floor with RealGain™, EMCCD gain control
Kinetic series recording and playback
Comprehensive and real time multiple ROI analysis, including live stats and plot generation
Various real-time and playback display options, including 2D, 3D, stacked and overlaid
Comprehensive data analysis and arithmetic operations
Extensive export options, including TIF, BMP, AVI, GRAMS, ASCII, FITS
Intuitive and comprehensive user-defined thresholding and auto-scaling
Data histogram enabling easy image display data scaling
Full experiment and camera control within the same package
Improved signal-to-noise with the “Integrate On Chip” function
Real-time Photon Counting mode enables observation of data build at very low flux levels
Intuitive and dedicated GUI for Shamrock spectrograph real-time control





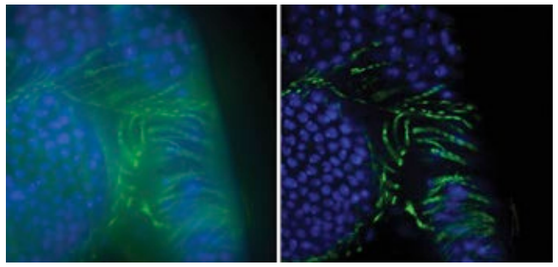
iQ3

Multi-dimensional imaging with Python IDE

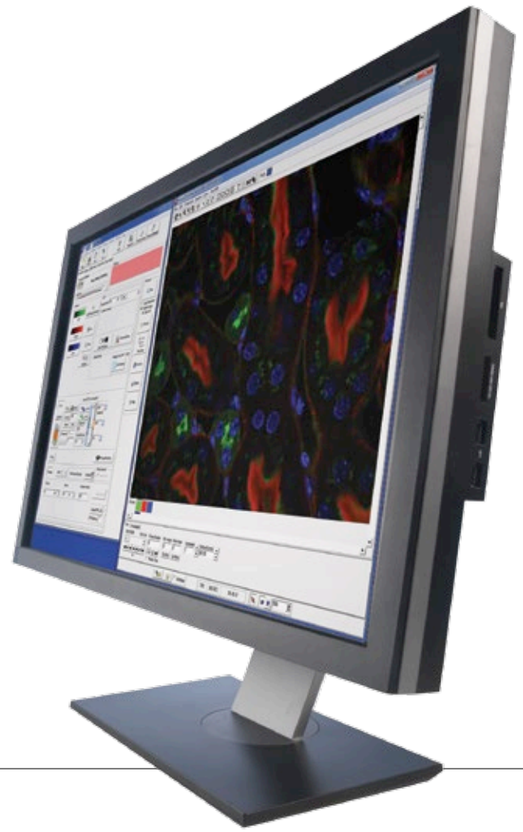
Andor iQ is our flagship live cell imaging software. iQ3 delivers a radical new user interface to simplify the capture of many routine multi-dimensional image capture protocols. The focus is on minimizing the time required to learn iQ as well as being able to navigate and edit experiments as quickly as possible. The latter is a key requirement for live cell imaging and greater productivity.

iQ3 has been designed with core facilities in mind, not just reducing training time, but also providing user accounts for managing user settings, file access and also usage reporting to help with facility financial tracking. For long-standing iQ users, who rely on the powerful flexible protocol structure for complex multi-modal experiments, this is retained with a simple toggle button between the new and traditional user interfaces.

Features
Routine and advanced imaging protocol user interfaces available
Multidimensional at its core – from fast time-lapse to 5D / 6D imaging
User account management for settings and activity reporting
Online data charting for ratiometric imaging
Multi-well and Micro-plate scanning
Dual camera acquisition - 50 full frames per second (iXon Ultra)
Integrated Python environment for user programming
Smooth integration with Imaris for deep analysis



Ovariole of Drosophila melanogater showing germarium and early stage egg chambers. Green: F-actin stained with Alexa Fluor® 488 phalloidin. Blue: DNA stained with DAPI. Courtesy of Dr. Eurico Sá, Molecular Genetics group, IBMC, Porto, Portugal



Imaris

The ultimate tool for data management, analysis and visualization of multidimensional images.

Imaris offers you a fully integrated workflow from data management and searching to image visualization, analysis and exploration Imaris' rendering quality, speed, precision and interactivity are unrivalled. With a large variety of segmentation options, Imaris provides you with the most effective tools to segment even the toughest datasets to identify, separate and visualize individual Biologically relevant objects. The interface of Imaris has been carefully designed by scientists for scientists who want to focus their time doing research, interpreting their data and building knowledge.

Features
Organize, tag and search your image data
Visualize volume images and objects in real time using a rich selection of rendering modes
Detect and track the motion of objects based on morphology, intensity, size and many more parameters
Reproducibly batch process hundreds of images from a full experiment
Validate segmentation by superimposing objects on the original volume image
Interact dynamically with individual objects
Trace filament-like structures
Explore hypotesis
Study and interpret colocalization of objects and protein clusters
Create interactive 2D / 3D / 4D scatter plots that summarize and highlight your findings
Create the most impressive pictures, animations and stunning movies for your publication with just a few mouse clicks

Imaris 8.1 Freedom to Discover

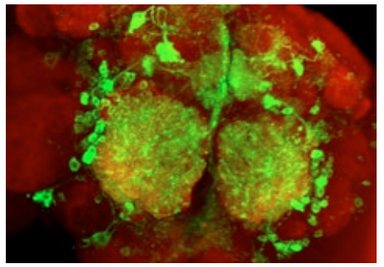
IMARIS NEW

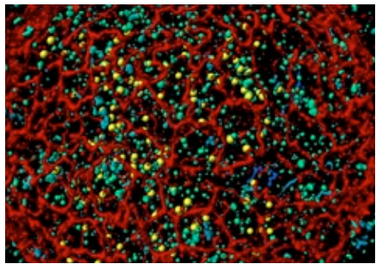
Imaris 8.1 expands its reach both upstream and downstream from the visualization and analysis of single 2/3D+time images. Imaris Arena, Surpass and Vantage - will naturally guide you through the stages of the Scientific Method.

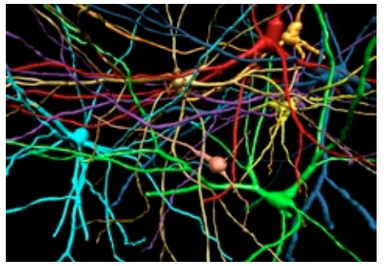
At your disposal you have a fully integrated platform which allows you to organize/explore your data, visualize it, (batch) analyze it, test hypotheses and present your conclusions in the best possible manner. The Arena view is Imaris' central hub and it keeps track of (and allows you to search for) all images, experiments, plots, image analysis protocols and results.

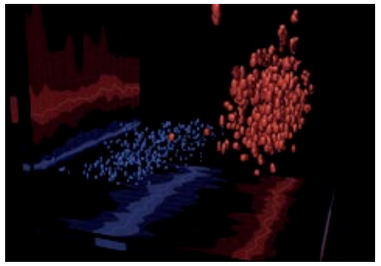
Surpass is an interactive 3D/4D work environment where you can visualize and analyze your images - thus creating an image analysis protocol. Vantage is a multi-dimentional results plotting and exploration tool - ideal to test hypothesis.

Features
Arena View (tag, search and manage all image data related resources)
New Imaris Batch
Imaris Batch fully integrated into the Arena view
Imaris Administrator Section
Floating License Opt-In
Dark Theme GUI
Context/View dependent menus









SDK

Software Development Kit

A software development kit that allows you to control the Andor range of cameras from your own application. Available as 32 and 64-bit libraries for Windows (XP, Vista and 7) and Linux. Compatible with C/C++, LabView and MATLAB.

The SDK provides a suite of functions that allow you to configure the data acquisition process in a number of different ways. There are also functions to control the CCD temperature and shutter operations. The SDK will automatically handle its own internal memory requirements.

MetaMorph

Though we offer our own integrated software, we also recognise that many laboratories around the world use MetaMorph as their imaging software package. Consequently Molecular Devices have included support for many Andor components, which will also be made available in the newest software platform.

The next generation of MetaMorph Software streamlines the workflow for all tasks and provides an entirely new user-focused interface. With one-click access to features, integrated hardware setup, and synchronized, unobstructed views of your data, you can become an imaging expert in minutes.

Features
“Ribbon” interface for convenient access to commonly used options
Selectable context specific acquisition modes
Easy installation and configuring of microscope devices
Multi-threading for software interaction during acquisition
Live data review and analysis
Settings recall function from previous experiments
Improved the speed of acquisitions

Third-Party Software Support

Andor has worked with a number of third-party software companies to include support for our cameras and other products in their software.

NOTE For further information on the latest versions of Andor’s third-party software packages, which are compatible with Andor products please visit andor.com/software/software_support/

Third-party compatible software includes:
Metamorph, MetaFluor and MM NX from MDS (Universal Imaging)
μManager – open source ImageJ compatible (micro-manager.org)
Nikon Elements
Olympus cell ^M / R family
Leica LAS and MM AF
ImagePro from Media Cybernetics
Imaging Workbench from Indec Biosystems
EPICS
Slidebook from III

Andor also offers drivers for the following popular ‘development environments’:
National Instruments – LabVIEW
MathWorks – MATLAB
Bruxton - SIDX

Typical Applications Matrix

	Komet 7	iQ	Imaris	Solis
Data Acquisition	•	•		•
Live Cell Confocal Microscopy		•	•	
Off-line Image Analysis	•	•	•	
3D Deconvolution		•	•	
Physical Sciences Imaging				•
Bose-Einstein Condensation (BEC)				•
Single Molecule Detection / Tracking				•
Advanced Volume / Surface Rendering			•	
Colorimetry / Ratiometry				•
Super-Resolution Microscopy		•		•
Calcium flux imaging		•		
Cell Motility		•	•	
Filament Tracing and Analysis			•	
Embryo Development		•	•	
Correlative Microscopy (EM and Optical)			•	

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