Andor Spectroscopy
Product Portfolio

Engineered from the outset with ease-of-use in mind, every Andor spectroscopy system features a combination of market leading detectors and spectral instruments, seamlessly controlled through Andor’s dedicated and intuitive Solis software platform. From configuration of these pre-aligned, pre-calibrated instruments to integration into each unique laboratory set-up, Andor spectroscopy solutions allow researchers around the world to focus quickly on their own challenges: achieving high quality results and breakthrough discoveries.

1. Detectors
Market leading CCDs, InGaAs PDAs, Intensified CCDs and Electron-Multiplying CCDs for VUV to NIR spectroscopy. Unsurpassed combination of cutting-edge TE cooling, proprietary vacuum technology and ultra-low-noise electronics to extract the very best performance from every Andor camera.

2. Spectrographs
Complete family of nagged, pre-aligned and pre-calibrated Czerny-Turner, Echelle, for applications ranging from high-resolution UV plasma studies to NIR photoluminescence. The ideal partner for Andor’s high-performance detectors and accessories for ultimate low-light detection.

3. Accessories
From gratings to fiber optics, sample chambers and filter wheels, each accessory allows seamless optimization of Andor detection system performance and easy integration into researchers complex experimental setups. Andor also offers a range of single point detectors including PMTs, Si photodiode, InSb, IIIb and MCT for extension into the Short and Long-Wave IR.

4. Microspectroscopy
Modular, seamlessly upgradeable microspectroscopy solutions. Large range of microscope coupling accessories including direct C-mount and ‘cage’ system, microscope height matching foot sets and spectrograph wide-aperture slit for large field imaging of sample and spectroscopy analysis through the same optical path.

5. Software
Solis Spectroscopy and Solis Scanning offer interactive and dedicated graphical interfaces for simultaneous multichannel or single point detector data acquisition, as well as spectrographs and motorized accessories control.

NEW 6. Kymera 328i
Andor’s new intelligent highly modular imaging spectrometer with Adaptive Focus and Truflex™ technology, ideal for a wide range of applications (e.g. material/nano-material science, chemical processes, life science/medical or plasma studies).

NEW 7. iStar sCMOS
The new iStar sCMOS combines lightning fast acquisition speeds up to 4,000 fps with nanosecond gating capabilities and high dynamic range, ideal for applications including fast plasma diagnostics and time-resolved study of luminescent materials.

NEW 8. Marana and Zyla sCMOS
Achieving > 24,000 spectra/s with ultra low readout noise, the Marana and Zyla offer unique platforms to study fast transient spectral phenomena, fast hyperspectral imaging or multi-track spectroscopy while maintaining high dynamic range.
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 28 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.

A Charge Coupled Device, or CCD, is a 2D matrix of silicon diode photo-sensors referred to as “pixels”. Incident photons with sufficient energy are absorbed in the silicon bulk and liberate an electron, which can be stored and detected as part of a readout sequence. Photons with wavelength >1.1 μm do not have enough energy to create a free electron and therefore set the upper detection limit of silicon CCDs.

The probability of detecting a photon at a particular wavelength is known as Quantum Efficiency (QE). QE will vary with depletion depth of the silicon, quality of the CCD structural layers and clocking electrodes “transparency”.

At the end of an exposure, the CCD pixel charges are transferred sequentially under a masked area known as the shift register. This serial register connects to an amplifier that digitizes the signal and allows a quantitative readout of the amount of electrons per pixel. The principal types of high performance CCD-based digital cameras include:

- **The Charge-Coupled Device (CCD)**
- **The Electron-Multiplying CCD (EMCCD)** with on-chip gain for sensitivity down to a single photon
- **The Intensified CCD (ICCD)** - Image Intensifier provides fast nanosecond optical shuttering and signal amplification

**Benefits of Ultravac™ technology for research-grade cooled detectors**

- Maintenance-free operation in laboratory or in-field over extended periods of time, unlike liquid nitrogen (LN2) cooled platforms that require hazardous and regular manual Dewar refills.
- Operating temperature of the chip can be reduced significantly. Better cooling with an enhanced thermoelectric (TE) Peltier design translates into substantially lower darkcurrent and lower “hot” blemishes.
- No peak QE and sensor cooling performance degradation over many years operation. Andor Ultravac™ technology offers an MTBF (mean time between failure) of more than 100 years.

**Making sense of sensitivity: signal-to-noise ratio considerations**

A camera Signal-to-Noise Ratio (commonly abbreviated to S/N or SNR) is the true comparison basis between detectors and detector technologies. It takes into account both the photon capture capability of the detector and the different noise sources along the detection path that can impact on the integrity of the useful signal. The sources of this noise are the following:

- **Readout noise**
- **Inherent sensor electron-to-voltage conversion and amplification noise**
- **Thermal noise**
- **Originating from sensor, blackbody radiation (SWIR region) or image intensifier photocathode**
- **Photon noise / Shot noise**
- **Statistical incoming photon variation**
- **Spurious Charge / Clocking Induced Charge (CIC)**
- **Result of impact ionization during charge transfer**

**CCD Basics**

- **CCD Sensitivity** is shot noise and readout noise limited - typically used at slow digitization speeds
- **EMCCD**
- **Sensitivity** is shot noise and CIC limited – typically used for photon-starved and ultrafast spectroscopy
- **ICCD**
- **Sensitivity** is shot noise and photocathode thermal noise (EBI) limited – typically used for ns time-resolution

\[
\text{Noise}_{\text{total}} = \sqrt{N^2_{\text{readout}} + F^2 \cdot G^2 \cdot (N^2_{\text{darknoise}} + N^2_{\text{photons}} + N^2_{\text{CIC}})}
\]

- F = amplification noise factor
- G = amplification gain
Spectroscopy Cameras

Andor has been taking pride in helping researchers around the world achieve breakthrough discoveries for the last 28 years. By keeping at the forefront of detector technology, Andor is able to offer a range of market leading high-performance, ultra sensitive spectroscopy detectors. Our CCDs, ICCDs, EMCCDs, sCMOS and InGaAs arrays can operate from the VUV to Near-Infrared spectral regions with a unique combination of high sensitivity (down to single photon in the case of EMCCD technology) and ultrafast acquisition speeds.

**CCD**

Workhorse Broadband Platform

Newton CCD, iDus CCD

A two dimensional silicon-based semiconductor matrix of photo-sensors, with sensitivity ranging from soft X-ray to NIR (1.1 μm). Spectroscopy CCDs are traditionally a rectangular format with a maximum width of 30 mm and a height up to 13 mm, i.e. matching the focal plane size of the majority of high-end spectrographs.

**Electron Multiplying CCD**

High Sensitivity and Speed

NewtonEM, iXon Ultra EMCCD

Identical architecture to standard CCD sensors, with the addition of an on-chip amplification channel prior to the digitization node, designed to overcome the readout noise limitation of slow-scan CCDs. This technology opens the door to ultra-sensitive and ultra-fast spectroscopy.

**Intensified Detectors**

High speed and dynamic range

iStar ICCD

Combination of a CCD or sCMOS matrix with a fibre coupled Image Intensifier, which provides optical shuttering capabilities and time-resolution down to the nanosecond regime while also offering a signal amplification up to x1,000.

**InGaAs**

High performance infrared

Indium Gallium Arsenide (InGaAs)

is a photo-sensitive material used for detection up to 2.2 μm. The typical sensor architecture for spectroscopy applications is a single row array of up to 25.6 mm.

**sCMOS**

High speed and dynamic range

Newton EMCCD, iXon Ultra EMCCD

Zyla and Marana sCMOS

Scientific CMOS (sCMOS) provides a unique combination of high resolution pixels, high spectral rates up to 27,000 sps, low noise and high dynamic range simultaneously. This technology is perfectly suited for fast transient phenomena or fast extended multi-track analysis.

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**Sensor Type**

<table>
<thead>
<tr>
<th>Back-Illuminated</th>
<th>Deep-depletion</th>
<th>Low dark current</th>
<th>Readout noise suppression</th>
</tr>
</thead>
</table>

**Description**

- Back-Illuminated, low dark current
- Deep-depletion with fringe suppression
- Readout noise suppression

---

**Scientific CMOS (sCMOS)**

- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR

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**InGaAs**

- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR

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**NEW**

- UV-NIR
- UV-NIR
- UV-NIR
- UV-NIR
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† Optimum
iDus CCD Cameras

Workhorse spectroscopy cameras

The iDus is Andor’s most popular platform for the spectroscopy research and OEM communities, suitable for everyday spectroscopy measurements, as well as more advanced, low light detection applications.

Comprehensive Sensor Range

CCD matrix sizes include 1024 x 127, 1024 x 256 and high resolution 2000 x 256 formats with UV and NIR optimized options. Dual AR coating (BEX2-DD) offers the best broadband detection performance and versatility.

High Sensitivity

Best detection capabilities for experiments requiring long exposure times. The iDus range boasts sensor QE option up to 95%, TE cooling down to -100ºC and state-of-the-art Ultravac™ for long-lasting performance. New Low Dark Current Deep-Depletion (LDC-DD) technology offers the best detection capabilities in the near infrared.

Key Applications

Absorption - Transmission - Reflection
Raman (244, 532, 786 and 833 nm)
Fluorescence - Luminescence - Photoluminescence
Plasma studies
Non-linear spectroscopies

Features

Peak QE of 95%
TE cooling to -100 ºC
Ultravac™ – Guaranteed hermetic vacuum seal
26 or 15 µm pixels
Fringe suppression technology for back-thinned and back-illuminated Deep-Depletion option
Deep-Depletion sensor options
Simple opto-mechanical coupling interface
Simple USB 2.0 connection

Benefits

High detector sensitivity options both in VIS and NIR regions
Negligible dark current without the inconvenience of LN$_2$
Permanent vacuum integrity, critical for deep cooling and best sensor performance
Choice of high dynamic range (401 and 420 models) or high resolution (416 model)
Greatly reduces etaloning effect above 650 nm
High NIR QE, low etaloning – ideal for NIR Raman or photoluminescence. Superior broadband detection with Dual-AR technology option (BEX2-DD). Low dark-current (LDC technology (416 model)) – ideal for challenging low light NIR spectroscopy without the need for LN$_2$ cooling
Readily integrate with Andor Kymera and Shamrock spectrograph series
User friendly plug and play connection directly to the back of the camera

Model | Active pixels (µm) | Pixel size (µm) | Deepest cooling | Sensor options
--- | --- | --- | --- | ---
DU416 | 2000 x 256 | 15 x 15 | -90ºC | LDC-DD
DV416 | 2000 x 256 | 15 x 15 | -70ºC | LDC-DD
DU401 | 1024 x 128 | 26 x 26 | -100ºC | BU, BV, OE, BVF
DU401-BF-DD | 1024 x 128 | 26 x 26 | -100ºC | BU, BV, BVF
DU420 | 1024 x 256 | 26 x 26 | -100ºC | BU, BV, BVF
DU420-Bx-DD | 1024 x 256 | 26 x 26 | -100ºC | BU, BV, BVF
DV401 | 1024 x 127 | 26 x 26 | -70ºC | BU, BV, BVF
DV420 | 1024 x 255 | 26 x 26 | -70ºC | BU, BV, BVF

More information at andor.com/learning

Webinar
“Investigating Molecular Properties of Live Cells and Tissues”

Technical Notes
LDC-DD technology for high sensitivity NIR spectroscopy
*Ultravac technology and long-lasting detection performance*

Software
iDusViewer
Andor iDus software

Quantum efficiency (%)

Wavelength (nm)

[Graph showing quantum efficiency across different wavelengths]

Benefits

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Technical Notes
LDC-DD technology for high sensitivity NIR spectroscopy
*Ultravac technology and long-lasting detection performance*
iDus InGaAs

Andor’s platform for large bandpass SWIR spectroscopy

The iDus InGaAs range is a perfect complement to Andor’s UV-VIS-NIR CCD camera family, extending spectral detection capabilities beyond 1.1 μm and up to 2.2 μm.

Choice of Resolution and Bandpass

Both 1.7 and 2.2 μm cut-off option offer high resolution and high capacity pixel sizes (25 and 50 μm respectively) and large band-pass option (1024 pixels / 25.6 mm width) for extended spectral information simultaneous collection.

TE cooling - No need for inconvenient use of LN₂

The Thermo-Electrically cooled, in-vacuum sensors reach cooling temperatures of -90°C where the best signal-to-noise ratio can be achieved for the majority of the applications in this spectral region. Beyond this cooling point blackbody radiation from any elements facing the sensor will dominate the dark signal, and since Quantum Efficiency will be impacted with decreasing cooling temperature, TE cooling will allow access to optimum SNR performance.

Key Applications

- High Quantum Efficiency
- Typical attainable TE cooling to -90°C
- UltraVac™
- Minimum exposure time of 1.4 μsec
- 25 μm pixel width option
- 25.6 mm wide arrays options
- Software selectable output amplifiers
- Simple opto-mechanical coupling interface
- Simple USB 2.0 connection

Benefits

- Maximum sensitivity in the SWIR
- Minimise dark current efficiently without the inconvenience of LN₂
- Ensure best sensor performance and protection in time
- Allows study of fast transient phenomena
- Optimized for high dynamic range and high resolution
- Optimized for Czerny-Turner spectrograph focal plane size
- Choice of High Dynamic Range (HDR) or High Sensitivity (HS)
- Readily integrate with Andor Kymera and Shamrock spectrograph series
- User-friendly plug and play connection directly to the back of the camera

More information at andor.com/learning

Application Note
- Raman and Photoluminescence measurements on laser lithographically written structures in Si

Webinar
- ‘A TE Cooling Approach to SWIR spectroscopy’

Features

- High Quantum Efficiency
- Peak QE >80% for 1.7 μm cut-off
- Peak QE >70% for 2.2 μm cut-off
- Typically attainable TE cooling to -90°C
- UltraVac™
- Minimum exposure time of 1.4 μsec
- 25 μm pixel width option
- 25.6 mm wide arrays options
- Software selectable output amplifiers
- Simple opto-mechanical coupling interface
- Simple USB 2.0 connection

Model

| DU490A-1.7 | 12.8 | 512 x 1 | 25 x 500 | 1.7 |
| DU490A-2.2 | 12.8 | 512 x 1 | 25 x 250 | 2.2 |
| DU491A-1.7 | 25.6 | 1024 x 1 | 25 x 500 | 1.7 |
| DU491A-2.2 | 25.6 | 1024 x 1 | 25 x 250 | 2.2 |
| DU492A-1.7 | 25.6 | 512 x 1 | 50 x 500 | 1.7 |
| DU492A-2.2 | 25.6 | 512 x 1 | 50 x 250 | 2.2 |
Newton CCD

The world’s fastest spectroscopy CCD

When it comes to access simultaneously the best spectral resolution, acquisition rates and detection range flexibility, the Newton CCD cameras always come first.

![Newton CCD Image]

**Fast spectral acquisitions**
The Newton MHz readout platform allows spectral rates up to 1,600 spectra per second with crop mode, ideal for fast microspectroscopy chemical mapping or microfluidics analysis.

**High resolution and high dynamic range spectroscopy**
13.5 µm pixel option allows access to the highest spectral resolution, while 26 µm pixel matrix boasts larger photoelectrons storage capacity and greater dynamic range.

**Key Applications**
- Absorption
- Transmission
- Reflection
- Raman (244, 532, 785 and 833 nm)
- Fluorescence
- Luminescence
- Photoluminescence
- Plasma studies
- Plasmonics
- Fast Transient phenomena study

**Features**
- Multi-megahertz readout
- TE cooling to -100°C
- UltraVac™ - guaranteed hermetic vacuum seal technology
- Down to 13.5 x 13.5 µm pixel size
- Crop mode operation
- Deep-depletion sensor options
- Software-selectable output amplifiers (DU940)
- Simple opto-mechanical coupling interface
- Simple USB 2.0 connection

**Benefits**
- High repetition rates achievable with low noise electronics - ideal for transient phenomena study
- Negligible dark current without the inconvenience of LN₂
- Permanent vacuum integrity, critical for deep cooling and best sensor performance access
- Achieve the highest possible spectral rates of over 1,600 spectra per second
- High NIR QE, virtually etalon-free - ideal for NIR Raman
- Superior broadband detection with Dual-AIR technology option (BEX2-DD)
- Choice of High Dynamic Range (HDR) or High Sensitivity (HS)
- Readily integrate with Andor Kymera and Shamrock spectrograph series
- User friendly plug and play connection directly to the back of the camera

**Model | Active pixels (μm) | Pixels size (μm) | Sensor options**
--- | --- | --- | ---
DU920 | 1024 x 255 | 26 x 26 | BU, BU2, BV, OE, BVF
DU920-BX-DD | 1024 x 256 | 26 x 26 | BR-DD, BEX2-DD
DU940 | 2048 x 512 | 13.5 x 13.5 | BU, BU2, BV, OE, BVF, BR-DD, BEX2-DD

**More information at andor.com/learning**

*Application Note* "Fiber Probe Based Raman spectroscopy Bio-sensor for Surgical Robotics"

![Quantum Efficiency Graph]
iXon Ultra and Newton EMCCD

Speed and sensitivity with no compromise

From the pioneers of EMCCD technology the newly expanded iXon Ultra and Newton™ series have brought low-light spectroscopy to a new level of performance. These cameras offer the absolute combination of sensitivity and acquisition speed for the most demanding photon starved applications.

Highest sensitivity
EMCCDs operate by amplification of weak signal events (down to single photons) to a signal level that is well clear of the read noise floor of the camera at any readout speed. This ‘on-chip’ amplification process is realized without sacrificing the photon collection capability of the sensor. Back-illuminated architecture boosts QE up to 95%, while Andor’s market leading TE cooling to -100°C offers unmatched dark noise performance.

Highest spectral rates
The supercharged iXon Ultra and Newton™ allow access to the highest spectral rates without loss of sensitivity thanks to the EM amplification architecture. The iXon Ultra 888 achieves over 11,990 spectra per second (Crop Mode), while the Newton 970 allows spectral rates in excess of 1,515 spectra per second (Crop Mode) with larger simultaneous bandpass capture capabilities.

Key Applications
- Absorption - Transmission - Reflection
- Raman (244, 532, 633 nm)
- Raman (785 and 833 nm – VP and FI only)
- Fluorescence - Luminescence
- Plasma studies
- Photon counting
- Single molecule spectroscopy

Features
- <1 e- readout noise and up to 95% QE
- Industry benchmark for fast frame and spectral rate
- Cropped mode option
- Ultravac™ technology and TE cooling down to -100ºC
- Software-selectable output amplifiers
- Spectroscopy and Imaging sensor formats available
- Seamlessly integration with Andor spectrographs
- Simple USB 2.0 connection

Benefits
- ‘Silent’ noise floor, perfectly complements high QE performance for extremely low-light detection
- Full vertical binning up to 650 spectra per second or imaging frame rate up to 56 full-frames per second
- Boost spectral rates in excess of few thousand of spectra per second
- Permanent vacuum integrity, critical for deep cooling and best sensor performance access
- Choice of High Sensitivity (low light applications) or Electron Multiplication (ultra-low light applications down to single photon)
- 25 mm wide option for maximum spectral information collection, or up to 13 mm tall option for larger vertical field of view, ideally suited for microspectroscopy.
- Fringe suppression options available for minimizing optical etaloning above 650 nm
- Simple opto-mechanical coupling to Andor Kymera and Shamrock spectrograph series, with all-integrated dedicated software control
- User friendly plug and play connection directly to the back of the camera

More information at andor.com/learning

Webinar
‘EMCCDs for spectroscopy’

Application note
‘Spectral Flow Cytometry’

Model Active pixel matrix Pixel size (μm) Fastest spectral rate Data transfer interface Sensor options
Newton 970 1600 x 200 16 x 16 1,515 sps USB 2.0 BV, BV, BV, UVB, BRF
Newton 971 1600 x 400 16 x 16 1,515 sps USB 2.0 BV, BV, UVB, BRF
iXon Ultra 888 1024 x 1024 13 x 13 11,990 sps USB 3.0 BV, USB, EXP, EX
iXon Ultra 897 512 x 512 16 x 16 9,921 sps USB 2.0 BV, USB, EXP, EX, BRF

Professor Michael Morris
Professor of Chemistry, University of Michigan

“In our lab the Andor Newton™ EMCCD has enabled millisecond Raman spectroscopy and hyperspectral Raman imaging in times as short as a minute or two. And the 1600 x 400 format is just right for spectroscopy.”
NEW Marana & Zyla sCMOS

Speed, sensitivity and dynamic range

The Marana & Zyla scientific CMOS (sCMOS) platforms offers Physical and Life Science spectroscopists seamless access to a unique combination of superfast spectral rates, high sensitivity, high resolution and high dynamic range.

Features
- Up to 95% QE & lowest noise (Marana)
- 4.2 Megapixel sensor and 11µm pixels (Marana)
- 5.5 & 4.2 Megapixel sensor formats and 6.5µm pixels (Zyla)
- Spectral rates greater than 24,000 sps
- Selectable binning bit-depth up to 32-bit
- Better than 99.7% linearity

Benefits
- Maximum signal to noise for light starved measurements, UV sensitivity down to 200nm
- Largest field of view (sCMOS), large simultaneous bandpass acquisition and high dynamic range
- High resolution with ‘zero’ etaloning in the NIR
- Excellent time resolution capabilities for study of transient phenomena through user-definable Region of Interest
- Extend camera dynamic range in extensive on-head binning scenarios
- Unparalleled quantitative measurement accuracy across the full dynamic range

More information at andor.com/learning

Application note
’sCMOS for Ultrafast Spectroscopy’

Applications
- µs-resolved transient absorption
- Fast Hyperspectral imaging
- Fast Multi-track spectroscopy

High dynamic range
The Marana and Zyla sCMOS offer user-configurable, ready-to-analyze binned single spectra or multiple (multi-track) spectra. A unique 32-bit data transmission mode allows the preservation of the signal dynamic range in these extensive spectroscopy binning scenarios.

Highest spectral rates
Market leading spectral rates up to 27,057, ideally suited for high resolution transient spectroscopy applications with 10’s of µs time-resolution. Multi-track mode provides rates up to 6,000 acquisitions/second for hyperspectral imaging and dual-track, kilohertz transient absorption spectroscopy.
iStar Intensified CCD and sCMOS

Industry gold standard for high-resolution, high-speed nanosecond time-resolved spectroscopy

With over 16 years of Excellence in the development of world-class, fast-gated intensified CCD and sCMOS cameras, Andor’s iStar detectors are at the forefront of rapid, nanosecond time-resolved spectroscopy. They extract the very best from CCD/sCMOS sensors and gated image intensifier technologies, achieving a superior combination of rapid acquisitions rates and exceptional sensitivity down to single photon.

Nanosecond time-resolution
Software-controlled, ultra-low-jitter onboard Digital Delay Generator (DDG™) and high-voltage, high-speed gating electronics offer < 2 ns time resolution and ultra-precise synchronisation.

Highest spectral rates
The iStar’s 5 MHz platforms and intelligent Crop and Fast Kinetics modes offer spectral rates in excess of 3,500 sps and, respectively. The iStar sCMOS offers spectral rates up to 4,004 sps.

Key Applications
- Laser Induced Breakdown Spectroscopy (LIBS)
- Time-resolved fluorescence - luminescence
- Transient absorption spectroscopy
- Single molecule spectroscopy
- Time Resolved Raman and Resonance Raman spectroscopy (TR3)

More information at andor.com/learning

Application Notes
- ‘Stand-off LIBS - A detection technique for explosive residues’
- ‘High sensitivity imaging of Thomson scattering signal’

Higher Applications
- Stand-off LIBS - A detection technique for explosive residues
- Time-Resolved Raman and Luminescence
- Transient absorption spectroscopy
- Time-resolved fluorescence - luminescence
- Laser Induced Breakdown Spectroscopy (LIBS)

Features
- USB 2.0 connectivity
- Industry-standard plug and play, lockable and rugged interface
- Seamless multi-camera control from single PC or laptop
- 5 MHz readout platform
- Rapid spectral rates for superior dynamic phenomena characterization
- Comprehensive binning options - Crop and Fast Kinetic mode
- Fully software-customizable binning sequences for highest spectral and image rates. Greater than 3,400 spectra/s continuous rates, up to 29,000 spectra/s in burst mode
- High-resolution sensors and image intensifiers
- Sharpest images and spectrum definition, 100% fill factor for maximum signal collection
- High QE Gen 2 and 3 image intensifiers
- Highest intensifier resolution with QE > 50% and sensitivity up to 1.1 µm
- True optical gating < 2 ns
- Millisecond of a second-time-resolution for accurate transient phenomena study
- Low jitter, on-board digital delay generator
- Highest gating timing accuracy with lowest propagation delay
- Insertion delay as low as 19 ns
- Lowest delay from signal generation to photocathode triggering
- Comprehensive triggering interface
- Software-controlled 3x triggering outputs with 10 ps setup accuracy
- Intelligate™
- Intelligent and accurate MCP gating for better than 1:10⁶ shuttering efficiency in the UV
- 500 kHz sustained photocathode gating
- Maximizes signal-to-noise in high-repetition rate laser-based applications
- TE-couling to -40ºC
- Efficient minimization of CCD dark current and pixel bleomance
- Real-time control interface
- On-the-fly software control of intensifier gain, gating and 3x outputs trigger parameters for real-time detection optimization

Benefits
- Real-time detection optimization
- On-the-fly software control of intensifier gain, gating and 3x outputs trigger parameters for real-time detection optimization

Professor JJ Laserna
Professor of Chemistry, University of Malaga

“The Andor iStar ICCD detectors played a vital role in allowing us to develop this new mobile standoff detection system since their sensitivity allowed us to work with exceedingly low light levels. Furthermore, their refresh rates meant we could analyze spectral information at rates in excess of 10 Hz and, therefore, perform simultaneous Raman and LIBS spectroscopy in real time”.

<table>
<thead>
<tr>
<th>Models</th>
<th>Active Pixel Matrix</th>
<th>Effective Pixel Size (µm)</th>
<th>Image Intensifier Choice (opt. taper)</th>
<th>More information at andor.com/learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>DH320T</td>
<td>1024 x 256</td>
<td>26 x 26</td>
<td>Ø16 mm [1:1]</td>
<td>USB 2.0 connectivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø25 mm [1:1]</td>
<td>Industry-standard plug and play, lockable and rugged interface</td>
</tr>
<tr>
<td>DH334T</td>
<td>1024 x 1024</td>
<td>13 x 13</td>
<td>Ø18 mm [1:1]</td>
<td>USB 2.0 connectivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø25 mm [1:1]</td>
<td>Industry-standard plug and play, lockable and rugged interface</td>
</tr>
<tr>
<td>DH340T</td>
<td>2048 x 512</td>
<td>13.5 x 13.5</td>
<td>Ø18 mm [1:1]</td>
<td>USB 2.0 connectivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø25 mm [1:1]</td>
<td>Industry-standard plug and play, lockable and rugged interface</td>
</tr>
<tr>
<td>iStar sCMOS</td>
<td>2560 x 2160</td>
<td>6.5 x 6.5</td>
<td>Ø18 mm [1:1]</td>
<td>USB 2.0 connectivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ø25 mm [1:1]</td>
<td>Industry-standard plug and play, lockable and rugged interface</td>
</tr>
</tbody>
</table>
Andor’s technical know-how extends far beyond market-leading performance detectors with a comprehensive range of high-end spectrographs. At the heart of this portfolio are the new Kymera and Shamrock platforms, which offer ultimate flexibility and performance with their “out-of-the-box”, pre-aligned and pre-calibrated approach and seamless combination with our highly sensitive spectroscopy cameras. The Mechelle 5000 is Andor’s dedicated detection solution for broadband and high resolution LIBS.

**Shamrock 500i**
Ideal combination of high spectral resolution, imaging capabilities for multi-track acquisitions and monochromator capabilities with single point detector use for detection up to 12 µm. Convenient USB interface, fully motorized platform and accessory range.

**Shamrock 750**
Delivers the highest spectral resolution of the Shamrock range while also featuring monochromator scanning capabilities with single point detectors sensitive up to 12 µm and plug and play, fully motorized interface.

**Shamrock 163**
Patented optical echelle design with band pass ranging from 200 nm to 975 nm and resolution power λ/Δλ of 5,000 across the full wavelength range, all accessible in a single acquisition without the need for moving components.

**Mechelle 5000**
Intelligent and highly configurable, motorized imaging spectrograph with RFID-tagged dual turret, dual detector output ports and seamless interfacing to microscopes for modular micro-Raman or micro-luminescence setups.

**Kymera 193i**
Intelligent, modular and compact imaging spectrograph with Active Focus technology (patented), fully motorized, RFID-tagged dual grating turret, dual detector output ports and seamless interfacing to microscopes for modular micro-Raman or micro-luminescence setups.

**Kymera 328i**
Intelligent and highly configurable, motorized imaging spectrograph with RFID-tagged dual turret (4-axes rotation), Active Focus technology (patented), user-controlled TrueFlex spectral resolution enhancement, dual input and output ports for ease of integration into complex experiments or microscope spectroscopy systems.

**Kymera 500i**
Patented optical echelle design with band pass ranging from 200 nm to 975 nm and resolution power λ/Δλ of 5,000 across the full wavelength range, all accessible in a single acquisition without the need for moving components.

**Techniques**
- Absorption - Reflection
- Fluorescence - PL - CL
- Raman (inc. SERS, CARS)
- Non-linear spectroscopies (inc. SHG, SFG)
- LIBS
- OES (plasma studies)
- Single molecule spectroscopy
- Multi-track spectroscopy

- Suitable
- Optimum
**NEW**

**Kymera 193i**

**Versatile, intelligent and compact imaging spectrograph**

The Kymera 193i is a compact imaging spectrograph with F/3.6 aperture which, when combined with Andor’s world-class range of ultra-sensitive UV-NIR and SWIR detectors, offers a ‘workhorse’ spectroscopy platform with superb photon collection efficiency.

**Features**

- 193 mm focal length
- F/3.6 aperture
- USB 2.0 and I2C interface
- Dual output port
- Motorized dual grating turret with eXpressID™
- Astigmatism-corrected optical design
- Silver-protected coated optics options
- Compact and rugged design
- μManager software control
- 10 Hz shutter with 40 Hz burst mode

**Benefits**

- Provides typical resolution of 0.21 nm with a 1200 l/mm @ 500 nm and up to 0.1 nm with a 2400 l/mm grating @ 300 nm
- High throughput design suitable for photon starved applications such as single molecule microspectroscopy
- Easy control of both spectrograph and Andor USB detectors through laptops
- Maximum detection flexibility to cover the widest wavelength range by combining UV-Vis-NIR, CCDs with SWIR InGaAs sensor
- Precise indexing design and easy hatch access for rapid in-field upgrade
- User-friendly software controlled with automatic RFID-based grating turret details upload
- Extremely high fidelity image relay of a microscope sample image through the new 15 mm wide aperture slit – imaging and spectroscopic analysis can be performed through one single optical path
- Ideal for rapid background series acquisition and fast imaging or multi-track applications
- Extended lifetime > 1 million cycles

**Key Specifications**

| Kymera 193i |
|------------------|------------------|
| Aperture (F/#) | F/3.6 |
| Focal length | 193 mm |
| Imaging corrected optics | UV-NIR and SWIR |
| Resolution | 0.21 nm |
| Slit options | Adjutable (manual): 10 μm to 2.5 mm |
| Motorized: 10 μm to 2.5 mm |
| Wide aperture: Motorized 10 μm to 2.5 mm, manual to 15 mm |
| Operation | Motorized, USB2.0 and I2C |
| † Nominal values using 1200 l/mm grating, 13.5 μm pixel and 27.6 mm wide sensor, 500 nm central wavelength. |

**Ease of use**

The RFID-based technology eXpressID™, indexed dual-grating turret, dual output port and extensive accessories range provide a highly configurable, yet compact platform to best match Academic and OEMs specific performance requirements.

**Key Applications**

- Absorption - Transmission - Reflection (UV-NIR and SWIR)
- Raman (244, 532, 785, 833 and 1064 nm)
- Fluorescence - Luminance (UV-NIR and SWIR)
- Micro Raman and Micro-fluorescence
- Single molecule spectroscopy
- Photon counting

**Adaptive Focus Technology (patented)**

‘Intelligent’ motorized adaptive focus allows access to the very best spectral resolution performance in any configuration with un-matched repeatability.

**Looking for a manually-controlled, compact, general benchtop spectroscopy platform?**

The Shamrock 163 is a manually controlled, single grating spectrograph designed for setups with lower integration and automatization/motorization constraints. More details can be found at andor.com/163.
The Kymera 328 mm focal length imaging spectrograph offers a highly configurable platform, with advanced user controls to always access the very best spectral performance for routine measurements and more demanding optical setups.

**Quad Turret**
Combines up to 4 gratings for greater flexibility in one single setup - more choice of resolution or blaze options at the touch of a button without grating turret swapping.

eXpressID™, RFID-based technology ensures seamless recognition and upload of all important turret parameters automatically to the spectrograph.

**TruRes™**
Intelligent spectral resolution enhancement at the touch of a button, which greatly expands your spectrograph performance capabilities and range. This provides a unique ability to precisely tune the resolution needed for your applications without the need for multiple grating sets.

**Key Specifications**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Kymera 328i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture (F/#)</td>
<td>F/4.1</td>
</tr>
<tr>
<td>Focal length</td>
<td>328 mm</td>
</tr>
<tr>
<td>Imaging corrected optics</td>
<td>Yes (multi-track capabilities)</td>
</tr>
<tr>
<td>Bandpass†</td>
<td>61 nm</td>
</tr>
<tr>
<td>Grating turret</td>
<td>Quad grating, motorized, interchangeable, RHU</td>
</tr>
</tbody>
</table>
| Slit options                 | Adjustable (manual): 10 µm to 2.5 mm  
Wide aperture: Motorized 10 µm to 2.5 mm, manual to 15 mm |

† Nominal values using 1200 l/mm grating, 13.5 µm pixel and 27.6 mm wide sensor, 500 nm central wavelength. ** With TruRes™ option

**Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>328 mm focal length, F/4.1 aperture</td>
<td>Ideal combination for a wide range of applications ranging from luminescence/photoluminescence spectroscopy to more demanding, higher resolution Raman spectroscopy or plasma studies</td>
</tr>
<tr>
<td>Adaptive Focus (patented)</td>
<td>Intelligent and user-friendly interface for uncompromised high spectral resolution performance</td>
</tr>
<tr>
<td>Motorized quad-grating turret with eXpressID™ RFID technology</td>
<td>Seamless field-upgradability with precise indexing interface and user-friendly hatch access. Automatic gratings recognition and setup with embedded RFID tags - minimum user interaction.</td>
</tr>
<tr>
<td>TruRes™</td>
<td>True spectral resolution enhancement at the touch of a button. Fully user-controlled feature to extract the very best spectral performance for a wide range of applications without the need for multiple grating sets.</td>
</tr>
</tbody>
</table>

**Additional Information**

More information at andor.com/learning
Accessory Tree
Please refer to p37
Resolution Calculator
andor.com/calculators

**Key Applications**

Absorption - Transmission - Reflection (UV-NIR and SWIR)  
Raman (244, 532, 785, 833 and 1064 nm)  
Photoluminescence - Luminescence (UV-NIR and SWIR)  
Micro-Raman and Micro-fluorescence  
Plasma studies and LIBS
Shamrock 500i and 750

Research grade modular high resolution spectrographs

The Shamrock 500i and 750 imaging spectrographs are research-grade, high performance, motorized and rugged platforms designed for working with demanding low-light applications, but equally suited to routine measurements.

Versatility

The Shamrock series offers a choice of high resolution, highly modular, multi-input and output platforms with a wide range of field-upgradable accessories, including indexed triple grating turrets, motorized slits and filter wheels, shutters, multi-way (multi-track) fiber optics, IR single point detectors, scanning accessories and microscope coupling interfaces.

The right resolution for your experiment

With focal lengths of 500 and 750 mm, researchers have access to a wide range of spectral resolution performance, down to 0.02 nm for plasma spectroscopy or up to a few nanometers for broadband luminescence / photoluminescence spectroscopy. Each Shamrock comes with a choice of three software-selectable gratings (or flat mirror) that offers maximum flexibility with both broadband and high resolution options available.

Key Applications

Absorption - Transmission - Reflection (UV-NIR and SWIR)
Raman (244, 532, 785, 833 and 1064 nm)
Photoluminescence - Luminescence (UV-NIR and SWIR)
Micro Raman and Micro-fluorescence
Proton coating
Single molecule spectroscopy
Photon counting

Features

Pre-aligned, pre-calibrated detector and spectrograph systems
USB 2.0 interface
Triple exchangeable grating turret
Double detector outputs
Wide range of accessories available
Monochromator capabilities
Gold and silver optics coating options

Benefits

Motorized, individually factory-calibrated systems – “out-of-the-box” operation and seamless integration to experimental set-ups
Maximum light throughput with multitrack capabilities
Plug and play connectivity, ideal for laptop operation alongside multi-USB camera control
Precision kinematic mount for precise in-field upgrade
For extended wavelength coverage when combining Andor UV-VIS-NIR CCD and InGaAs cameras
Extract best optical resolution while allowing use of single point detectors with sensitivity up to 12 μm
Most efficient for NIR detection when used in conjunction with Andor InGaAs cameras and single point detectors

Spectrograph Specifications Comparison

<table>
<thead>
<tr>
<th></th>
<th>Kymera 328i</th>
<th>500i</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture ratio (f/#)</td>
<td>4.1</td>
<td>6.5</td>
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<tr>
<td>Focal length (mm)</td>
<td>328</td>
<td>500</td>
<td>750</td>
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<tr>
<td>Wavelength Resolution (nm)</td>
<td>0.1 → 0.07**</td>
<td>0.06</td>
<td>0.04</td>
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<tr>
<td>Band pass (nm)</td>
<td>61</td>
<td>80</td>
<td>78</td>
</tr>
<tr>
<td>Multi-track capability</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

* Nominal values using 1200 l/mm grating, 13.5 μm pixel and 27.6 mm wide sensor, 500 nm central wavelength.
** With TruRes™ option
Andor’s Mechelle 5000 spectrograph is based on the echelle grating principle with a patented optical design provides extremely low crosstalk and maximum resolution compared with other spectrographs. It is designed to operate with both Andor’s iKon CCD camera and the iStar DH334T intensified camera in applications including LIBS and plasma studies.

Simultaneous high bandpass and resolution

The Echelle spectrograph design allows capture of multiple grating orders in one single acquisition, leading to a spectral coverage of over 750 nm from 200 – 975 nm, while also offering a constant high resolution power up to 6,000 across the entire wavelength range.

Key Applications
- Laser Induced Breakdown Spectroscopy (LIBS)
- Plasma studies

Spectrograph Specifications
- Wavelength range (nm): 200 - 975
- Focal length (mm): 195
- Aperture: F/7
- Spectral resolution (λ/Δλ) (corresponding to 3 pixels FWHM): 6,000
- Wavelength accuracy: Better than ± 0.05 nm
- Optical adjacent order cross-talk: Better than 1 x 10^-2
- Stray light: Better than 1.5 x 10^-4

Features
- Compact and robust design with no moving components
- Patented optical design
- Auto-temperature correction
- N₂ purged
- Pre-aligned detector/spectrograph solution
- Low F/number
- Wide range of accessories available

Benefits
- Ideal for lab and OEM system integration
- Ensures maximum resolution and extremely low crosstalk
- Corrects for the variation of prisms optical refractive index with temperature
- Enables maximum throughput in the UV region
- Enables fast and efficient experimental set-up
- Highly efficient light collection
- Including fiber optics, slits, aiming laser, collector/collimator and calibration lamps
Modularity is Andor’s ethos when it comes to spectroscopy systems, because every researcher’s requirements are unique. This translates into the need for an extensive range of state-of-the-art accessories, from light collection to signal analysis and detection.

Andor combines over 25 years of expertise in the fields of optics, mechanics and electronics, from designing complex interfaces to extract the very best of its market leading detectors and spectrographs, to working alongside key suppliers worldwide. The result is Andor’s ability to offer a comprehensive range of high performance dedicated or extremely versatile accessories, ranging from multi-cord fiber optics to sample chamber, light sources, gratings, slits and third party instruments interfaces including microscopes and VUV monochromators.

More information at [andor.com/learning]
Research spectroscopy applications demand powerful software tools that provide everything from seamless configuration of spectrographs and cameras to actual data acquisition optimization. Andor’s Solis software and Software Development Kit (SDK) offer a truly powerful, yet user-friendly modular approach to spectroscopy.

Software

Andor SDK features a comprehensive library of camera and spectrograph controls, ideally suited for complex experiments integration including third-party hardware control and SDK - i.e., microscope motorized stages or light sources - and user-specific data analysis protocols. Available as 32 and 64-bit libraries for Windows (7, 8, 8.1 and 10) and Linux, the SDK provides a suite of functions that allow configuration of the data acquisition process in a number of different ways. The dynamic link library can be used with a wide range of programming environments including C/C++, C#, VB.NET, Labview and Matlab.

New

Software Development Kit (SDK)

This third party software platform offers extensive control of microscope and microscope accessory devices as well as Andor’s Kymera 193i and 328i spectrographs and spectroscopy cameras, allowing simple control of complex microspectroscopy experiments.

Software Development Kit

Andor SDK features a comprehensive library of camera and spectrograph controls, ideally suited for complex experiments integration including third-party hardware control and SDK - i.e., microscope motorized stages or light sources - and user-specific data analysis protocols. Available as 32 and 64-bit libraries for Windows (7, 8, 8.1 and 10) and Linux, the SDK provides a suite of functions that allow configuration of the data acquisition process in a number of different ways. The dynamic link library can be used with a wide range of programming environments including C/C++, C#, VB.NET, Labview and Matlab.

Software for Spectroscopy

Modular Raman spectroscopy, Laser Induced Breakdown Spectroscopy (LIBS) and Plasma diagnostics are only a few examples of applications where Andor Solis Spectroscopy allows researchers to truly focus on their own experimental challenges. With its unique interactive real-time control interface, users can optimize system optical performance through wavelength, gratings and entrance/exit slit selection at the touch of a button, while accessing all key detectors acquisition parameters to optimize the quality of the signal. Solis also features a comprehensive range of acquisition options including ultrafast kinetic series and “Crop mode” operation, simultaneous multi-track recording, photon-counting mode, and time-resolved series capture for lifetime fluorescence studies.

Solis Scanning

With detection capabilities ranging from UV to the Long Wave IR (LWIR) region through a comprehensive range of single point detectors - including PMTs, PbS and MCT, Solis Scanning offers a dedicated platform for scanning applications. Spectrograph/monochromators, detectors, data acquisition unit, lock-in amplifier / chopper and motorized accessories can all be conveniently synchronised through a series of intuitive interfaces. A single software package features a comprehensive step-by-step experiment building interface for parametrising and synchronising all components of the detection chain.

Complex scanning sequences involving multiple gratings, filters and up to two monochromators for fluorescence measurements - including a tunable light source setup - can be seamlessly captured prior to acquisition start and executed without further intervention of the user. Solis Scanning can also handle multiple detectors control and data display for Absorption - Transmission - Reflection spectroscopy, while offering post-acquisition mathematical data processing covering simple ratios and lifetime measurements to fast phenomena analysis.

μManager

μManager

This third party software platform offers extensive control of microscope and microscope accessory devices as well as Andor’s Kymera 193i and 328i spectrographs and spectroscopy cameras, allowing simple control of complex microspectroscopy experiments.

More information at andor.com/software
Spectrograph Accessories

Access to a wide range of detection system configurations is the basis of Andor’s modular approach to spectroscopy. That is why Andor is continuously and dynamically expanding its range of field-upgradable accessories to meet the ever-growing demand from researchers. This now includes enhanced options for combining microscopy and spectroscopy.

Looking for light coupling interfaces to Andor spectrographs?

Get an instant view of all standard accessories and follow the configuration trees to check for compatibility.

Can’t see exactly what you are looking for?

Do you want a grating with a different groove density or a different blaze angle, FC connection instead of SMA or custom light coupling between microscope and spectrograph? Andor’s experienced and dedicated Customer Special Request (CSR) team will be eager to discuss your specific needs.

More information at andor.com/learning

Specification sheets andor.com/spectrographs

Resolution calculator andor.com/calculators
Fiber Optics Solutions

Fiber optic is one of the most convenient ways to collect and transport light from an experimental set-up to a spectrograph-based detection solution. Andor’s series of “round-to-line”, multi-core fiber optic bundles maximizes the signal collection by positioning the multiple cores alongside the spectrograph entrance slit. Andor works with industry leading manufacturers to deliver solutions which meet any user requirement.

<table>
<thead>
<tr>
<th>Fiber Reference</th>
<th>Number of legs</th>
<th>Fiber Core Diameter</th>
<th>Optimized Wavelength</th>
<th>Number of fiber cores per leg</th>
<th>a (mm)</th>
<th>b (mm)</th>
<th>c (mm)</th>
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<td>4.66</td>
<td>-</td>
</tr>
</tbody>
</table>

Key Specifications

- UV-Vis and Vis-NIR optimized options
- Numerical Aperture = 0.22
- 100 and 200 μm fiber core options
- From 1 to 5 leg options as standard
- Standard SMA connectors to Ø 11 mm Andor ferrule
- 2 m overall length – setup convenience and minimum transmission losses
- Re-enforced shell and ruggedized connecters
- Compatible with Andor Kymera and Shamrock F/number matchers and X-Y adjusters

Have you found what you are looking for?

Need a different fiber core size? A longer overall cable? FC connectors? Additional channels or legs?
Please contact your local Andor representative to discuss your specific needs.
Adding structural and chemical spectral analysis to Microscopy images of bio-samples such as cells and proteins, or materials such as polymers or semiconductors, is of ever increasing demand amongst the research community. Andor’s range of modular interfaces feature cage systems couplers, allowing endlessly configurable connections between Kymera and Shamrock spectrographs and a wide range of market leading microscopes such as Nikon, Olympus, Leica and Zeiss. The “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.

**Key Applications**
- Micro-Raman
- Micro-Fluorescence - luminescence
- Micro-LIBS

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**Features**
- C-mount interfaces
- Microscope feet
- Wide-aperture slit
- Thorlabs or Linos cage systems compatible interfaces
- EMCCD compatible
- Software Development Kit

**Benefits**
- Seamless integration of Kymera and Shamrock spectrograph-based systems to market leading upright and inverted microscopes
- Microscope left or right inverted output options – matches precisely Kymera and Shamrock spectrograph optical height for accurate opto-mechanical coupling
- Up to 12 mm field of view - Andor’s imaging-optimized spectrographs allow high quality sample image relay, without compromise in spectral information collection through the same optical channel
- Fully user-configurable optical setups for Micro-Luminescence and Micro-Raman – compatible with 16, 30 and 60 mm versions
- Andor Newton™ and iXon platforms offer a unique combination of single photon sensitivity and high spectral rate and frame rate for challenging low-light spectroscopy
- Enables seamless integration with third-party hardware and SDK under Labview, C/C++ and Visual Basic

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**Adjustable spectrograph foot set**
- Leica DMi 8000 / 6000B
- Leica DMi 8
- Nikon Eclipse Ti series
- Nikon TE-2000
- Olympus IX71/81 (left port)
- Olympus IX73/83
- Zeiss Axiocamt 200
- Zeiss Axi Observer

**Microscope fixed foot set**
- Kymera 193i/328i
- Shamrock 500i/750

**Microscope to cage system adapter**
- TR-DMi-MNT-150
- TR-NKTE-MNT-150
- TR-DLOX-MNT-150
- TR-ZSAV-MNT-150
- TR-ZAXO-MNT-150
**Scanning Accessories**

**The perfect complement to Andor’s multi-channel detector portfolio**

These accessories provide a perfect complement to Andor’s extensive range of market leading CCD, ICCD, InGaAs and EMCCD detectors. Shamrock and Kymera spectrograph double detector output configurations allow detection from 180 nm to 12 μm with one single setup. A Solis Scanning software platform provides a dedicated single interface for seamless setup and synchronizing of single point detectors, spectrographs, data acquisition unit and lock-in amplifiers, with an intuitive interface for complex experiment acquisition sequences.

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**Features**

- Wide range of single point detectors
- Seamless integration with Kymera and Shamrock spectrographs
- Gold/silver optics coating options
- Dedicated software interface
- Three acquisition modes
- USB 2.0 connectivity

**Benefits**

- Selection of PMTs, silicon photodiode, InGaAs, PbS, InSb and MCT detectors for sensitivity up to 12 μm
- All detectors include spectrograph flange for easy opto-mechanical coupling
- Ensures monochromator maximum throughput in the infrared region of the spectrum – MCT and InSb detectors include gold-coated focusing optics for maximum detection efficiency
- 1) Individual set-up interface for SPD, HV power supplies, photon counting and data acquisition units, lock-in amplifiers and monochromators, 2) Experiment builder interface for complex experiments involving sequential selection of gratings, filters or monochromators, 3) Dedicated GUI for data display and manipulation, including mathematical operators and FFT options
- Versatile interface for scanning monochromator, time-resolved and photon counting

**Specification sheets**

More information at andor.com/learning

**Part reference**

- **Detector type**
- **Wavelength coverage**
- **Active area (mm)**
- **Cooling**

<table>
<thead>
<tr>
<th>Part reference</th>
<th>Detector type</th>
<th>Wavelength coverage</th>
<th>Active area (mm)</th>
<th>Cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC-SR-ASM-0042</td>
<td>MCT *</td>
<td>2-1.2 μm</td>
<td>1 x 1</td>
<td>LN</td>
</tr>
<tr>
<td>ACC-SR-ASM-0043</td>
<td>InSb *</td>
<td>1.5-5 μm</td>
<td>32</td>
<td>LN</td>
</tr>
<tr>
<td>ACC-SR-ASM-0044</td>
<td>InGaAs</td>
<td>0.8-1.9 μm</td>
<td>33</td>
<td>Room temperature</td>
</tr>
<tr>
<td>ACC-SR-ASM-0046</td>
<td>Si</td>
<td>200-1100 nm</td>
<td>8 x 24</td>
<td>Room temperature</td>
</tr>
<tr>
<td>ACC-SR-ASM-0047</td>
<td>PMT (R928)</td>
<td>185-900 nm</td>
<td>8 x 24</td>
<td>Room temperature</td>
</tr>
<tr>
<td>ACC-SR-ASM-0048</td>
<td>PMT (R1527P)</td>
<td>165-480 nm</td>
<td>8 x 24</td>
<td>Room temperature</td>
</tr>
</tbody>
</table>

\* Including gold-focusing mirror for maximum signal collection

**Part reference**

- **Function**
- **Features**

<table>
<thead>
<tr>
<th>Part reference</th>
<th>Function</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC-SR-ASZ-0053</td>
<td>HV power supply for PMT</td>
<td>0 to 1.5 kV software-controlled range for PMT gain adjustment</td>
</tr>
<tr>
<td>ACC-SR-ASZ-0054</td>
<td>Photon counting unit for PMT</td>
<td>Software-selectable discrimination thresholds</td>
</tr>
<tr>
<td>ACC-SR-ASZ-0055</td>
<td>Data acquisition unit</td>
<td>USB 2.0 interface, includes 2x SPD acquisition channels, 2x analog outputs for PMT, HV power supply control and connections to lock-in amplifiers **</td>
</tr>
</tbody>
</table>

\* Recommended models include SRS SRS30 with associated SRS40 chopper
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- Novel enabling detector technology

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• Training services can be provided on-site or remotely via the Internet
• A testing service to confirm the integrity and optimize the performance of existing equipment in the field is also available on request.

A range of extended warranty packages are available for Andor products giving you the flexibility to choose one appropriate for your needs. These warranties allow you to obtain additional levels of service and include both on-site and remote support options, and may be purchased on a multi-year basis allowing users to fix their support costs over the operating life cycle of the products.