

PIXIS 科研级成像型和光谱型 CCD 相机

PIXIS 系列相机是集成度高，低噪声设计的科学成像/光谱相机，响应范围从紫外到近红外。PIXIS 是一款提供全金属真空封存，深度制冷的科研级 CCD 相机，且真空质量终生质保。PIXIS 成为高要求的低光实验中理想的选择。



PIXIS 系列相机是集成度高，低噪声设计的科学成像/光谱相机，响应范围从紫外到近红外。结合普林斯顿仪器专利的 XP 制冷技术，PIXIS 是一款提供全金属真空封存，深度制冷的科研级 CCD 相机，且真空质量终生质保。高量子效率，超低噪声电子电路，使得 PIXIS 成为高要求的低光实验中理想的选择：例如拉曼光谱，波什-爱因斯坦凝聚态（BEC），太阳能器件检测，荧光实验等等。PIXIS 相机可以选择 eXcelon 镀膜技术，增加其敏感度同时抑制近红外波段的干涉现象。

PIXIS 相机具有以下特点：

支持不同芯片尺寸

频谱响应从 ~ 120nm 至 ~1100nm（紫外到近红外）波段，更有 eXcelon 抗干涉技术 eXcelon technology

独特的全金属真空封存技术

灵活的读出设置

高速 USB2.0 接口

功能强大的 64 位 LightField 操作平台

产品特点：

1. 探测范围 120nm 至 1100nm:

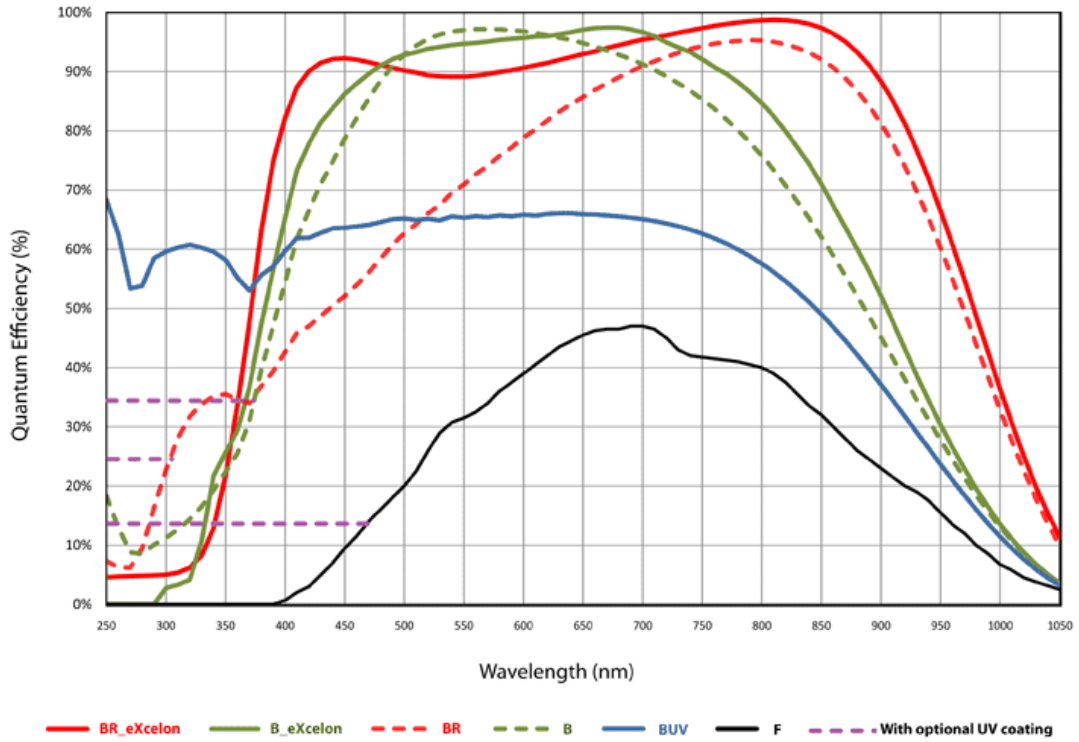
可满足各类实验需求

可选高于 95%的量子效率

紫外波段超高的量子效率，可选择紫外增强型 CCD 或者 Unichrome/Lumogen phosphor 镀膜

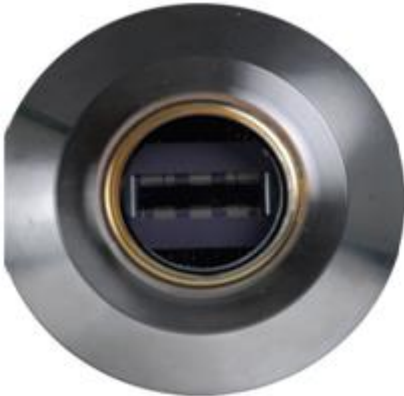
结合 eXcelon 技术，提升相机的敏感度

Quantum Efficiency Data



2. 独特的真空技术

PIXIS 提供空气或液体深度冷却至 -90°C ，为长时间曝光提供超低暗电流。单输入窗口提供最大的灵敏度与免维护操作。



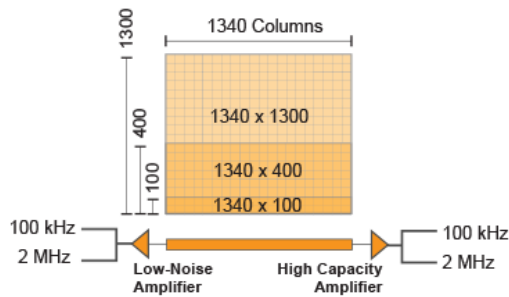
3. 使用 eXcelon™ 技术增强灵敏度

eXcelon™ 这项技术提高了像素的灵敏度，提供了更高的量子效率和减少了电子转移。

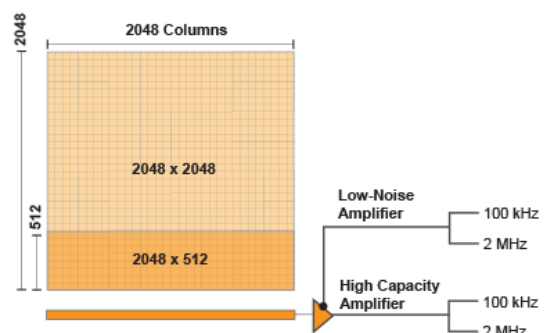


4. 终极灵活性

双放大器读出设计允许优化系统性能。高灵敏度放大器可降低微弱信号的读取噪声，高容量放大器可提供更大的有效动态范围。



Dual-amplifier architecture of PI proprietary 1340 x 100, 400 and 1300 series of CCD devices

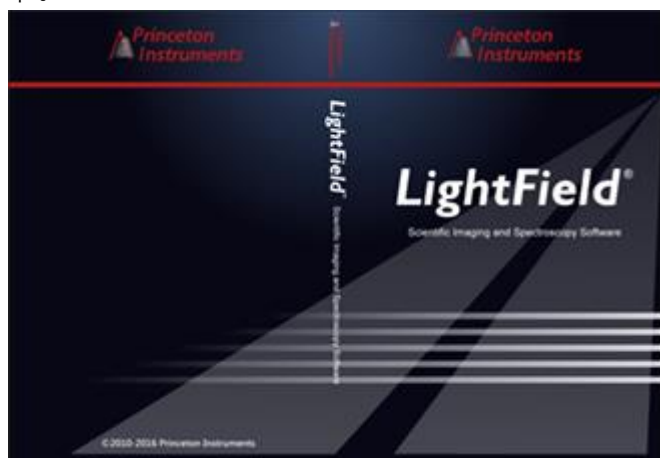


Dual-mode amplifier architecture of 2048 x 512 and 2048 x 2048 series of CCD devices

5. 由 LightField 软件提供支持

强大和直观的软件与内置的数学引擎允许完全控制相机和光谱仪，实时图像分析和光谱数据。

LightField 软件将硬件控制和直接数据采集无缝集成到诸如 National Instruments 的 LabVIEW®和 MathWorks 的 MATLAB®等程序中。该软件还完全支持智能自动波长和强度校准。





产品参数:

B: Back-illuminated R: Deep-depletion

F: Front-illuminated X: eXcelon technology

1 . PIXIS: 1024

	 PIXIS: 1024BR_eXcelon	PIXIS: 1024BR	 PIXIS: 1024B_eXcelon	PIXIS: 1024B/BUV	PIXIS: 1024F
Features	Back-illuminated, deep depletion CCD with eXcelon technology. Highest QE in the UV and the NIR. No etaloning.	Back-illuminated, deep depletion CCD. High QE in the NIR and no etaloning.	Back-illuminated CCD with eXcelon technology. Highest QE in the visible and high QE in the NIR. Extremely low etaloning. 5x - 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible region. Special BUV version offers the highest sensitivity in the UV region.	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.
CCD Image Sensor	Princeton Instruments' proprietary CCD with eXcelon technology, grade 1, NIMO	e2v CCD47-10 back-illuminated deep depletion, grade 1, NIMO	Princeton Instruments' proprietary CCD with eXcelon technology, grade 1, AIMO	e2v CCD47-10 back-illuminated, grade 1, AIMO	e2v CCD47-10 front-illuminated, grade 1, AIMO
Dark current @ -70°C (e-/p/sec)	0.02 (typical) 0.07 (max)	0.02 (typical) 0.07 (max)	0.0004 (typical) 0.001 (max)	0.0004 (typical) 0.001 (max)	0.0002 (typical) 0.0007 (max)
CCD UV coating	Optional UV coating (not needed for BUV version)				
CCD format	1024 x 1024 imaging pixels; 13 x 13 μm pixels; 100% fill factor				
Imaging area	13.3 x 13.3 mm (optically centered)				
Lens mount	Adjustable C-mount with integral 25mm shutter; spectrometer adapter available				
Deepest cooling temperature	-90°C typical; -70°C guaranteed, specified at ambient temperature of +20°C				
Thermostating precision	±0.05°C				
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II liquid circulator available)				
Full well: Single pixel	100 ke- (typical), 60 ke- (min)				
Output node	250 ke- (typical), 220 ke- (min)				
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit				
System read noise @100 kHz	3.0 e- rms (typical), 5 e- rms (max)				
@2 MHz	9.0 e- rms (typical), 15 e- rms (max)				
Vertical shift speed	< 3.2 μsec/row to 18 μsec/row (programmable)				
Non-linearity	<1% @ 100 kHz				
Software selectable gains	1, 2, 4 e-/ADU (typical); available at all speeds				
Operating systems supported	Windows 8/7 (64-bit) and Linux (64-bit), Windows 8/7/XP (32-bit)				
Data interface	USB2.0 (5m interface cable provided); Optional Fiberoptic interface is available for remote operation				
I/O signals	Two MCX connectors for programmable frame readout, shutter, trigger in				
Operating environment	+5 to +30°C non-condensing				
Certification	CE				
Dimensions / Weight	16.59 cm (6.53") x 11.81 cm (4.65") x 11.38 cm (4.48") (L x W x H) / 2.27 kg (5 lbs)				

All specifications subject to change



2 . PIXIS: 1300

	PIXIS: 1300F	PIXIS: 1300B_eXcelon	PIXIS: 1300B	PIXIS: 1300BR
Features	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.	Back-illuminated CCD. Highest sensitivity in the visible region. High sensitivity in the NIR. Extremely low etaloning. 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible region.	Back-illuminated, deep depletion CCD. Ideal for NIR applications. Highest sensitivity and no etaloning.
CCD Image Sensor	Princeton Instruments' proprietary CCD, front-illuminated, grade 1, AIMO	Princeton Instruments' proprietary CCD, grade 1, AIMO	Princeton Instruments' proprietary CCD, back-illuminated, grade 1, AIMO	Princeton Instruments' proprietary CCD, back-illuminated deep depletion, grade 1, NIMO
Dark current @ -60°C (e-/p/sec)	0.01 (typical) 0.05 (max)	0.01 (typical) 0.05 (max)	0.01 (typical) 0.05 (max)	0.32 (typical) 0.65 (max)
CCD UV coating	Optional UV coating			
CCD format	1340 x 1300 imaging pixels; 20µm x 20µm pixels; 100% fill factor			
Imaging area	26.8 x 26 mm (optically centered)			
Lens mount	F-mount with integral 45mm shutter			
Deepest cooling temperature	< -70°C (typical), -60°C (guaranteed) with CoolCUBEII liquid circulator < -65°C (typical), -55°C (guaranteed) with air			
Thermostating precision	±0.05 °C			
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II required)			
Full well: Single pixel Output node	250 ke- (typical), 200 ke- (min) 1000 ke- (typical), 800 ke- (min)			
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit			
System read noise @ 100kHz @ 2MHz	2 e- rms (typical), 3 e- rms (max) 12 e- rms (typical), 16 e- rms (max)			
Vertical shift speed	27 µsec/row (programmable)			
Non-linearity	<1% @ 100kHz			
Software selectable gains	1, 2, 4 e-/ADU (low noise output); 3.5, 7, 14 e-/ADU (high capacity output)			
Operating systems supported	Windows 8/7 (64-bit) and Linux (64-bit), Windows 8/7/XP (32-bit)			
Data interface	USB2.0 (5m interface cable provided); Optional Fiberoptic interface is available for remote operation			
I/O signals	Two MCX connectors for programmable frame readout, shutter, trigger in			
Operating environment	+5 to +30°C non-condensing			
Certification	CE			
Dimensions / Weight	19.51cm (7.67") x 11.81cm (4.65") x 11.38cm (4.48") (L x W x H) / 2.5kg (5.5lbs)			

3 . PIXIS: 2048



	PIXIS: 2048F	PIXIS: 2048B_eXcelon	PIXIS: 2048B	PIXIS: 2048BUV/BR*
Features	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.	Back-illuminated CCD. Highest sensitivity in the visible region. High sensitivity in the NIR. Extremely low etaloning. 100x lower dark charge than the BR.	Back-illuminated CCD. Highest sensitivity in the visible region.	UV enhanced, back-illuminated (BUV) and back-illuminated, deep depletion (BR) CCDs. BUV has highest sensitivity in 200 - 375nm range and is ideal for UV applications. BR CCD has highest sensitivity & extremely low etaloning, and is ideal for NIR applications.
CCD Image Sensor	e2v CCD42-40 front-illuminated, grade 1, AIMO	Princeton Instruments' proprietary CCD, grade 1, AIMO	e2v CCD42-40 back-illuminated, grade 1, AIMO	e2v CCD42-40 back-illuminated and back-illuminated deep depletion, grade 1, NIMO
Dark current e-/p/s @ -60°C	0.002 (typical) 0.006 (max)	0.005 (typical) 0.02 (max)	0.005 (typical) 0.02 (max)	0.2 (typical) 2 (max)
CCD UV coating	Optional UV coating			
Quantum efficiency	See graph, next page			
CCD format	2048 x 2048 imaging pixels; 13.5 x 13.5- μ m pixels; 100% fill factor			
Imaging area	27.6 x 27.6 mm (optically centered)			
Lens mount	F-mount with integral 45 mm shutter			
Deepest cooling temperature	< -70°C (typical), -60°C (guaranteed) with CoolCUBE II liquid circulator < -65°C (typical), -55°C (guaranteed) with air			
Thermostating precision	\pm 0.05°C			
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II required)			
Full well: Single pixel Output node	100 ke- (typical), 80 ke- (min) 1000 ke- (typical), 800 ke- (min)			
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit			
System read noise @ 100 kHz @ 2 MHz	3.5 e- rms (typical), 5 e- rms (max) 12 e- rms (typical), 16 e- rms (max)			
Vertical shift speed	32.2 μ sec/row (programmable)			
Non-linearity	<2% @ 100 kHz			
Software selectable gains	1, 2, 4 e-/ADU (low noise input); 3.5, 7, 14 e-/ADU (high capacity output)			
Operating systems supported	Windows 8/7 (64-bit) and Linux (64-bit), Windows 8/7/XP (32-bit)			
Data interface	USB2.0 (5m interface cable provided); Optional Fiberoptic interface is available for remote operation			
I/O signals	Two MCX connectors for programmable frame readout, shutter, trigger in			
Operating environment	+5 to +30°C non-condensing			
Certification	CE			
Dimensions / Weight	19.51 cm (7.67") x 11.81 cm (4.65") x 11.38 cm (4.48") (L x W x H) / 2.5 kg (5.5 lbs)			

4 . PIXIS:100
1340 x 100

	 PIXIS: 100BR_eXcelon	PIXIS: 100BR	 PIXIS: 100B_eXcelon	PIXIS: 100B	PIXIS: 100F
Features	Back-illuminated, deep depletion CCD with eXcelon technology. Highest average QE from the UV to the NIR with negligible etaloning.	Back-illuminated, deep depletion CCD. High QE in the NIR with minimal etaloning.	Back-illuminated CCD with eXcelon technology. Enhanced sensitivity in the UV and the NIR with low etaloning.	Back-illuminated CCD. Highest QE in the visible with low dark current. Subject to etaloning in the NIR.	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.
Dark current @ -80°C (e-/p/sec)	0.03 (typical)	0.03 (typical)	0.001 (typical)	0.001 (typical)	0.0008 (typical)
CCD format	1340 x 100, 20 x 20 μm pixels with 100% fill factor				
Imaging area	26.8 x 2.0 mm (optically centered)				
Optical mount	Princeton Instruments' Acton spectrometer adapter with optional shutter				
Deepest cooling temperature	-80°C guaranteed				
Thermostating precision	±0.05°C				
Cooling method	Thermoelectric air or liquid cooling; CoolCUBE II, a compact room temperature coolant circulator, is available for vibration sensitive environments				
Spectrometric Well Capacity: High Sensitivity High Capacity	300 ke- (typical), 250 ke- (min) 1 Me- (typical), 750 ke- (min)				
ADC speed/bits	100 kHz/16-bit and 2 MHz/16-bit				
System read noise @100 kHz @2 MHz	Front-illuminated 2.5 e- rms (typical), 4 e- rms (max) 10 e- rms (typical), 15 e- rms (max)		Back-illuminated 3 e- rms (typical), 5 e- rms (max) 11 e- rms (typical), 16 e- rms (max)		
Vertical shift speed	< 15 μsec/row (programmable)				
Non-linearity	< 1% @ 100 kHz				
Software selectable gains	1, 2, 4 e- (high sensitivity); 4, 8, 16 e- (high capacity); available at all speeds				
Operating systems supported	Windows 8/7/XP (32-bit), Windows 8/7 (64-bit) and Linux				
Data interface	USB2.0				
I/O signals	Two MCX to BNC connectors for programmable frame readout, shutter, trigger in				
Operating environment	+5 to +30°C, non-condensing atmosphere				
Certification	CE				
Dimensions / Weight	16.3 cm (6.43") x 11.8 cm (4.65") x 11.4 cm (4.48") (L x W x H) / 2.27 kg (5 lbs)				

All specifications are subject to change.

5 . PIXIS:400
1340 x 400

	 PIXIS: 400BR_eXcelon	PIXIS: 400BR	 PIXIS: 400B_eXcelon	PIXIS: 400B	PIXIS: 400F
Features	Back-illuminated, deep depletion CCD with eXcelon technology. Highest average QE from the UV to the NIR with negligible etaloning.	Back-illuminated, deep depletion CCD. High QE in the NIR with minimal etaloning.	Back-illuminated CCD with eXcelon technology. Enhanced sensitivity in the UV and the NIR with low etaloning.	Back-illuminated CCD. Highest QE in the visible with low dark current. Subject to etaloning in the NIR.	Front-illuminated CCD. Affordable technology for moderate light level applications. No etaloning.
Dark current @ -75°C (e-/p/sec)	0.03 (typical)	0.03 (typical)	0.001 (typical)	0.001 (typical)	0.0008 (typical)
CCD format	1340 x 400, 20 x 20 μm pixels with 100% fill factor				
Imaging area	26.8 x 8.0 mm (optically centered)				
Optical mount	Princeton Instruments' Acton spectrometer adapter with optional shutter				
Deepest cooling temperature	-70°C at 20°C ambient temperature				
Thermostating precision	±0.05°C				
Cooling method	Thermoelectric air or liquid cooling; CoolCUBE II, a compact room temperature coolant circulator, is available for vibration sensitive environments				
Spectrometric Well Capacity: High Sensitivity High Capacity	300 ke- (typical), 250 ke- (min) 1 Me- (typical), 750 ke- (min)				
ADC speed/bits	100 kHz/16-bit and 2 MHz/16-bit				
System read noise @100 kHz @2 MHz	Front-illuminated 2.5 e- rms (typical), 4 e- rms (max) 10 e- rms (typical), 15 e- rms (max)		Back-illuminated 3 e- rms (typical), 5 e- rms (max) 11 e- rms (typical), 16 e- rms (max)		
Vertical shift speed	< 15 μsec/row (programmable)				
Non-linearity	< 1% @ 100 kHz				
Software selectable gains	1, 2, 4 e- (high sensitivity); 4, 8, 16 e- (high capacity); available at all speeds				
Operating systems supported	Windows 8/7/XP (32-bit), Windows 8/7 (64-bit) and Linux				
Data interface	USB2.0				
I/O signals	Two MCX to BNC connectors for programmable frame readout, shutter, trigger in				
Operating environment	+5 to +30°C non-condensing atmosphere				
Certification	CE				
Dimensions / Weight	16.3 cm (6.43") x 11.8 cm (4.65") x 11.4 cm (4.48") (L x W x H) / 2.27 kg (5 lbs)				

All specifications are subject to change.

6 . PIXIS:2k
2048 x 512



	PIXIS: 2KB_eXcelon	PIXIS: 2KB/BUV
Features	Back-illuminated CCD with eXcelon technology. Enhanced sensitivity in the UV and the NIR with low etaloning.	Back-illuminated CCD. High sensitivity in both the visible and UV regions. Special BUV version offers the highest sensitivity in the UV region.
Dark current @ -75°C (e-/p/sec)	0.001 (typical)	0.001 (typical)
CCD format	2048 x 512 imaging pixels; 13.5 x 13.5- μ m pixels with 100% fill factor	
Imaging area	27.6 x 6.9 mm (optically centered)	
Optical mount	Princeton Instruments Acton spectrometer adapter with optional shutter	
Deepest cooling temperature	-75°C guaranteed	
Thermostating precision	\pm 0.05°C	
Cooling method	Thermoelectric air or liquid cooling (CoolCUBE II required)	
Spectrometric well capacity:		
High Sensitivity	250 ke- (typical), 150 ke- (min)	
High Capacity	750 ke- (typical), 600 ke- (min)	
ADC speed/bits	100kHz/16-bit and 2MHz/16-bit	
System read noise		
@100 kHz	3.5 e- rms (typical), 6 e- rms (max)	
@2 MHz	14 e- rms (typical), 20 e- rms (max)	
Vertical shift speed	15.2 μ sec/row	
Non-linearity	<1% @ 100 kHz	
Software selectable gains	1.5, 3, 6 e- (high sensitivity); 3, 6, 12 e- (high capacity); available at all speeds	
Operating systems supported	Windows 8/7/XP (32-bit), Windows 8/7 (64-bit) and Linux	
Data interface	USB2.0	
I/O signals	Two MCX to BNC connectors for programmable frame readout, shutter, trigger in	
Operating environment	+5 to +30°C non-condensing	
Certification	CE	
Dimensions / Weight	16.59 cm (6.53") x 11.81 cm (4.65") x 11.38 cm (4.48") (L x W x H) / 2.27kg (5lbs)	

All specifications are subject to change.

7 . PIXIS : 256
1024 pixel CCD array

	PIXIS: 256E		PIXIS: 256BR	
Features	Front-illuminated CCD. Open electrode architecture allows for an increased response in the UV compared to standard front-illuminated detectors.		Back-illuminated, deep depletion CCD. High QE in the NIR with minimal etaloning.	
CCD format	1024 x 256, 26 μm x 26 μm pixels with 100% fill factor, 26 mm x 6.7 mm height		1024 x 252, 26 μm x 26 μm pixels with 100% fill factor, 26 mm x 6.6 mm height	
Dark current @ -75°C (e-/p/s)	0.003 (typical)		0.3 (typical)	
System read noise @ 100 kHz readout @ 2 MHz readout	6 e- rms 22 e- rms		6 e- rms 22 e- rms	
Vertical shift rate (software adjustable)	30 $\mu\text{sec}/\text{row}$		15 $\mu\text{sec}/\text{row}$	
	Minimum	Typical	Minimum	Typical
Spectrometric well capacity* Single pixel Binned	200 ke- 500 ke-	300 ke- 800 ke-	400 ke- 750 ke-	500 ke- 1000 ke-
Optional UV phosphor coatings	Enhanced sensitivity for UV operation to below 200 nm			
Deepest cooling temperature	-75°C			
Thermostating precision	$\pm 0.05^\circ\text{C}$ across entire temperature range			
Software-selectable gains	High 3 e-/ct	Mid 6 e-/ct	Low 12 e-/ct	
Dynamic range	16 bits			
Nonlinearity @ 100 kHz readout @ 2 MHz readout	< 1 % < 2 %			
Dimensions	Without shutter: 4.65" (118 mm) \varnothing x 6.43" (163 mm) With shutter: 4.65" (118 mm) \varnothing x 6.69" (170 mm)			

SPECTRAL RATE

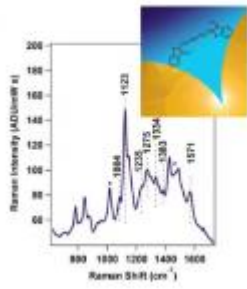
	PIXIS: 256E	PIXIS: 256BR
@ 100 kHz Full Vertical Binning (FVB)	52 spectra/sec	65 spectra/sec
@ 2 MHz Full Vertical Binning (FVB)	118 spectra/sec	190 spectra/sec

产品应用：

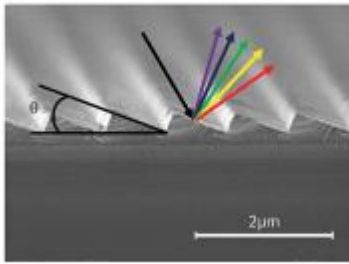
1. 高灵敏度，大幅面 CCD 相机-支持对土壤生长的根系进行多维表征



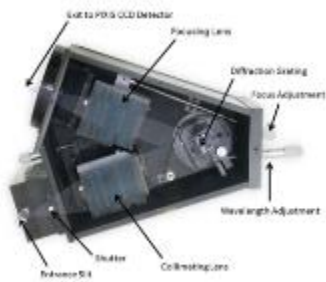
2. 先进的 CCD 相机和成像光谱仪有助于获得新的飞秒受激拉曼光谱



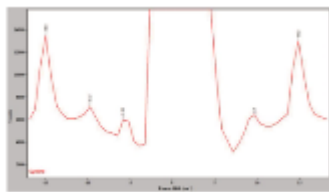
3. 显微镜和拉曼成像：开放系统拉曼显微镜



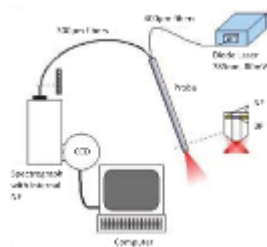
4. 近红外光谱技术在新生儿脑损伤诊断中的应用



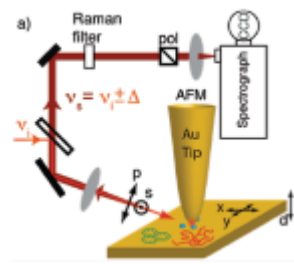
5. 氨基酸的低频拉曼光谱：第二个指纹区域的发现



6. 利用拉曼光谱检测组织中的恶性变化



7. 针尖增强拉曼散射 (TERS)



8. 太阳冷气体检测

