Advanced Application of Spectrometers

Advanced Application of Spectrometers

Introduction of Raman

1928 年印度物理學家 Raman C V 發現

當單色光入射一物體時,大部分的散射光具有和入射光相同的頻率。但有極少數的散射光並非如此,若我們進一步分析它們的頻率分布,將發現這些散射光和入射光的波數間關係,也就是散射光在入射光的附近成對的出現。從量子系統的觀點來看,散射光被發現和粒子的振動、轉動、電子能階的轉移有關。這種頻率發生轉換的散射光和入射光另一個不同的地方,是其具有極化的特性,而且它的強度、極化特性都和觀察方向有關。這種頻率發生改變的散射現象叫做 Raman 散射。

在散射光譜中,這種新的譜線就稱做 Raman shift 或 Raman bands,且其整個譜線集合起來就叫做 Raman 光譜。

在分子的轉動光譜、振動光譜和電子光譜上均可觀察到 Raman 散射光譜,其中
1) 轉動光譜的 Raman 散射光相對於入射光的頻移範圍較小
2) 振動躍遷光譜的 Raman 散射光相對於入射光的頻率範圍和前者相較起來較大
3) 電子躍遷光譜的 Raman 散射光相對於入射光的頻率範圍更大

散射光分類

(a) 散射光頻率＝入射光頻率（Rayleigh Scattering）
(b) 散射光頻率＞入射光頻率（Anti stokes line）
(c) 散射光頻率＜入射光頻率（Stokes line）

Principle of Raman

Rayleigh Scattering:

(1) 彈性碰撞
(2) 無能量交換,僅改變方向

Raman Scattering:

(1) 非彈性碰撞
(2) 方向改變且有能量交換

E_0 基態、E_1 振動激發態;$E_0 + hv_0$、$E_1 + hv_0$ 激發虛態
獲得能量後,躍遷到激發虛態(Virtual state)
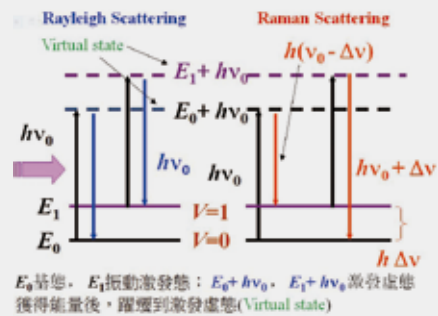
Raman Scattering
兩種躍遷能量差
Stokes
$\Delta E = h(V_0 + \Delta v)$
1) 特性:光強度強
2) 定性:基態分子多

兩種躍遷能量差
Anti-Stokes
$\Delta E = h(V_0 + \Delta v)$
1) 特性:光強度弱
2) 定性:Raman 位移
3) Raman 散射光與入射光頻率差 Δv
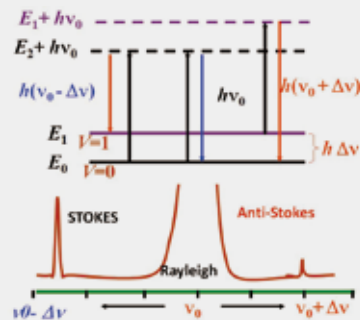
Raman Shift

[Wave Number]
是波動的一種性質,定義為每 2π 長度的波長數量(即每單位長度的波長數量乘以 2π)。波數是每 2π 長度內,波動重複的次數,波數與波長成反比。

$$k \stackrel{def}{=} 2\pi/\lambda$$

[Raman Shift]

$$\Delta w(cm^{-1}) = \left(\frac{1}{\lambda_0(nm)} - \frac{1}{\lambda_1(nm)}\right) \times \frac{(10^7 nm)}{(cm)}$$

Raman Spectroscopy Modular Systems

Flexible and configurable for unique needs

Our modular products allow you to build the exact Raman system you need, while maintaining the flexibility to change and optimize components as your needs evolve.

A modular system begins with your choice of excitation laser, typically routed to the sample with a specialized Raman probe (free-space coupling is also possible). Scattered Raman light is collected by the same probe and routed to a spectrometer that is configured with the sensitivity, optical resolution and Raman shift range needed for your application. We even offer sample holders to facilitate measurement of liquids in cuvettes and vials.

Modular systems offer the most value and flexibility when getting started with a new Raman application, and transition easily into OEM systems. Our modular Raman components include multiple lasers, probes, and user-configurable spectrometers to suit almost any need.

Modular Systems			
Excitation Laser	Multiple options : 532nm, 785nm, custom		
Raman Probe	Multiple options: general purpose, immersion, process		
Spectrometer	QE Pro Series	Vantana Series	Maya2000 Pro Series
Features	＊Maximum flexibility ＊Weak raman signals	＊High throughput ＊Fast measurements	＊Cost effective ＊Broad spectral range
Preconfigured Spectrometers	QE Pro-Raman (785nm)	Ventana-532-Raman Ventana-785-Raman Ventana-785L-Raman	Maya2000 Pro-NIR (785nm, 808nm)
Custom Configuration	＊User-defined spectral range ＊Changeable slits to optimize resolution	None	＊User-defined spectral range and resolution

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測

Modular Spectrometers

Raman spectroscopy requires detection that balances sensitivity and signal to noise with resolution. These spectrometers do so elegantly, each optimized for a particular type of application. Our Maya2000 Pro and QE Pro spectrometers can be custom-configured to your exact excitation wavelength, resolution, range and sensitivity requirements, while their preconfigured versions and our Ventana series are ideal for 532 nm or 785 nm excitation.

Maya2000 Pro

The Maya2000 Pro is a good general purpose configurable spectrometer for Raman, combining a low stray light optical design with an uncooled back-thinned FFT-CCD detector for enhanced sensitiv-ity that is value-priced. High quantum efficiency in the NIR makes it an excellent choice for long-wavelength Raman..

QE Pro

This premium configurable spectrometer yields the highest quality Raman spectra, both in resolution and signal to noise. Designed with gold-coated mirrors and a back-thinned FFT-CCD detector cooled to -15 °C, the QE Pro offers a low noise floor even at long integration times. Its ability to deliver sharp peaks from very weak Raman signals makes it an excellent choice when your exact application needs are undefined.

Ventana Series

The Ventana series of preconfigured spectrometers are designed specifically for Raman spectroscopy. By using a volume phase grating and a lower f/# than our other spectrometers (f/1.3 vs. f/4), they deliver higher throughput for fast measurements. This is further enhanced by control of the detector temperature at +15 °C, keeping the noise floor consistent for applications at short integration times.

	Maya2000 Pro-NIR	QE Pro-Raman	Ventana-785-Raman
Raman Shift Range*	0 - 4200cm^{-1}	0 - 2800cm^{-1}	200- 2000cm^{-1}
Resolution @810nm*	13cm^{-1}	11cm^{-1}	10cm^{-1}
Detector Temperature	Unregulated	-15℃	+15℃
S:N Ratio	450:1	1000:1	550:1
Alternate Configurations	Custom Maya2000 Pro	Custom QE Pro with user-changeable slits	532nm version
Best For	＊Broad range ＊High NIR efficiency ＊General purpose	＊Weak signals ＊Long integration times ＊Hightest quality data	＊Low f/# (high throughput) ＊Fast measurements

＊ Based on 785nm excitation
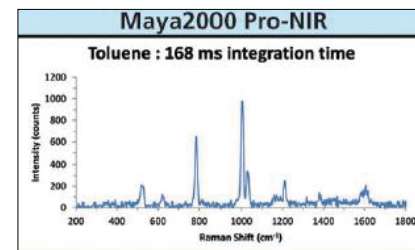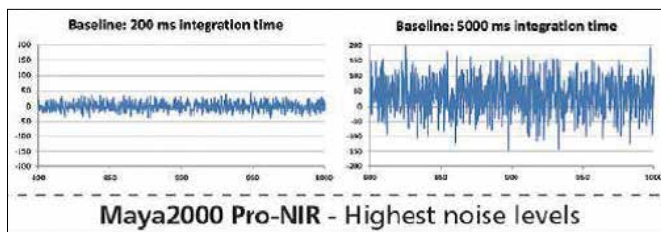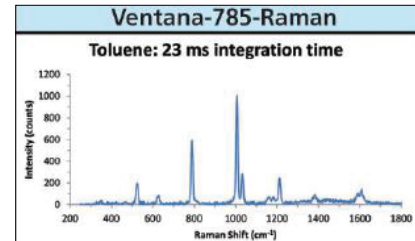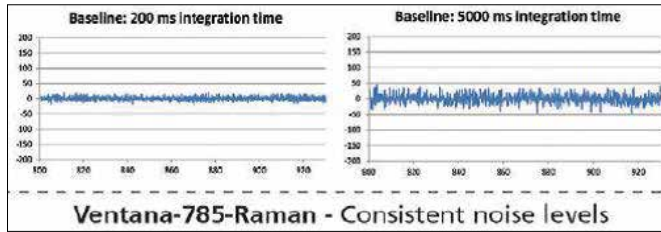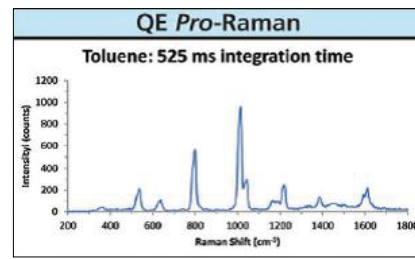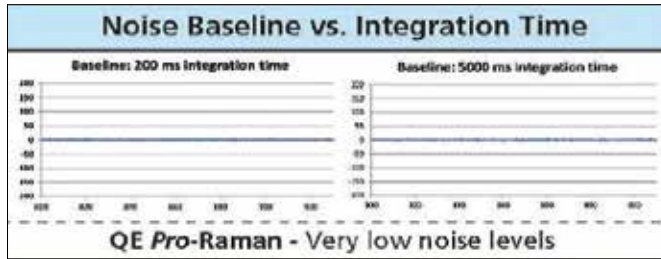
Integrated Systems

Turnkey operation for targeted applications

Integrated systems are a convenient solution for applications where your excitation wavelength, Raman shift range, and resolu-tion needs are known and unlikely to change. They operate at the more common laser wavelengths, and use free-space optics in place of fiber optic probes. This can improve sensitivity, and enables unique sampling modes like raster orbital scanning (ROS) or microscopy. Our integrated systems outshine the competition in performance and value, from benchtop systems for the lab to a handheld unit for the field.

		Benchtop		Handheld
Features		∗Spatial averaging ∗Lower average power	∗Specific location ∗High efficiency	∗Field use ∗Matching libraries
Excitation	532	●	●	
Wavelength	638	●		
(nm)	785	●	●	●
	808	●		
System		IDRaman Reader 	IDRaman Micro 	IDRaman Mini
Applications		∗SERS and tagging ∗Delicate samples ∗Pharmaceutical ∗Research and QA labs	∗Carbon nanotubes ∗Semiconductors ∗Life sciences ∗Art and forensics	∗Explosives, narcotics ∗Materials inspection ∗Anti-counterfeiting ∗Process lines

拉曼 / 螢光
量測系統

拉曼 / 螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透 / 反射
光譜量測

IDRaman Reader

Benchtop Measurement of Liquids and Solids

The IDRaman reader delivers all the performance of a larger, more expensive system, converting seamlessly between solid and liquid samples. Enabled with raster orbital scanning (ROS), it offers low background, high resolution and sensitive measurements of non-uniform and inhomogeneous samples in a footprint that moves easily around the lab.

An adjustable focus sample holder accommodates vials and cuvettes for study of liquids. The source knob on the laser unit allows you to switch easily to measurement of solid samples, SERS substrates and surfaces in the space below the unit, with a user-exchangeable lens for adjustment of focal length.

* Turnkey operation for the lab or process line
* Measure from bottom of vial for small volumes
* Optional side measurement of cuvettes or vials
* Downward facing lens for solid samples

Choose from 5 High-performance Systems

Systems Available	Raman Shift Range	Resolution
IDRaman reader 532	200 – 3200cm^{-1}	7 cm^{-1}
IDRaman reader 638	200 – 2000cm^{-1}	8 cm^{-1}
IDRaman reader 785	200 – 3200cm^{-1}	10 cm^{-1}
IDRaman reader 785HR	200 – 2000cm^{-1}	4 cm^{-1}
IDRaman reader 808	200 – 2000cm^{-1}	4 cm^{-1}

IDRaman Micro

Imaging of Specific Locations with High Efficiency

The IDRaman micro delivers spatial resolution, excellent collection efficiency, and high quality spectra at a fraction of the size and cost of a traditional Raman microscope. The superior OneFocus optical system performs Raman measurement and imaging in a single focal plane for optimum sensitivity and ease of use. Created for maximum flexibility, this system is ideal for the research or QA/QC lab. It offers considerably better signal to noise than fiber-coupled systems of comparable cost, and better resolution of weak and closely spaced peaks.

* High quality imaging of sample
* Lever switches measurement from stage to vial
* Measure from bottom of vial for small volumes
* Interchangeable objectives
* Micro or macro view of a specific location

Choose from 3 High-performance Systems

Systems Available	Raman Shift Range	Resolution
IDRaman micro 532	200 – 3200cm^{-1}	7 cm^{-1}
IDRaman micro 785	200 – 3200cm^{-1}	10 cm^{-1}
IDRaman micro 785HR	200 – 2000cm^{-1}	4 cm^{-1}

IDRaman mini

Handheld Raman System

The IDRaman mini is the smallest, most powerful handheld Raman instrument available today. Designed to make rapid and accurate measurements that identify, authenticate and verify samples, the IDRaman mini is ideal for:

* Authentication analysis
* Counterfeit detection
* Rapid material identification
* Verification of incoming materials
* Harsh and demanding environments
* In-line or at-line testing

From rugged field measurements of chemical and explosive agents to quality assurance and quality control in the laboratory, the IDRaman mini is a truly compact choice for fast and accurate measurements.

Engineering Specifications	IDRaman mini
Physical	
Dimensions: (LWH) cm and inches:	9.4 cm x 7.4 cm x 3.8 cm (3.7" x 2.9" x 1.5")
Weight:	0.33 kg (11.75 oz.)
System	
Raman laser excitation wavelength:	785 nm +/- 0.5 nm, 2 cm^{-1} line width, stability <0.1 cm^{-1}
Laser output power:	100 mW (50 mW at sample)
Range:	400-2300 cm^{-1}
Resolution:	12-14 cm^{-1}
Acquisition speed:	Visual confirmation in <9.0 seconds
Signal to Noise:	1000:1
Raster Orbital Scanning:	Sampling function allows detection of inhomogeneous samples without sample degradation
Detector:	2048-element back-thinned, NIR -enhanced CCD array
Collection optics:	NA = 0.50; 8 mm working distance and 2.5 mm interrogation area
Sampling method:	vial (2 mL) or point and shoot accessory for solid sampling
Operating temperature:	-20℃ to +40℃
Display:	2.8" resistive touch display
Battery life:	>11 hours with 2 AA batteries
Raman library:	Basic library of ~30 compounds (included)
Accessories:	Box of 144 x 2 mL vials (included); point-and-shoot accessory for solid sampling

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測

ACCUMAN PRO-500

Protable Raman Spectrometer

The pharmaceutical industry constantly needs to meet ever-growing compliance and quality standards. Achieving this often brings substantial costs. Many processes require identification of Active Pharmaceutical Ingredients (API) and excipients, often involving sophisticated sample preparation, lengthy testing time, and substantial labor. Opening up packaging also introduces the risk of contamination and exposure. Both risks and costs could be greatly reduced by using a non-destructive, point-and-shoot, instantaneous identification solution, directly at the production site.

The ACCUMAN PR-500 is a portable Raman spectrometer, offering rapid, through-packing, accurate identification of pharmaceutical materials. The Raman spectrometer quickly captures the molecular fingerprint of target materials, enabling packet-by-packet or batch-by-batch verification, while delivering the same accuracy as the conventional procedures. At the core of the ACCUMAN PR-500 is the QE-Series spectrometer, which for its superior performance and quality, was used in NASA's projects. This revolutionary solution brings the answer to the growing compliance requirements in the pharmaceutical manufacturing industry.

Advantages

＊ **Speedy**
High stability and performance integration system, delivering accurate results in seconds, significantly raising efficiency.

＊ **Accurate and Reliable**
The core is the Ocean Optics QE-Series spectrometer. Its industry-leading signal-noise ratio and stability allows accurate capturing of molecular "fingerprint", giving highly reliable identification results.

＊ **User-friendly**
An ergonomically-designed hand-held probe weights just 330g, and comes with a high-resolution, touchscreen interface, allowing intuitive, single-hand operation.

＊ **Customized Library**
Library can be customized according to users' raw material from different vendors, reducing variations and false from standard libraries.

＊ **Compliance**
Designed according to GAMP 5, complies with CFR part 11 and GxPs.

User Interface
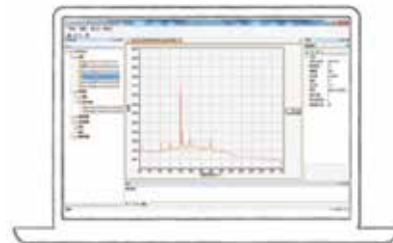
PC User Interface

Specification

Spectral range	200~2000 cm^{-1}	200~3000 cm^{-1}	200~3900 cm^{-1}
Wavenumber resolution	4~6 cm^{-1}	5~9 cm^{-1}	10~12 cm^{-1}
Laser wavelength	785nm ±0.5nm		
Laser power	350 mW Max, Adjustable in 10 steps		
Optical parameter	NA 0.22, 7.5mm working distance		
Detector	TE cooling Backthinned CCD array		
Signal-Noise-Ratio	10000:1		
Intergration time	0.1~30s		
Screen	4.5'LCD 720p Touch screen		
Bar code	1D / 2D		
Data transfer	USB 2.0		
Data format	.pdf / .csv / .txt		
Battery	Li-ion Battery , duration time > 5h		
Power adapter	100~240V AC 50/60 Hz		
Weight	(Main unit) 3.8kg , (Probe) 330g		
Dimensions	(Main unit) 29cm×22cm×10cm , (Probe) 15.5cmx7.4cmx2.5cm		
Operating temperature	0~45℃		
Accessory	Probe cap , calibration cap		
Compliance	USP , EP		
	Designed according to GAMP 5 guidance , complies with CFR Part 11 and GxPs computerized system requirements.		

QE Pro-Raman

High-Sensitivity Spectrometer for Raman

Wide Dynamic Range

The QE Pro-Raman is a preconfigured for 785 nm Raman excitation, using a 900 lines/mm grating and 50 µm slit. To complete your modular Raman system, add a 785 nm Raman excitation laser, sample holder, software and other Raman accessories.

The high-sensitivity QE Pro is a good option for measuring the Raman shift of aromatic hydrocarbons such as toluene.

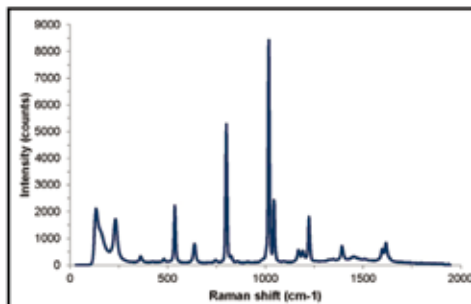| Engineering Specifications	QE Pro-Raman
Physical	
Dimensions: (L x W x H) mm and inches	182 x 110 x 47 mm (7.17" x 4.33" x1.85")
Weight: kg and lb	Spectrometer: 1.15 kg (2.6 lbs.); power supply: 0.45 kg (1 lb.)
Detector	
Type:	Hamamatsu scientific grade, back-thinned, TE Cooled, 1044 x 64 element CCD array
Range:	185-1100 nm
Quantum efficiency:	90% (peak)
Spectroscopic	
Wavelength range:	780-1000 nm
Raman shift:	0-2800 cm^{-1}
Resolution:	7 – 11 cm^{-1} over the range*
Integration time:	8 ms to 60 minutes
Dynamic range:	~85,000:1
Signal-to-noise ratio:	System: 1000:1 (single acquisition)
Stray light:	<0.08% at 600 nm; 0.4% at 435 nm
Buffering:	15,000 spectra
Fiber optic connector:	SMA 905 and Ocean Optics FC
Electronics	
Power requirement:	Supply voltage: 4.5 – 5.5 V
Strobe functions:	continuous and single strobe
Interfaces:	USB 2.0, 480 Mbps (USB 1.1 compatible); RS-232 (5-wire)
Temperature:	TE Cooler can only cool 40 ℃ below ambient temperature; Operation: -40 ℃ to +50 ℃
Humidity:	≤ 90% noncondensing

Example Configurations and Predicted Performance

Grating	Slit	Raman Shift	Resolution
1200 lines/mm	10 µm	150-4000 cm^{-1}	~8 cm^{-1}
1200 lines/mm	25 µm	150-4000 cm^{-1}	~10 cm^{-1}
600 lines/mm	10 µm	150-7500 cm^{-1}	~16 cm^{-1}
600 lines/mm	25 µm	150-7500 cm^{-1}	~19 cm^{-1}

QE Pro with 785 nm Raman Laser Excitation

Grating	Slit	Raman Shift	Resolution
1200 lines/mm	50 µm	150-2100 cm^{-1}	~6 cm^{-1}
1200 lines/mm	100 µm	150-2100 cm^{-1}	~8 cm^{-1}
600 lines/mm	50 µm	150-3950 cm^{-1}	~13 cm^{-1}
600 lines/mm	100 µm	150-3950 cm^{-1}	~18 cm^{-1}

VENTANA Series Spectrometer

High-Sensitivity Spectrometer for Raman Measurements

VENTANA spectrometers are high throughput, high sensitivity benchtop instruments for your lab and QA/QC environments. They are a great choice for Raman analysis and fluorescence measurements, offering short integration times for fast measurements.

Specifications	VENTANA 532 Raman	VENTANA 785 Raman	VENTANA 785L Raman	VENTANA VIS-NIR
Physical				
Dimensions:	170 x 110 x 50 mm	125 x 110 x 50 mm	127 x 159 x 51 mm	170 x 110 x 50 mm
Weight:	0.9 kg (2 lb.)			
System				
Wavelength range:	533-690 nm	800-940 nm	800-940 nm	430-1100 nm
Raman shift range:	350-4300 cm^{-1}	200-2000 cm^{-1}	200-2000 cm^{-1}	None
Resolution (FWHM):	20 cm^{-1}	10 cm^{-1} @ 810 nm	10 cm^{-1} @ 810 nm	4.0 nm
Signal to Noise (typical):	~550:1			
Dynamic range:	17000:1			
Thermoelectric cooling:	None	15 ℃	15 ℃	None
Operating environment:	0-50 ℃ (non-condensing)	0-50 ℃ (noncondensing)	5-45 ℃ (noncondensing)	0-50 ℃ (non-condensing)
Fiber optic input:	Optimized for 600 µm, NA 0.39 NA; SMA 905			
Power input:	12 VDC			
Interface:	USB 2.0 (no external accessory connector access)			
Operating software:	OceanView (OmniDriver and SeaBreeze device drivers)			
Regulatory:	CE Mark, RoHS			

Order Information

Model	Description	Example Applications
VENTANA-532-RAMAN	High sensitivity, preconfigured for 532 nm excitation Raman measurements	＊Life sciences ＊Clinical diagnostics
VENTANA-785-RAMAN	High sensitivity, preconfigured for 785 nm excitation Raman measurements	＊Pharmaceutical R&D and QA/QC
VENTANA-785L-RAMAN	High sensitivity, preconfigured for 785 nm excitation Raman measurements with integrated 785 nm laser	＊Free-space Raman analysis of powders and more
VENTANA-VIS-NIR	High sensitivity, preconfigured with 430 - 1100 nm bandwidth, 50 micron slit	＊Life sciences

拉曼／螢光系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

Apex 785 Raman Spectrometer
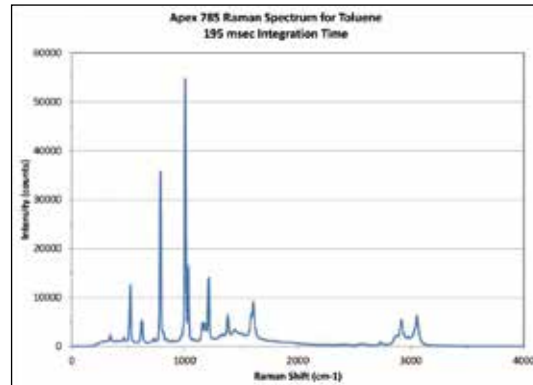
The Apex 785 Raman spectrometer was designed for maximum resolution and sensitivity and delivers exceptional performance. Using patented high throughput virtual slit (HTVS) technology licensed from Tornado Spectral Systems, Apex eliminates the trade-offs among throughput, resolution and spectral range and provides high sensitivity, with excellent optical resolution, over a wide Raman shift range.

HTVS technology dramatically increases the throughput of the detection system, allowing faster measurements and lower excitation powers for delicate samples. Measure samples with very low noise in a fraction of the integration time.

Apex is the first of many new spectrometers, light sources and sampling accessories in our Elite series. Elite products deliver superior performance in a compact and customizable format. Achieve the highest quality data, choose Apex.

Features

* High throughput virtual slit for shorter integration times, faster measurements
* High resolution and high sensitivity eliminates typical performance trade-offs
* Flexible use with a variety of lasers and accessories

Specifications

Specifications	APEX
Physical Specifications	
Physical Dimensions (LxWxH)	254 x 167.6 x 81 mm
Spectrometer Weight	2.36 kg (5.2 lbs.)
Spectrometer	
Focal length (input)	F/4 101.6 mm
Input Fiber Connector	SMA 905 to single-strand optical fiber (0.22 NA)
Detector	Hamamatsu S11510-1106 Back-thinned FFT-CCD
Pixels	2048 x 64 (effective); 2068 x 70 (total)
Pixel size	$14\mu m^2$
Spectral range	780 – 1120 nm (>3800 cm^{-1})
Well Depth	300 Ke-
Spectroscopic	
Integration Time	7.2ms – 5s
Dynamic Range (Typical)	15000:1
Signal-to-Noise	450:1
Nonlinearity (uncorrected)	<1.0%
Environmental Conditions	
Temperature	−30˚ to +70˚ C Storage & −0˚ to +50˚ C Operation
Humidity	0% – 90% noncondensing
Interfaces	
USB	USB 2.0

拉曼/螢光
量測系統

拉曼/螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透/反射
光譜量測

可攜式拉曼光譜檢測系統 - UOH-Portman 532 系列

UOH-Portman 532 系列是一款具備國際領先水準的可攜式拉曼檢測系統，專為拉曼現場快速檢測、鑑定而設計。配合專業的拉曼分析軟體，非常適用於對原材料的篩選、現場檢測及物質分析鑑定，廣泛應用於各種行業。

產品特性

＊高度集成，輕巧便捷，攜帶方便
＊大小樣品均可進行無損現場檢測，專業實用
＊客戶自建資料庫
＊可調節的雷射功率，針對不同樣品進行處理，應用更靈活

產品規格

型號	UOH-PORTMAN-532-S	UOH-PORTMAN-532-M	UOH-PORTMAN-532-L
物理參數			
整機尺寸		300 × 200 × 62 mm	
整機重量	3.7kgs	3.7kgs	3.9kgs
探頭光纖配置		激發端 : 105 µm VIS-NIR 接收端 : 200 µm VIS-NIR	
輸出介面		SMA905	
性能參數			
光譜範圍		$200\ cm^{-1} \sim 4000 cm^{-1}$	
波長解析度		$13\ cm^{-1}$ @1000 cm^{-1}	
波長穩定性		< 0.01nm / ˚C(標準)	
激發波長		532nm ± 1nm，線寬 < 0.2 nm	
雷射噪音		≦1% RMS (10Hz-100MHz)	
雷射功率穩定性		≦ 2% P-P (@2hrs)	
雷射器使用壽命		10,000 hrs	
電源電壓		100 - 240VAC@50/60Hz	
輸出功率		0 ~ 500mW可調	
積分時間	1ms ~ 2min	7.2ms ~ 5s	8ms ~ 15min
濾光片雷射截止深度		OD6	
探頭工作焦距		7.5mm	
環境參數			
工作/儲存溫度		0 ~ 45℃	
工作/儲存濕度		5% ~ 80%	

樣品拉曼譜圖

積分時間：2s
雷射功率：20mW@532nm
檢測樣品為放置於 12.5mm×12.5×45mm 比色皿中的酒精
（在 150cm-1 的範圍已經出現信號）
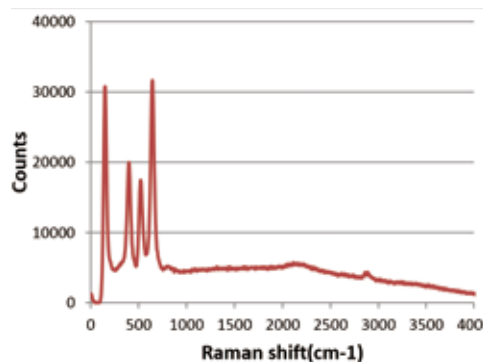
積分時間：300ms
雷射功率：20mW@532nm
檢測樣品：ti02(150cm-1 的範圍已經出現信號）

可攜式拉曼光譜檢測系統 - UOH-Portman 785 系列

UOH-Portman 785 系列是一款具備國際領先水準的可攜式拉曼檢測系統,專為拉曼現場快速檢測、鑑定而設計。配合專業的拉曼分析軟體,非常適用於對原材料的篩選、現場檢測及物質分析鑑定,廣泛應用於各種行業。

產品特性

＊系統整合,輕巧便捷,攜帶方便
＊大小樣品均可進行無損現場檢測,專業實用
＊客戶自建資料庫
＊雷射功率可調,針對不同樣品進行處理,應用更靈活

產品規格

型號	UOH-PORTMAN-785-S	UOH-PORTMAN-785-M	UOH-MICRO-PORTMAN-785-L
物理參數			
整機尺寸	300 × 200 × 62 mm		
整機重量	3.7kgs	3.9kgs	金相顯微鏡(選配)
探頭光纖配置	激發端:105 μm VIS-NIR		
	接收端:200 μm VIS-NIR		
輸出介面	SMA905		
性能參數			
光譜範圍	200 cm^{-1} ~ 4000cm^{-1}		
波長解析度	13 cm^{-1} @1000 cm^{-1}		
波長穩定性	<0.01nm/ ℃(標準)		
激發波長	785nm ±0.5nm,線寬 < 0.1nm		
雷射噪音	≦1% RMS (10Hz-100MHz)		
雷射功率穩定性	≦2% P-P(@2hrs)		
雷射器使用壽命	10,000hrs		
電源電壓	100-240VAC@50/60Hz		
輸出功率	0 ~ 500mW可調		
積分時間	7.2ms ~ 20s	7.2ms ~ 20s	8ms ~ 15min
濾光片雷射截止深度	OD6		
探頭工作焦距	7.5mm		
環境參數			
工作/儲存溫度	0 ~ 45℃		
工作/儲存濕度	5% ~ 80%		

樣品拉曼譜圖
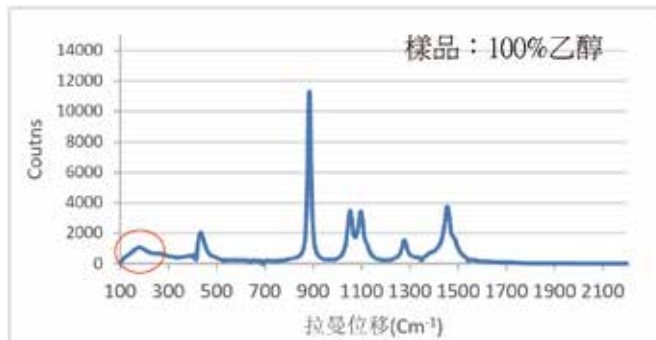
積分時間:5s
雷射功率:500mW

積分時間:5s
雷射功率:500mW

拉曼/螢光量測系統
拉曼/螢光量測配件
含氧量量測
薄膜量測
LED 光學特性量測
穿透/反射光譜量測
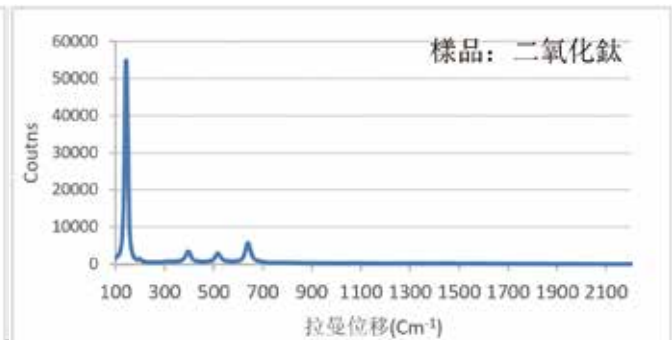
拉曼檢測系統 - SEED3000

SEED3000 拉曼檢測系統操作簡單，使用方便，無需對樣品固定、脫水、包埋、切片、染色、標記等繁瑣的前處理作業，即使少量檢測樣品，亦可在無損傷樣品時取得最真實的資料。SEED3000 拉曼檢測系統是根據市場需求，特別為非專業人士的客戶群，日常檢測使用而自主研發生產的檢測系統。藉由"Uspectral-Ram 分析軟體"，通過產品自帶的專業標配拉曼探頭，配合使用不同的"採樣附件"，即可針對各式不同的樣品進行精準檢測以及相對應產品的資訊比對。可廣泛應用於各個領域，尤其適用於食品安全、國防安全、珠寶鑑定、醫藥等需對原材料快速篩選、現場快速檢測及物質分析鑑定的行業。

產品特性

＊高度集成，應用靈活，輕巧便捷，方便攜帶
＊功率可調節，針對不同樣品進行處理
＊客戶可自建資料庫
＊標配 785 專用拉曼探頭，含 1.5 米尾纖

探頭特徵

＊可適配光譜範圍在 150cm-1 ～ 4000cm-1
＊截止深度可實現 > OD6
＊配探頭帽，並可根據客戶需求升級探頭
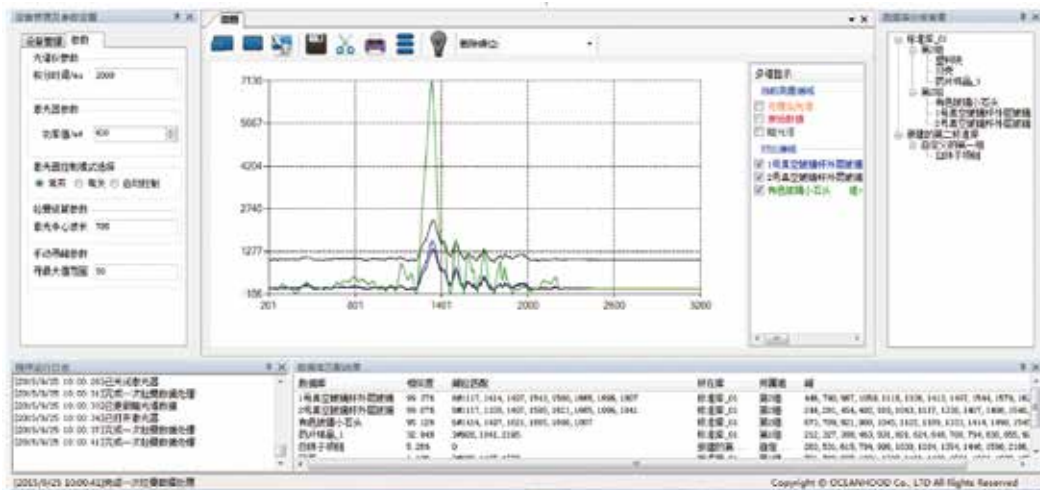
產品規格

物理參數	
整機尺寸	220 × 143.1 × 58.6 mm
整機重量	3.5 kgs
探頭光纖配置	激發端：105 μm VIS-NIR 接收端：200 μm VIS-NIR
輸出介面	SMA905
性能參數	
光譜範圍	200 cm^{-1} ～ 3200cm^{-1}
波長解析度	13 cm^{-1} @1000 cm^{-1}
波長穩定性	< 0.01nm / ℃ (標準)
激發波長	785nm ± 0.5nm，線寬 < 0.1nm
雷射器噪音	≤ 1% RMS(10Hz-100MHz)
鐳射功率穩定性	≤ 2% P-P(@2hrs)
雷射器使用壽命	10,000 hrs
電源電壓	100 - 240VAC@50/60Hz
輸出功率	0 ~ 480mW 可調
積分時間	1ms ~ 20S
濾光片鐳射截止深度	OD6
探頭工作焦距	7.5mm
環境參數	
工作/儲存溫度	0 ~ 45℃
工作/儲存濕度	5% ~ 80%

拉曼 / 螢光量測系統

拉曼 / 螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透 / 反射光譜量測

雷射誘導螢光系統

UOH-LIFS-405 系列

UOH-LIFS-405 系列雷射誘導螢光光譜儀檢測系統，主要由三個元件組成：405nm 穩譜雷射、405nm 光纖探頭和微型光纖光譜儀。 相較於傳統的螢光光譜儀，405nm 雷射誘導螢光光譜儀具有良好的重現性，測量速度快，靈敏度高等特點。樣品可以是固體、粉末、熔融片，液體等。主要應用領域可分為：生物醫療、寶石鑑定、奈米材料、農業生產、石油化工等。

產品特性

＊半導體泵浦 405nm 雷射器，功耗更低，外形更小
＊高空間分辨：可以達到微米量級
＊高靈敏度：探測下限最高可以達到 106 個粒子 /cm^3
＊穩定性已達 2% RMS
＊ 5,000 小時壽命
＊毫秒級的光譜採集速度
＊ 0~100mW，雷射功率可調，利用效率更高
＊固體、液體、粉末均可檢測
＊共聚焦設計，OD3 的濾波效果
＊一定程度上支持定性分析和定量分析

產品規格

型號	UOH-LIFS-405-S	UOH-LIFS-405-M	UOH-LIFS-405-L
物理參數			
整機尺寸		300 x 200 x 62 mm	
整機重量	2.7kgs	3.7kgs	3.9kgs
探頭光纖配置		激發端：100μm UV-VIS 接收端：200μm UV-VIS	
輸出介面		SMA905	
性能參數			
光譜範圍		420 ~ 1000nm	
波長解析度	~1.69nm	~1.72nm	~1.9nm
波長穩定性		<0.01nm/℃(標準)	
激發波長		405 ± 3nm，線寬<2nm	
雷射器噪音		≦3% RMS(10Hz-100MHz)	
雷射功率穩定性		≦2% RMS (@2hrs)	
雷射器使用壽命		5,000 hrs	
電源電壓		100-240VAC@50/60Hz	
輸出功率		0-100mW可調	
積分時間	1ms ~ 2min	7.2ms ~ 5s	8ms ~ 15min
光學衰減度		OD3	
探頭工作焦距		7.5mm	
環境參數			
工作/儲存溫度		0 ~ 45℃	
工作/儲存濕度		5% ~ 80%	

注：以上規格為標準配置，可根據客戶具體需求，提供定制產品。

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測

應用實例

＊量子點生物螢光探針

利用量子點極強的螢光特性長期即時監測和跟蹤生物分子間相互作用，通過檢測藥物作用前後的各量子點的螢光，快速、高效、高靈敏度地尋找到藥物作用的真正靶點，加快藥物研發和論證。

＊農藥殘留檢測

油溶性的 CdSe/ZnS 轉移到水箱，然後通過陰陽離子共軛作用與有機磷水解酶形成生物共軛體，通過該方法研製了一種新型的量子點生物感測器，製備的生物感測器可用來檢測氧磷農藥，最低檢測限達到 10 ～ 8mol/L

量子效應

＊基於雷射誘導的水果糖分子無損測定

利用 405 雷射誘導螢光光譜獲取 400 ~ 1000 nm 範圍內的特徵變數。提取 12 個特徵變數時， 建立的獼猴桃糖分子多元線性回歸 (MLR) 模型的校正集相關係數 Rc 為 0.932，校正均方根誤差（RMSEC）為 0. 476 4°Brix，預測集相關係數 Rp 為 0. 822 7，校正均方根誤差（RMSEP）為 0. 564 5°Brix。

＊油料檢測／石油污染物檢測

利用紫外雷射作為激發光源，建立了石油類污染物／機油汽油螢光探測系統。利用此系統測量了多種石油類樣品的螢光光譜信號。結果表明，不同種類的石油樣品螢光信號存在較大差異，因此，螢光光譜可以作為石油類污染物分類識別的一種依據。

＊毒品檢測
＊寶石鑑定
＊食品防腐劑測量
＊有機物污染水質檢測

毒品檢測

寶石鑑定
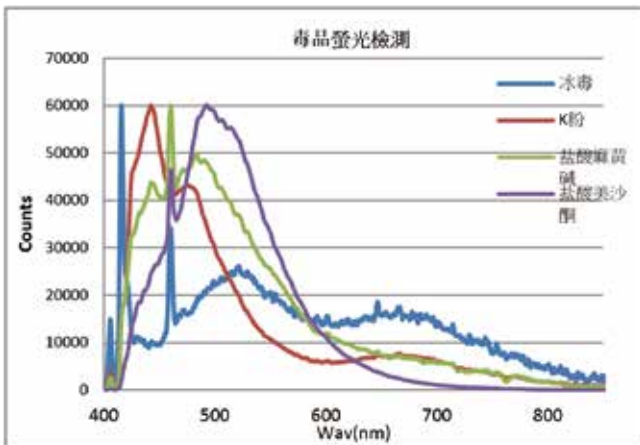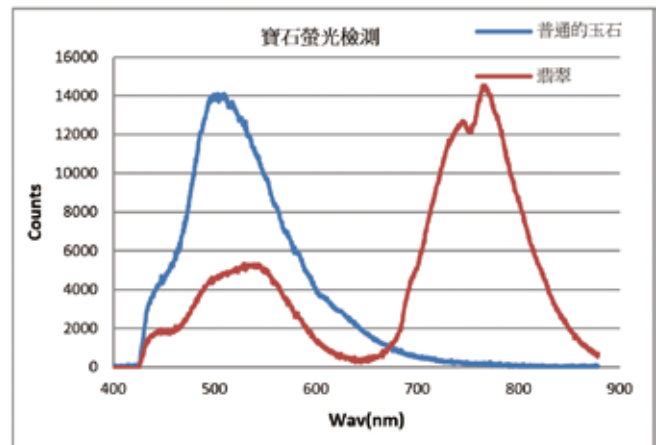
雷射誘導螢光系統

UOH-LIFS-808 系列

UOH-LIFS-808 系列雷射誘導螢光系統，主要由三個元件組成：808nm 多模光纖耦合雷射、808nm 光纖探頭和微型光纖光譜儀。808nm 雷射誘導螢光系統採用高亮多模光纖耦合，具有耦合效率高，輸出功率大等優點。

該系統採用 TEC 致冷控制，保證雷射光源更加穩定，性能更加優異。其檢測樣品可以是固體、粉末、熔融片，液體等。UOH-LIFS-808 系列雷射誘導螢光光譜儀檢測系統更具有良好的重現性，測量速度快，靈敏度高等特點。適合於各種工業和科研用戶。主要應用領域可分為：生物醫療、寶石鑑定、奈米材料、農業生產、石油化工等。
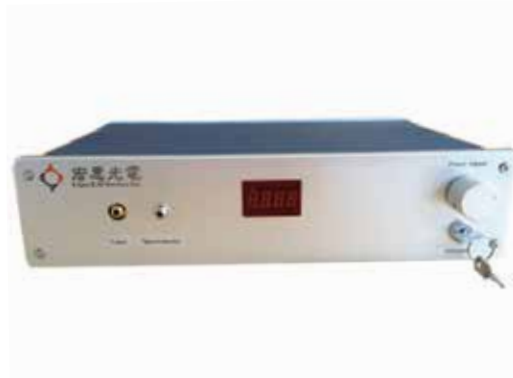
產品特性

＊半導體泵浦 808nm 雷射器，功耗更低，外形更小
＊高空間分辨：可以達到微米量級
＊穩定性已達 3% RMS
＊ 5,000 小時壽命
＊毫秒級的光譜採集速度
＊ 10mW~5000mW 雷射功率可調，利用效率更高
＊固體、液體、粉末均可檢測
＊共聚焦設計，OD3 的激發光濾光效果
＊一定程度上支持定性分析和定量分析

產品規格

型號	UOH-LIFS-808-S	UOH-LIFS-808-M	UOH-LIFS-808-L
物理參數			
整機尺寸	300 x 200 x 62 mm		
整機重量	2.7kgs	3.7kgs	3.9kgs
探頭光纖配置	激發端：100μm UV-VIS 接收端：200μm UV-VIS		
輸出介面	SMA905		
性能參數			
光譜範圍	850nm - 1100nm		
波長解析度	~1.69cm^{-1}	~1.72cm^{-1}	~1.9cm^{-1}
波長穩定性	<0.01nm/ ℃ (標準)		
激發波長	808 ± 3nm，線寬<2nm		
雷射器噪音	≦3% RMS (10Hz-100MHz)		
雷射功率穩定性	≦3% RMS (@2hrs)		
雷射器使用壽命	5,000 hrs		
電源電壓	100-240VAC@50/60Hz		
輸出功率	10mW - 5000mW		
積分時間	1ms ~ 2min	7.2ms ~ 5s	8ms ~ 15min
濾光片雷射截止深度	OD3		
探頭工作焦距	7.5mm		
環境參數			
工作/儲存溫度	0 ~ 45℃		
工作/儲存濕度	5% ~ 80%		

注：以上規格為標準配置，可根據客戶具體需求，提供定制產品。

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

拉曼 / 螢光 量測系統

拉曼 / 螢光 量測配件

含氧量量測

薄膜量測

LED 光學 特性量測

穿透 / 反射 光譜量測

雷射誘導螢光系統

UOH-LIFS-980 系列

UOH-LIFS-980 系列雷射誘導螢光系統，主要由三個元件組成：980nm 多模光纖耦合雷射、980nm 光纖探頭和微型光纖光譜儀。 相較於傳統的螢光光譜儀，980nm 雷射誘導螢光系統具有良好的重現性，測量速度快，靈敏度高等特點。

該系統採用致冷控制，保證雷射光源更加穩定，性能更加優異。其檢測樣品可以是固體、粉末、熔融片，液體等。UOH-LIFS-980 系列雷射誘導螢光光譜儀檢測系統更具有良好的重現性，測量速度快，靈敏度高等特點。適合於各種工業和科研用戶。主要應用領域可分為：生物醫療、寶石鑑定、奈米材料、農業生產、石油化工等。

產品特性

＊半導體泵浦 980nm 雷射，功耗更低，外形更小
＊高空間分辨：可以達到微米量級
＊高靈敏度：探測下限最高可以達到 106 個粒子 /cm^3
＊穩定性已達 2% RMS
＊ 5,000 小時壽命
＊毫秒級的光譜採集速度
＊ 4000mW 功率
＊固體、液體、粉末均可檢測
＊共聚焦設計，OD3 的濾波效果
＊一定程度上支持定性分析和定量分析

產品規格

型號	UOH-LIFS-980-S	UOH-LIFS-980-M	UOH-LIFS-980-L
物理參數			
整機尺寸	300 x 200 x 62 mm		
整機重量	2.7kgs	3.7kgs	3.9kgs
探頭光纖配置	激發端：100µm UV-VIS 接收端：200µm UV-VIS		
輸出介面	SMA905		
性能參數			
光譜範圍	380nm - 850nm		
波長解析度	~1.69cm^{-1}	~1.72cm^{-1}	~1.9cm^{-1}
波長穩定性	<0.005nm/℃（標準）		
中心波長	976±3nm，線寬<2nm		
雷射器噪音	≦1% RMS (10Hz-100MHz)		
雷射功率穩定性	≦2% RMS (@2hrs)		
雷射器使用壽命	5,000 hrs		
電源電壓	100-240VAC@50/60Hz		
輸出功率	4000mW		
積分時間	1ms ~ 2min	7.2ms ~ 5s	8ms ~ 15min
濾光片雷射截止深度	OD3		
探頭工作焦距	7.5mm		
控制模式	TTL調製-- 0 ~ 100kHz		
環境參數			
工作/儲存溫度	0 ~ 45℃		
工作/儲存濕度	5% ~ 80%		

拉曼雷射 405nm

UOH-LASER-405 是中心波長在 405nm 的穩頻雷射。它是基於先進的半導體泵浦雷射技術（Diode pumped Solid State Laser）開發出來的，可提供光譜分析儀所需的窄線寬、穩光譜和穩功率的雷射輸出。優化設計的光回饋穩功率模組和內置的半導體致冷技術使得該系列雷射具有良好的光譜特性和功率特性。

UOH-LASER-405 系列雷射目前已經廣泛應用於生物分析、醫療儀器、材料檢測、螢光激發、拉曼光譜、圖像掃描、建築等領域。
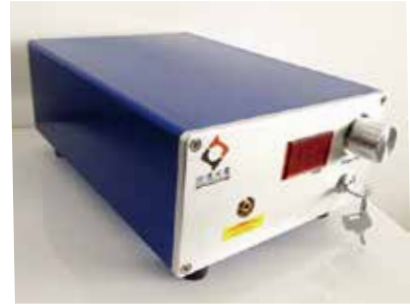
產品規格

規格參數	UOH-LASER-405-100-SMA
尺寸	300 x 200 x 62mm
重量	1.2kg
壽命	5,000 hrs
峰值波長	405nm ± 1nm
線寬	<2nm
功率	0 ~ 100mW (可調)
功率穩定性	< 2% RMS (2hrs)
波長穩定性	< 0.01nm / ℃
雜訊	≦1% RMS (10Hz-100MHz)
輸出方式	SMA905 或 FC/PC
電源電壓	15W @110V
工作溫度	0℃ ~ 40℃
工作濕度	5% ~ 95%RH
預熱時間	15min
適配的光纖	105um, 200um, 300um, 400um, 600um 或800um

拉曼雷射 532nm

UOH-LASER-532 是中心波長 532nm 的穩頻雷射。優化設計的光回饋穩功率模組和內置的半導體致冷技術使得該系列雷射器具有良好的光譜特性和功率特性。基於外腔式體光柵的技術開發，該系列雷射可提供光譜分析儀所需的窄線寬、穩光譜和穩功率的雷射輸出，同時也可提供多種輸出模式，如自由空間輸出、光纖輸出等。

UOH-LASER-532 系列雷射目前已經廣泛應用於生物分析、醫療儀器、材料檢測、螢光激發、拉曼光譜、圖像掃描、建築等領域。
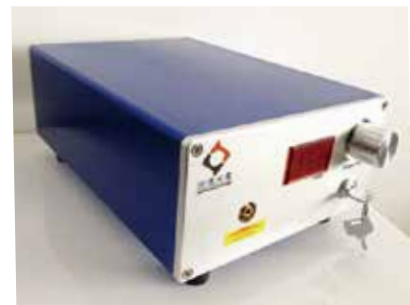
產品規格

規格參數	UOH-LASER532	UOH-LASER532-50
整機尺寸	211 x 156 x 62mm	211 x 156 x 62mm
重量	1.2kg	1.2kg
壽命	10,000 hrs	10,000 hrs
峰值波長	532nm ± 0.5nm	532nm ± 0.5nm
線寬	< 0.1nm	< 0.1nm
功率	0 ~ 100mW (可調)	0 ~ 50mW (可調)
功率穩定性	< 2% P-P (4hrs)	
波長穩定性	< 0.005nm / ℃	
輸出方式	SMA905或 FC/PC 或 Free Space	
功耗	15W @110V	
工作溫度	0℃ ~ 40℃	
工作濕度	5% ~ 85%RH	
預熱時間	15min	
適配的光纖	105um	

拉曼 / 螢光量測系統

拉曼 / 螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透 / 反射光譜量測

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

拉曼雷射 785nm

UOH-LASER-785-5H 是中心波長在 785nm 波長的穩頻雷射。它是基於外腔式體光柵技術開發的，可提供光譜分析儀所需的窄線寬、穩光譜和穩功率的雷射輸出。優化設計的光回饋穩功率模組和內置的半導體致冷技術使得該系列雷射具有良好的光譜特性和功率特性。

UOH-LASER-785 系列雷射目前已經廣泛應用於生物分析、醫療儀器、材料檢測、螢光激發、拉曼光譜、圖像掃描、建築等領域。可提供多種輸出模式，例如自由空間輸出、光纖輸出等。

產品優勢與特點

專業：具有功率可調整功能，可針對不同樣品做更靈活應用
方便：提供軟體介面，藉由軟體來控制雷射輸出或監控散熱風扇功能等
定制：可根據客戶要求，提供其他定制服務或二次開發服務，並提供相應技術支援
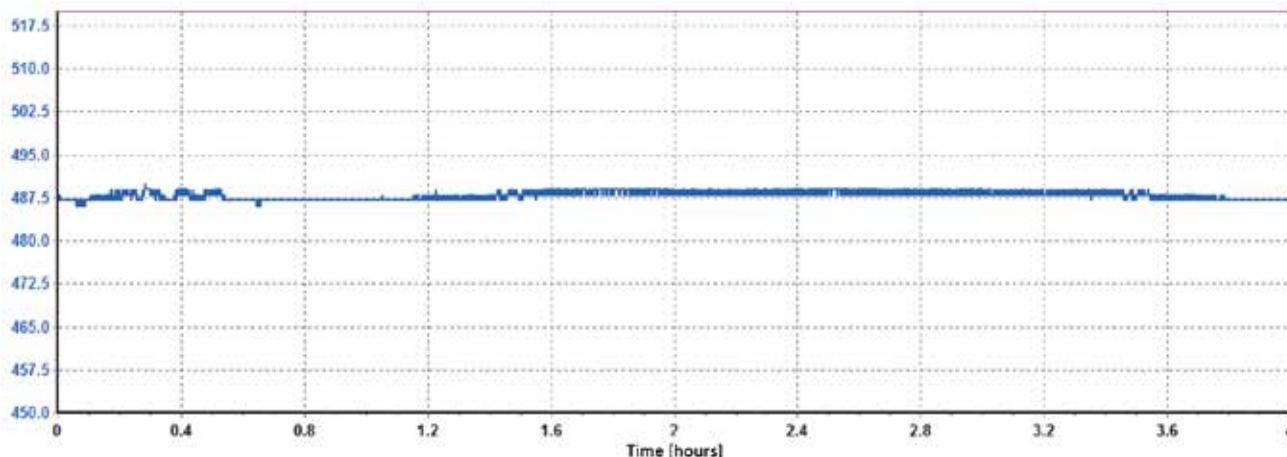
拉曼雷射功率穩定性

產品規格

規格參數	UOH-LASER-785-5H	UOH-LASER-785-5H OEM	
尺寸	211 x 156 x 62mm	79 x 65 x 19mm	75 x 50 x 100mm
重量	1.2kg	0.2kg	0.25kg
壽命	10,000 hrs		
峰值波長	785nm ± 0.5nm		
線寬	< 0.1nm		
功率	0 ~ 500mW (可調), 典型值@450mW(Max)		
功率穩定性	< 2 % P-P (4hrs)		
波長穩定性	< 0.005nm / ℃		
輸出方式	SMA905 或 FC/PC		
控制方式	N/A	軟體控制	軟體控制
通訊方式	N/A	USB	USB-Mini 轉 Serial comm Port
電源電壓	8W @110V	5V	5V
工作溫度	0℃ ~ 40℃		
工作濕度	5% ~ 85%RH		
預熱時間	15min		
適配的光纖	105um		

拉曼雷射 808nm

UOH-LASER-808 是中心波長在 808nm 的穩頻雷射。它是基於先進的半導體泵浦雷射技術（Diode pumped Solid State Laser）開發出來的，可提供光譜分析儀所需的窄線寬、穩光譜和穩功率的雷射輸出。優化設計的光回饋穩功率模組和內置的半導體致冷技術使得該系列雷射具有良好的光譜特性和功率特性。

本公司生產的 UOH-LASER-808 雷射目前已經廣泛應用於生物分析、醫療儀器、材料檢測、螢光激發、圖像掃描、建築等領域。
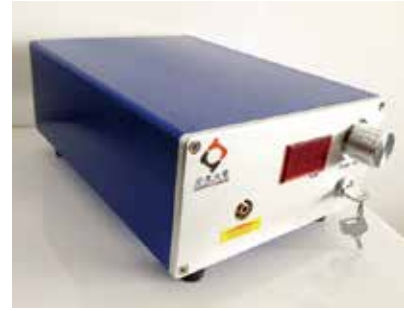
產品規格

規格參數	UOH-LASER-808-3000
尺寸	300 x 200 x 62mm
重量	1.2kg
壽命	5,000 hrs
峰值波長	808nm ± 1nm
線寬	< 2nm
功率	10mW ~ 3000mW
功率穩定性	≦ 2% RMS (@2hrs)
波長穩定性	< 0.01nm / ℃
雜訊	≦ 1% RMS (10Hz-100MHz)
輸出方式	SMA905 或 FC/PC
電源電壓	20W @110V
工作溫度	0℃ ~ 40℃
工作濕度	5% ~ 85%RH
預熱時間	15min
適配的光纖	105um, 200um, 300um, 400um, 600um 或800um

拉曼雷射 980nm

UOH-LASER-980 是中心波長在 980nm 的穩頻雷射。它是基於先進的半導體泵浦雷射技術（Diode pumped Solid State Laser）開發出來的，可提供光譜分析儀所需的窄線寬、穩光譜和穩功率的雷射輸出。優化設計的光回饋穩功率模組和內置的半導體致冷技術使得該系列雷射具有良好的光譜特性和功率特性。

UOH-LASER-980 系列雷射目前已經廣泛應用於生物分析、醫療儀器、材料檢測、螢光激發、圖像掃描、建築等領域。
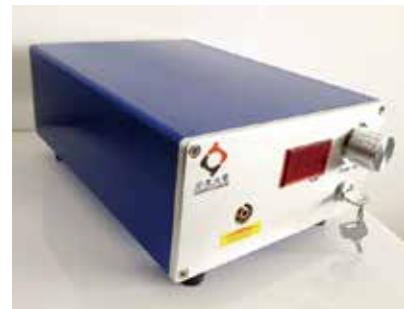
產品規格

規格參數	UOH-LASER-980-3000
尺寸	300 x 200 x 62mm
重量	1.2kg
壽命	5,000 hrs
峰值波長	976nm ±3nm
線寬	< 2nm
功率	100mW ~ 3000mW可調
功率穩定性	< 2% RMS (2hrs)
波長穩定性	< 0.01nm/℃
雜訊	< 1% RMS (10Hz-100MHz)
輸出方式	SMA905 或 FC/PC
電源電壓	20W @110V
工作溫度	0℃ ~ 40℃
工作濕度	5% ~ 85%RH
預熱時間	15min
適配的光纖	105um, 200um, 300um, 400um, 600um 或800um

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

Advanced Application of Spectrometers

拉曼 / 螢光 量測系統

拉曼 / 螢光 量測配件

含氧量量測

薄膜量測

LED 光學 特性量測

穿透 / 反射 光譜量測

拉曼探頭 UOH-RPB-532

UOH-RPB-532 系列探頭是根據雷射誘導拉曼光譜的應用而設計的光纖探頭。通過窄線寬穩光譜 532nm 雷射和光纖光譜儀配合使用，從而實現拉曼光譜測量。OD6 的光學干涉濾光片設計，有效地濾除瑞利散射干擾。緊湊的設計使得 UOH-RPB-532 系列探頭更易實現固體和液體的拉曼光譜測量。

產品特性

＊可適配拉曼光譜範圍：200cm^{-1} ~ 4000cm^{-1}
＊優化設計，有效濾除瑞利散射，光學衰減度 > OD6
＊批次出貨一致性保證，保證探頭靈敏度 ±10%。
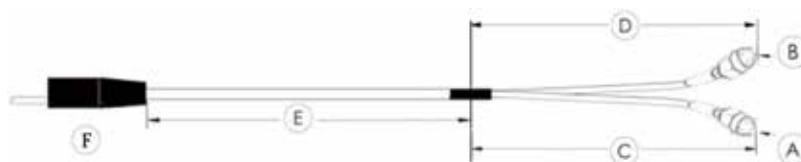
產品規格

物理參數	UOH-RPB-532-1.5-SS UOH-RPB-532-1.5-FS	UOH-RPB-532-1.5T-SS UOH-RPB-532-1.5T-FS	UOH-RPB-532-1.5TS-SS UOH-RPB-532-1.5TS-FS	UOH-RPB-532-N-FF
本體材質	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁
尺寸	102 x 30 x 13mm	102 x 40 x 13mm	102 × 40 × 13mm	102 x 30 x 13mm
探頭尺寸	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm
激發端光纖	105um (VIS-NIR)	105um (VIS-NIR)	105um (VIS-NIR)	N.A.
接收端光纖	200um (VIS-NIR)	200um (VIS-NIR)	200um (VIS-NIR)	N.A.
耦合段披覆	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	N.A.
觸發方式	N.A.	觸發按鈕	觸發按鈕	N.A.
軟體控制	N.A.	N.A.	Yes	N.A.
探頭總長	1.5M (E:1.15M + C/D:0.3M)	1.5M (E:1.15M + C/D:0.3M)	1.5M (E:1.15M + C/D:0.3M)	N.A.
連接雷射器接頭 A	SMA905 or FC/PC	SMA905 or FC/PC	SMA905 or FC/PC	SMA905 or FC/PC
連接光譜儀接頭 B	SMA905	SMA905	SMA905	SMA905
性能參數				
雷射波長	532nm			
光學衰減度	OD6			
拉曼光譜範圍	200cm^{-1}~ 4000cm^{-1}			
探頭耦合效率	60% ~ 70%			
探頭工作距離	7.5mm			

拉曼探頭 UOH-RPB-785

UOH-RPB-785 系列拉曼探頭是針對 785nm 雷射誘導拉曼光譜應用而設計的探頭。通過與 785nm 半導體雷射和光纖光譜儀配合使用,從而實現拉曼光譜測量應用。OD6 的光學干涉濾光片有效保證了瑞利散射的濾除,緊湊的設計使得 UOH-RPB-785 系列拉曼探頭更易實現固體和液體的拉曼光譜測量。

產品特性

＊可適配拉曼光譜範圍:150cm^{-1} ~ 4000cm^{-1},光譜範圍更寬
＊優化的設計,有效濾除瑞利散射,光學衰減度 >OD6
＊一致性保證:同批次探頭靈敏度 ±10%
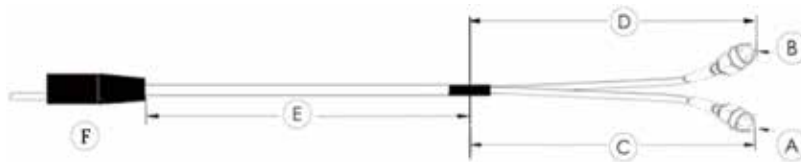
產品規格

物理參數	UOH-RPB-785-1.5-SS UOH-RPB-785-1.5-FS	UOH-RPB-785-1.5T-SS UOH-RPB-785-1.5T-FS	UOH-RPB-785-1.5TS-SS UOH-RPB-785-1.5TS-FS	UOH-RPB-785-N-FF
本體材質	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁
尺寸	102 x 30 x 13mm	102 x 40 x 13mm	102 x 40 x 13mm	102 x 30 x 13mm
探頭尺寸	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm
激發端光纖	105um (VIS-NIR)	105um (VIS-NIR)	105um (VIS-NIR)	N.A.
接收端光纖	200um (VIS-NIR)	200um (VIS-NIR)	200um (VIS-NIR)	N.A.
耦合段披覆	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	N.A.
觸發方式	N.A.	觸發按鈕	觸發按鈕	N.A.
軟體控制	N.A.	N.A.	Yes	N.A.
探頭總長	1.5M (E:1.15M + C/D:0.3M)	1.5M (E:1.15M + C/D:0.3M)	1.5M (E:1.15M + C/D:0.3M)	N.A.
連接雷射器接頭 A	SMA905 or FC/PC	SMA905 or FC/PC	SMA905 or FC/PC	SMA905 or FC/PC
連接光譜儀接頭 B	SMA905	SMA905	SMA905	SMA905
性能參數				
雷射波長	785nm			
光學衰減度	OD6			
拉曼光譜範圍	150cm^{-1}~ 4000cm^{-1}			
探頭耦合效率	60% ~ 70%			
探頭工作距離	7.5mm			

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測

螢光探頭 UOH-FPB-405

UOH-FPB-405 是基於同軸背向散射光路設計的雷射誘導螢光型光纖探頭。通過與 405nm 半導體雷射及微型光譜儀配合使用，可以實現常規的螢光測量。固定的光學設計可以獲得穩定的光學訊號。此外，通過優化的樣品支架，輕鬆、簡單地實現液體和固體的螢光測量。

產品特性

＊可適配螢光光譜範圍：420nm ~ 1100nm
＊優化設計，有效濾除瑞利散射，對激發光的光學衰減度：OD3
＊相對於傳統螢光測量結構，螢光檢測靈敏度提高 100 倍
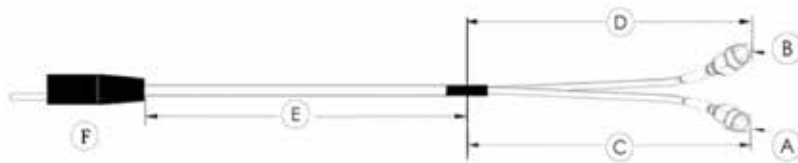
產品規格

物理參數	UOH-FPB-405-1.5-SS	UOH-FPB-405-1.5TS-SS	UOH-FPB-405-N-SS
本體材質	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁
尺寸	102 x 30 x 13mm	102 x 39 x 13mm	102 x 30 x 13mm
探頭尺寸	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm
激發端光纖	105um (VIS-NIR)	105um (VIS-NIR)	N.A.
接收端光纖	200um (VIS-NIR)	200um (VIS-NIR)	N.A.
耦合段披覆	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	N.A.
觸發方式	N.A.	觸發按鈕	N.A.
軟體控制	N.A.	Yes	N.A.
探頭總長	1.5M (E:1.15M + C/D=0.3M)	1.5M (E:1.15M + C/D=0.3M)	N.A.
連接雷射器接頭 A	SMA905		
連接光譜儀接頭 B	SMA905		
雷射波長	405nm		
光學衰減度	OD3		
拉曼光譜範圍	420nm ~ 1100nm		
探頭耦合效率	>60%		

螢光探頭 UOH-FPB-808

UOH-FPB-808 系列探頭是雷射誘導螢光系列的光纖螢光探頭。通過與 808nm 半導體雷射及微型光譜儀配合使用,可以實現常規的螢光測量。固定的光學設計可以獲得穩定的光學訊號。此外,通過優化的樣品支架,輕鬆,簡單地實現液體和固體的螢光測量。

產品特性

＊可適配螢光光譜範圍:850nm ~ 1100nm
＊優化設計,有效濾除瑞利散射,對激發光的光學衰減度:OD3
＊相對傳統螢光檢測結構,可以將提供信號靈敏度 100 倍
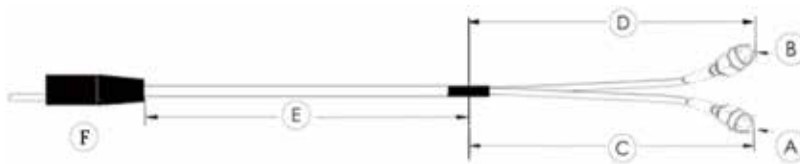
產品規格

物理參數	UOH-FPB-808-1.5-SS	UOH-FPB-808-N-SS
本體材質	黑色陽極氧化鋁	
尺寸	102 × 30 × 13 mm	
探頭尺寸	Φ9.5mm, L45mm	
激發端光纖	105um (VIS-NIR)	
接收端光纖	200um (VIS-NIR)	
耦合段披覆	Φ8.5mm, PVC 黑色	N.A.
觸發方式	N.A.	
探頭總長	1.5M (E:1.15M + C/D:0.3M)	N.A.
連接雷射器接頭 A	SMA905	
連接光譜儀接頭 B	SMA905	
雷射波長	808nm	
光學衰減度	OD3	
拉曼光譜範圍	850nm ~ 1100nm	
探頭耦合效率	>60%	

拉曼 / 螢光量測系統

拉曼 / 螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透 / 反射光譜量測

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

螢光探頭 UOH-FPB-980

UOH-FPB-980 系列探頭是鐳射誘導螢光型光纖探頭。通過與 980nm 半導體雷射及微型光譜儀配合使用，可以實現常規的螢光測量。固定的光學設計可以獲得穩定的光學訊號。此外，通過優化的樣品支架，輕鬆，簡單地實現液體和固體的螢光測量。

產品特性

＊可適配螢光光譜範圍：380nm ~ 850nm
＊優化設計，有效濾除瑞利散射，對激發光的光學衰減度：OD3
＊相對於傳統螢光測量結構，螢光檢測靈敏度提高 100 倍
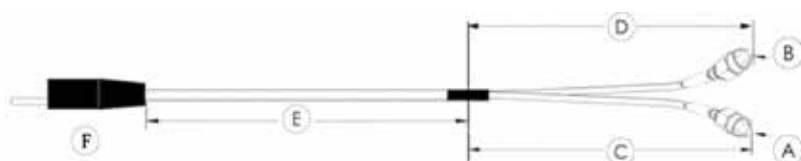
產品規格

物理參數	UOH-FPB-980-1.5-SS	UOH-FPB-980-1.5TS-SS	UOH-FPB-980-N-SS
本體材質	黑色陽極氧化鋁	黑色陽極氧化鋁	黑色陽極氧化鋁
尺寸	102 x 30 x 13mm	102 x 39 x 13mm	102 x 30 x 13mm
探頭尺寸	Φ9.5mm, L45mm	Φ9.5mm, L45mm	Φ9.5mm, L45mm
激發端光纖	105um (VIS-NIR)	105um (VIS-NIR)	N.A.
接收端光纖	200um (VIS-NIR)	200um (VIS-NIR)	N.A.
耦合段披覆	Φ8.5mm, PVC黑色	Φ8.5mm, PVC黑色	N.A.
觸發方式	N.A.	觸發按鈕	N.A.
軟體控制	N.A.	Yes	N.A.
探頭總長	1.5M (E:1.15M + C/D=0.3M)	1.5M (E:1.15M + C/D=0.3M)	N.A.
連接雷射器接頭 A	SMA905		
連接光譜儀接頭 B	SMA905		
雷射波長	980nm		
光學衰減度	OD3		
拉曼光譜範圍	380nm ~ 850nm		
探頭耦合效率	>60%		

採樣配件 UOH-SH-RAM-FFP－檢測固體樣品

UOH-SH-RAM-FFP 適用於固體樣品的檢測位置定位，防止因樣品擺放位置而造成雷射未聚焦的問題。 該產品選用 POM 加工而成，可長期使用，且 POM 最大優勢即不磨傷樣品。可配合拉曼探頭（UOH-RPB 系列）與螢光探頭（UOB-FPB 系列）使用，實現對固體樣品信號的採樣定位和遮罩環境光干擾。

規格	UOH-SH-RAM-FFP
尺寸	外徑Φ15 × 20mm，內徑 9.6mm
材質	POM
顏色	黑色
焦距	7.5 mm（探頭焦距）
適配產品	拉曼探頭 螢光探頭
用途	專為固體樣品測量而設計；準確聚焦，保證檢測的距離有效性。

採樣配件 UOH-SH-RAM-FS-V2－檢測粉末樣品

UOH-SH-RAM-FS-V2 拉曼探頭適配件是用於粉末樣品的檢測位置定位，專為粉末樣品測量而設計，能有效防止探頭被樣品粉末污染，影響檢測效果。該產品選用優質鋁合金加工而成，表面採用亞光發黑處理，增加視覺上的美觀效果，質感卓越不凡。每次使用後，請採用酒精和擦鏡紙及時清潔視窗。

規格	SH-RAM-FS-V2
尺寸	Φ16 × 33mm
材質	鋁合金
顏色	黑色
焦距	7.5 mm（探頭焦距）
適配產品	拉曼探頭
用途	專為粉末樣品測量而設計；準確聚焦，保證檢測的距離有效性。

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

拉曼 / 螢光量測系統

拉曼 / 螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透 / 反射光譜量測

T-SERS 表面增強拉曼芯片

奈米雕刻表面增強拉曼散射 (SERS)@ 銀 - 表面光譜技術

自然界裡的分子與細胞皆有拉曼光譜指紋，但是其訊號微弱；奈米表面增強基板可將拉曼光譜訊號增強數百萬倍以上的強度，解決光譜分析上的困難。T-SERS 表面增強拉曼基板使用新穎的奈米雕刻技術，藉由電漿子在近場金屬奈米結構的交互作用，增強待測目標的拉曼訊號。

氣相沉積奈米雕刻技術

奈米雕刻技術屬於一種物理氣相真空鍍膜方式，使用電子槍系統將粒狀固態金屬靶材溶化並以磁場轟擊轉換成氣態分子，在基板上成長奈米孔隙結構；借著調整基板載台的方向與鍍膜參數可以控制奈米結構的尺寸與外型。此鍍膜技術具有大面積、高均勻度之特點。TRES 表面增強拉曼基板使用常見的金屬材料 (如金、銀、銅等)，做為激發廣波長範圍的奈米電漿子結構，可有效的增強待測分子或細胞的拉曼訊號。

優點

* 適用于廣波域雷射激發範圍 (532nm ~ 1064nm)
* 可達百萬倍表面增強拉曼訊號 (大多數吸附表面待測分子)
* 高表面結構均勻度與良好拉曼訊號重複性

應用專案

* 植物病毒檢驗
* 食品安全
* 農作物農藥殘留檢驗
* 環境污染監測
* 藥物成份分析
* 細胞、病毒偵測
* 水污染偵測
* 科學辨識

SERS 晶片
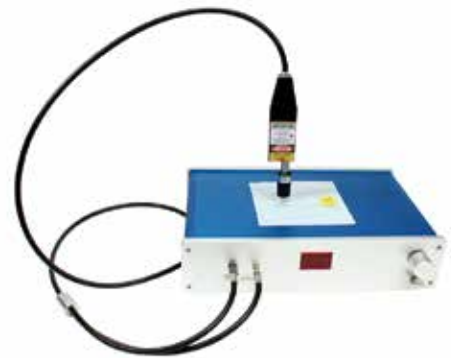
Raman 應用

T-SERS 表面增強拉曼芯片規格

有效區域	標準尺寸：2.2 x 2.2mm² 客制尺寸：2 x 2mm², 4 x 4mm² 金屬鍍膜/矽晶片
基板	載玻片(75mm x 25mm x 2mm)
金屬材料	銀
制程方式	物理氣相沉積
適合激發波長/量測條件	標準：532nm, 633nm, 785nm及1064nm；10X物鏡倍率；濕式量測(建議)
增強倍率	>1,000,000 (大多數可吸附表面之待測分子)@Rh6G
產品代碼	PHANSCOSUB_AGP1

Active area

2.2mm

2.2mm

75mm

25mm

532nm excitation (30mW)

Enhanced Raman spectra of 10^{-6}M Rh6G@532nm

- TRES SUB (POINT-1)
- TRES SUB (POINT-2)
- TRES SUB (POINT-3)

Objective lens:10x
Integration time: 3s

Raman Intensity (a.u.)

Wavenumber(cm^{-1})
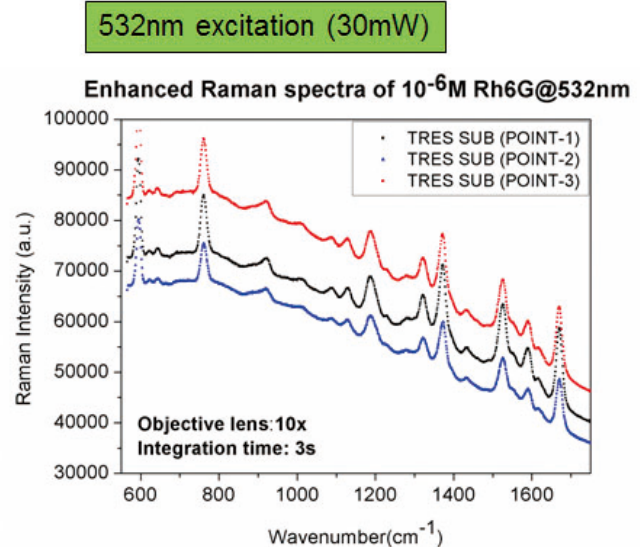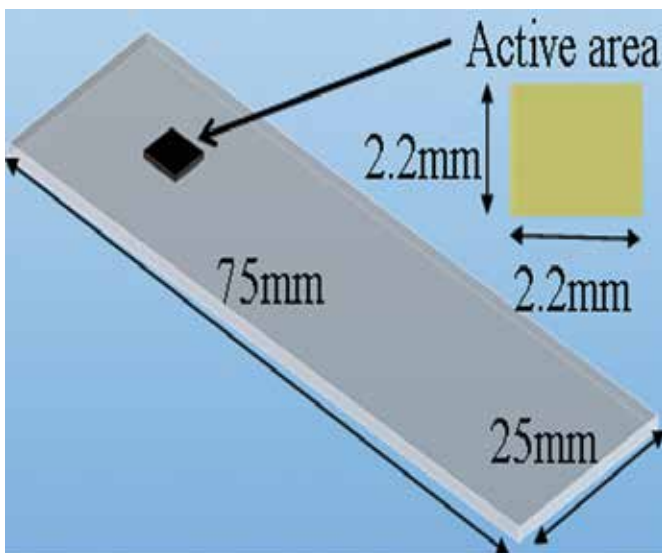
NeoFox Phase Measurement System

Benchtop and Handheld Electronics for Your Optical O2 Sensor

For oxygen sensing, the NeoFox® Phase Measurement System is our most popular fluorescence-based optical sensing system. Because of NeoFox's unique ability to improve overall system stability and make calibration easier for a wide variety of oxygen sensing setups, it is the choice for measuring fluorescence lifetime, phase and intensity. Plus, NeoFox is brilliantly suited for applications where sensitivity to drift and system stability are critical.

The NeoFox uses LED excitation and photodiode detection with filter-based wavelength selection for easy experimental setup and control. Because the unit is self-contained, it is invariant to fiber bending and stray light, and has a wide dynamic range of optical intensity as well as low optical and electronic crosstalk, and low drift and phase noise.

NEOFOX-GT is a more robust benchtop option with RS-232 communications capability.

NeoFox Specifications

	Benchtop Item Code: NEOFOX
Dimensions	107.95 x 63.5 x 38.1 mm
Weight	642 g
Principle	Photoluminescence quenching using a ruthenium compound; sensor measures O2 partial pressure
Parameters measured	Luminescence phase shift, AC luminescence intensity, temperature (via optional external thermistors) and pressure (via onboard pressure transducer)
Sensor coating formulations (sol gel-embedded dyes)	General purpose (FOXY), high-sensitivity (FOSPOR) and hydrocarbon-ready (HIOXY)
Media	Gases and liquids
Computer interface	PC
Operating systems	Windows XP (32-bit); also, Windows 7 (32-bit)
Power input	5VDC, 500 mA steady state
Communications	USB, analog out, RS-232

NeoFox Viewer Software

NeoFox Viewer is the Windows-based software that allows you to collect, manage and analyze data with your NeoFox measurement system. This nimble software also makes it simple to configure your NeoFox and update firmware when necessary. Use NeoFox Viewer to get the most out of your NeoFox and to ensure reliability through each measurement.

E Advanced Application of Spectrometers

拉曼／螢光系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

NeoFox Probe and Patch-Based Systems

Full System Performance Specifications

One of the biggest advantages our fiber optic oxygen sensors offer compared with electrodes and other optical sensors is the range of available sampling options. In the table below we've compiled performance data for NeoFox-based systems used with our two primary sampling choices: oxygen probes and patches. Please note that some performance parameters vary according to the sensor format and coating formulation used.

One other item of interest: The specifications for O2% and dissolved oxygen range are given for conditions at 1ATM (atmosphere). At 1 ATM (typical conditions on Earth), we breathe many molecules such as nitrogen, helium, hydrogen and oxygen. All these molecules make up the total pressure in the environment. The ruthenium in our sensors is sensitive only to oxygen, which is just one part of the total pressure in the environment.

So, when we determine the percentage of oxygen present in the environment at 1 ATM, we're measuring part of the total pressure, hence the term "partial pressure."

Probe-based System Specifications	FOXY Formulation	FOSPOR Formulation	HIOXY Formulation
Recommended use	General purpose coating	High-sensitivity coating for lowoxygen environments	Robust coating for hydrocarbon-rich environments
O2% range (at 1 ATM)	0-100%	0-10%	0-20.9%
DO range (ppm at 1 ATM)	0-40 ppm	0-4 ppm	0-8 ppm
Temperature range	-50-+80 ℃ for probes	0-+60 ℃ for probes	-50-+60 ℃ for probes
O2% resolution	100 ppm in gas	10 ppm in gas	100 ppm in gas
DO resolution (at room temp)	4 ppb	0.4 ppb	4 ppb
O2% accuracy	<5% of reading	<5% of reading	<5% of reading
DO accuracy	<5% of reading	<5% of reading	<5% of reading
Min. detectable level in gas	0.01% - 0.05%	0.001% - 0.01%	0.01% - 0.05%
Response time	<1 s in gas	<30-60 s in gas	<1 s in gas
	45-60 s with overcoating in gas	60-90 s with overcoating in gas	NA
	30-45 s in pure water	60-90 s in pure water	~45 s in pure water
Patch-based System Specifications	FOXY Formulation	FOSPOR Formulation	HIOXY Formulation
Recommended use	General purpose coating	High-sensitivity coating for lowoxygen environments	Robust coating for hydrocarbon-rich environments
O2% range (at 1 ATM)	0-100%	0-10%	0-20%
DO range (ppm at 1 ATM)	0-40 ppm	0-4 ppm	0-8 ppm
Temperature range	-20 to +60 ℃ for patches	0 to +60 ℃ for patches	-20 to +60 ℃ for patches
O2% resolution	0.05% (at 20 s averaging)	0.01% (at 30 s averaging)	0.05% (at 20 s averaging)
DO resolution (at room temp)	20 ppb	4 ppb	20 ppb
O2% accuracy	5% of reading	5% of reading	5% of reading
DO accuracy	5% of reading	5% of reading	5% of reading
Min. detectable level	0.1% O2	0.01% O2 (at 30 s averaging)	0.1% O2
Min. detectable level in water (at room temp)	40 ppb	4 ppb	40 ppb
Response time	<1 s in gas	30-60 s	<1 s in gas
	~30-45 s with overcoating in gas	~60-90 s with overcoating in gas	NA
	~45 s in pure water	~60-90 s in pure water	~30-45 s in pure water
Stability (Continuous LED)	FOXY Formulation	FOSPOR Formulation	HIOXY Formulation
Lifetime stability (Tau)	0.0006 μsec/hour	0.003 μsec/hour	0.0002 μsec/hour
Oxygen stability %	0.01% hour	0.005% hour	0.007% hour
Modulation range	0.73 kHz-93.75 kHz	0.73 kHz-93.75 kHz	0.73 kHz-93.75 kHz

FoxyKits for Oxygen Sensing

Fully Integrated Systems for Your Probe or Patch Applications

We've packaged everything you'll need for probe- or patch-based oxygen sensing applications into two convenient kits.

NEOFOX-KIT-PROBE and NEOFOX-KIT-PATCH are complete, out-of-the-box solutions for a variety of benchtop applications in research environments, teaching labs and commercial labs. Each kit allows you to set single- or multi-point calibration and to display oxygen readings in percent oxygen, partial pressure, moles per liter and more.

You'll note that we selected FOXY sensor formulation for both the NeoFox probe and patch kits. FOXY is our most versatile sensor coating chemistry and is useful for a wide range of applications. If FOXY is not appropriate for your applications, you can always opt for one of our modular oxygen sensing systems with a different coating formula.

Here's what you get with each kit:

NEOFOX-KIT-PROBE

* NeoFox Phase Fluorometer
* NeoFox Viewer software
* NeoFox-TP temperature probe (thermistor)
* 1000 µm bifurcated optical fiber and SMA 905 splice bushing for coupling NeoFox to the probe
* FOXY-R multipurpose probe

Probe kits are great for applications involving biological samples such as tissue and organic matter, foods and beverages and liquids in natural environments.

NEOFOX-KIT-PATCH

* NeoFox Phase Fluorometer
* NeoFox Viewer software
* NeoFox-TP temperature probe (thermistor)
* 1000 µm bifurcated borosilicate optical fiber
* 5-unit package of 8 mm diameter, self-adhesive FOXY sensor patches

Patch kits are useful anywhere non-intrusive and through-package oxygen measurements are necessary: headspace in food packaging, process monitoring in bioreactor environments and partial pressure sof oxygen in biomedical vessels.

拉曼 / 螢光量測系統

拉曼 / 螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透 / 反射光譜量測

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments
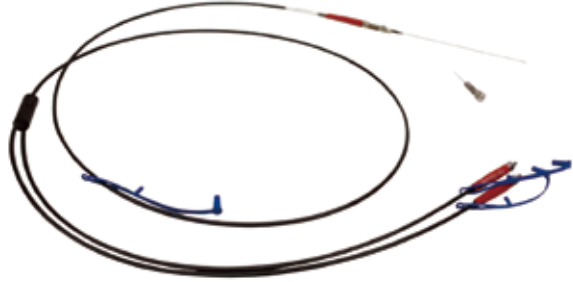
Oxygen sensor probes typically are available in a variety of designs and with each of our standard coating formulations (FOXY, FOSPOR and HIOXY). Custom probes and accessories are also available. In most cases, you'll need a 21-02 Splice Bushing and a BIF-BORO bifurcated optical fiber to couple your probe to the NeoFox electronics. Information on the proper care of probes is available elsewhere in this section.

HypoTube Probes

HypoTube probes are ideal for penetrating septa in packaging, vials and other vessels. The probes are suitable for use in solutions and headspace.

Item	HypoTube Oxygen Probe
Use	Puncturing septa, packaging and other rigid materi- als; especially good for solutions
Core diameter	300 µm
Outer diameter	1000 µm
Length	2 m (assembly), 127 mm (tube)
Ferrule / jacketing	PVC Monocoil
Reconditioning available	Yes
Options	FOXY-HPT-1-PNA general-purpose FOSPOR-HPT-1-PNA high-sensitivity HIOXY-HPT-1-PNA hydrocarbon-ready HPT-PNA (puncture accessory only)

Electrode-replacement Probes

Our OR125-series probes are designed to replace standard 1/8" (0.125 mm) electrode probes. We offer smooth and O-ring grooved versions.

Item	Direct-replacement Probes for O-ring grooved electrodes
Use	Replacement for 1/8" OD (3.175 mm) oxygen electrodes (O-ring grooved)
Core diameter	1000 µm
Outer diameter	3.175 mm
Length	63.5 mm
Ferrule / jacketing	Stainless steel, titanium and PEEK versions; smooth or O-ring grooved
Reconditioning available	Yes
Options	FOXY-OR125-G general-purpose FOSPOR-OR125-G high-sensitivity HIOXY-OR125-G hydrocarbon-ready FOXY-OR125-GT general-purpose FOSPOR-OR125-GT high-sensitivity HIOXY-OR125-GT hydrocarbon-ready

Item	Direct-replacement Probes for 1/8" OD (3.175 mm) electrodes
Use	Replacement for 1/8" OD (3.175 mm) oxygen elec- trodes (smooth)
Core diameter	1000 µm
Outer diameter	3.175 mm
Length	63.5 mm
Ferrule / jacketing	Stainless steel, titanium and PEEK versions; smooth or O-ring grooved
Reconditioning available	Yes
Options	FOXY-OR125 general-purpose FOSPOR-OR125 high-sensitivity HIOXY-OR125 hydrocarbon-ready

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Polyimide Probes

Choose a polyimide probe for applications where the sample environment is hostile to metallic probes. Polyimide also offers good resistance to harsh chemicals. Note: The 200 μm version of these probes is less robust and should be handled carefully. Contact us about custom probe lengths and availability of HIOXY formula probe coatings.

Item	Polyimide Probes
Use	Environments hostile to metallic probes
Core diameter	200 μm and 600 μm versions available
Outer diameter	710 μm
Length	2 m (other lengths available)
Ferrule / jacketing	Silicone
Reconditioning available	Yes
Options	FOXY-PI600 and FOXY-PI200 general-purpose FOSPOR-PI600 and FOSPOR-PI200 high-sensitivity

General-purpose Probes

Stainless steel 1/16" (1.587 mm) OD probes are versatile options for a range of lab and other applications.

Item	General-purpose 1.587 mm (1/16") Probes
Use	General purpose
Core diameter	1000 μm
Outer diameter	1.587 mm (1/16")
Length	152.4 mm
Ferrule / jacketing	Stainless steel
Reconditioning available	Yes
Options	FOXY-R general-purpose FOSPOR-R high-sensitivity HIOXY-R hydrocarbon-ready

Item	General-purpose 1.587 mm (1/16") Probes; short- length versions
Use	General purpose
Core diameter	600 μm
Outer diameter	1.587 mm (1/16")
Length	32 mm (other lengths available)
Ferrule / jacketing	Titanium
Reconditioning available	Yes
Options	FOXY-600-32MM general-purpose FOSPOR-600-32MM high-sensitivity HIOXY-600-32MM hydrocarbon-ready

Process-ready Probes

Robust 1/4" (6.35 mm) stainless steel probes have a high pressure rating for process environments

Item	Process-ready 6.35 mm probes
Use	Process environments
Core diameter	1000 μm
Outer diameter	6.35 mm
Length	177.8 mm
Ferrule / jacketing	Stainless steel
Reconditioning available	Yes
Options	FOXY-T1000 general-purpose FOSPOR-T1000 high-sensitivity HIOXY-T1000 hydrocarbon-ready

Oxygen Sensor Probes

Options for a Wide Range of Sensing Environments

Small-Diameter Probes

Slender, aluminum-jacketed probes work well where sampling space is limited. Standard and tissue-monitoring versions are available.

Item	Small-diameter, Al-jacketed Probes
Use	Fine spatial resolution applications
Core diameter	300 µm
Outer diameter	500 µm
Length	1 m (other lengths available)
Ferrule / jacketing	Aluminum
Reconditioning available	Yes
Options	FOXY-AL300 general-purpose FOSPOR-AL300 high-sensitivity HIOXY-AL300 hydrocarbon-ready

Item	Small-diameter Probe for Tissue Monitoring
Use	Tissue monitoring
Core diameter	300 µm (fiber)
Outer diameter	500 µm (fiber) 25.4 mm (1") at tip, body 1.6 mm (1/16") stainless steel
Length	1 m (other lengths available)
Ferrule / jacketing	Aluminum
Reconditioning available	No
Options	FOXY-AL300-TM general-purpose

Respiration Probe

This plastic probe is designed for monitoring oxygen respiration.

Item	Respiration Probes (Standard)
Use	Monitoring of oxygen tension in respiratory gases
Core diameter	200 µm
Outer diameter	6.35 mm
Length	107.9 mm
Ferrule / jacketing	Plastic
Reconditioning available	No (uses replaceable glass fiber membranes)
Options	FOXY-RESP general-purpose FOSPOR-RESP high-sensitivity

Oxygen Sensor Temperature Compensation

Options for Dealing with Temperature Effects in O2 Measurements

Our optical O2 sensors are affected by temperature. Temperature affects both fluorescence intensity and excited state lifetime due to the decrease of fluorescence energy quantum efficiency with temperature increase. The effect of change in temperature is seen as a change in the calibration slope.

As temperature increases and partial pressure of oxygen remains the same, compensating for temperature mitigates the risk of a false partial pressure reading. For best results, the sample must be held at a constant temperature (+/-1°C). The temperature response of our sensors can be determined by the user, or can be supplied by a factory calibration. In a multichannel sensor setup, the user must account for temperature effects in each channel.

In-house Temperature Calibration Services

If your sample cannot be maintained at a constant temperature (+/-1°C), you can perform a temperature calibration in NeoFox Viewer software or include our temperature calibration service as part of your order. The standard service covers environments from 0-80°C; extended-range service is available for environments outside those parameters. You'll need to tell us which oxygen sensor formulation you're using (FOXY, FOSPOR or HIOXY) and provide the temperature and oxygen concentration ranges of your sample environment.

Item codes: xxxx (sensor formulation)-CAL (standard option) and xxxx (sensor formulation)-CAL-EXT (extended temperature range)

Temperature Probe Options for Optical Oxygen Sensor Systems

We offer temperature probe options for use with our oxygen sensor systems: a rugged, discrete thermistor or a T1000-style ¼" (6.35 mm) stainless steel probe with an embedded thermistor. The latter is available in each of three coating formulations (FOXY, FOSPOR, HIOXY).

T1000-TS-6CM-NEO **T1000-TS-NEO** **NEOFOX-TP**

Temperature Probes for Oxgen Sensor Systems

Item	Description	Core Diameter	Outer Diameter	Length	Ferrule/ Jacketing	Pressure Rating	Reconditioning Available
FOXY-T1000-TS-NEO	1/4" process probe w/general-pur- pose coating and thermistor	1000 μm	6.35 mm	177.8 mm	Stainless steel	3000 psi	Yes
FOXY-T1000-TS-6CM-NEO	1/4" process probe w/general-pur- pose coating and thermistor	1000 μm	6.35 mm	60 mm	Stainless steel	3000 psi	Yes
FOSPOR-T1000-TS-NEO	1/4" process probe w/high-sensitivity coating and thermistor	1000 μm	6.35 mm	177.8 mm	Stainless steel	3000 psi	Yes
FOSPOR-T1000-TS-6CM- NEO	1/4" process probe w/high-sensitivity coating and thermistor	1000 μm	6.35 mm	60 mm	Stainless steel	3000 psi	Yes
HIOXY-T1000-TS-NEO	1/4" process probe w/hydrocarbon- ready coating and thermistor	1000 μm	6.35 mm	177.8 mm	Stainless steel	3000 psi	Yes
HIOXY-T1000-TS-6CM-NEO	1/4" process probe w/hydrocarbon- ready coating and thermistor	1000 μm	6.35 mm	60 mm	Stainless steel	3000 psi	Yes
NEOFOX-TP	3" x #32 AWG thermistor w/10,000 Ohm resistance @ 25 °C	115 mm	3.5 mm	76.2 mm	Radial leaded wires	Not tested	No

RedEye Optical Sensing Patches

Self-adhesive Patches for Non-intrusive Oxygen Measurements

The RedEye® indicator patch measures oxygen non-invasively in sealed packaging and containers used in medical, pharmaceutical and food applications. Using a combination of proprietary sensing material and measuring technologies, this non-invasive patch enables quick determination of the presence of oxygen, as well as quantitative measurements. Oxygen monitoring can also ensure patient safety in point-of-care analysis or indicate a sterile seal on surgical instruments and drug packaging. RedEye patches meet USP Class VI certification for biocompatibility.

RedEye Features a Propriety Sol Gel Coating

RedEye patches are unique in that high-performance sol gel coatings are used – rather than polymer membranes. RedEye coatings are capable of monitoring low levels of oxygen in gas (to 0.01%) and dissolved oxygen in liquids (to 4 ppb), as well as the higher oxygen levels present in cell culture and respiratory monitoring. Also available is a new design that uses the HIOXY formulation on a BK7 glass substrate autoclavable at 100 °C. Contact an Applications Scientist for details on item RE-HIOXY-HTC.

The RedEye can be integrated into packaging for continuous monitoring or used externally for post-production and R&D monitoring purposes. Depending on the application, the simple presence of oxygen can be visually determined by color change with a handheld LED. A fluorometer can also be used to directly measure oxygen partial pressure.

Typical Applications

∗ Point-of-care analysis (e.g., disposable oxygen attachments for ventilators used during anesthesia operation)
∗ Blood bag analysis
∗ Beverage and food packaging
∗ Bioprocess control
∗ Cell culture monitoring

Specifications	FOXY Formulation	FOSPOR Formulation	HIOXY Formulation	HIOXY High-Temp Option
Recommended use	General purpose coating	High-sensitivity coating for low-oxygen environments	Robust coating for hydrocarbon-rich environments	Applications where autoclaving is necessary
O2% range (at 1 ATM)	0 - 100%	0 - 10%	0 - 20%	0 - 20.9%
DO range (ppm at 1 ATM)	0 - 40 ppm	0 - 4 ppm	0 - 8 ppm	0 - 8 ppm
Temperature range	0 to +60 °C for patches	0 to +60 °C for patches	0 to +60 °C for patches	0 to +100 °C for glass window (patch)
O2% resolution	0.05% (at 20 s averaging)	0.01% (at 30 s averaging)	0.05% (at 20 s averaging)	0.05% (at 20 s averaging)
DO resolution (at room temp)	20 ppb	4 ppb	20 ppb	4 ppb
O2% accuracy	5% of reading	5% of reading	5% of reading	<5% of reading
DO accuracy	5% of reading	5% of reading	5% of reading	<5% of reading
Min. detectable level in gas	0.1% O2	0.01% O2 (at 30 s averaging)	0.1% O2	0.01% - 0.05%
Min. detectable level in water (at room temp)	40 ppb	4 ppb	40 ppb	40 ppb
Response time	<1 s in gas	30 - 60 s in gas	<1 s in gas	5 - 10 s in gas
	~30 - 45 s with overcoating in gas	~60 - 90 s with overcoating in gas	~30 s with overcoating in gas	~30 s with overcoating in gas
	~45 s in pure water	~60 - 90 s in pure water	~30 - 45 s in pure water	~40 - 60 s in pure water
Patch material	Acrylate	Acrylate	Acrylate	BK7 glass
Patch dimensions	4 mm, 8 mm and 127 mm disk (standard); custom sizes also available	4 mm, 8 mm and 127 mm disk (standard); custom sizes also available	4 mm, 8 mm and 127 mm disk (standard); custom sizes also available	4 mm (standard); custom sizes also available
Standard patch options	Single patch or pack of 5	Single patch or pack of 5	Single patch or pack of 5	Single glass window
Patch-cuvette options	Patch applied to quartz or polystyrene cuvettes	Yes	Yes	No
Overcoat option	Medical-grade overcoat	Medical-grade overcoat	Medical-grade overcoat	Medical-grade overcoat
Adhesive pH compatibility	Yes (pH 4.0 - 10.0)	Yes (pH 4.0 - 10.0)	Yes (pH 4.0 - 10.0)	Yes (pH 4.0 - 10.0)

TRANS-PH-KIT Series

Transmissive pH Dip Probe Kits

Engineering Specifications	PH-BCG-TRANS
pH Range	5 – 9
Analytical wavelength	620 nm
Baseline correction wavelengths	509 nm (isosbestic), or > 750 nm
Accuracy	0.05 pH unit (<1% of reading across range)
Resolution	0.02 pH unit
Response time	10 seconds
Calibration requirements (minimum)	Calibration reset: 3 buffers
	Full calibration: 6 buffers
Sterilization	Gamma radiation, EtO (ethylene oxide)
Chemical compatibility*	Aqueous, alcohols, some organic solvents, peroxides, ammonia, sodium hypochlorite
Discrete stability(lifetime)	50 uses or more. Dispose when absorbance at pH 11 < 0.1 (assumes pH 1 reference)
Storage conditions	Dry storage preferred

Stainless Steel pH Probe

Engineering Specifications	TRANS-PH-KIT-SS
Probe diameter	6.35 mm (1/4″)
Probe length	127 mm
Fiber length	2 meters
Breakout	1.5 meters from the end of the probe
Temperature limit	Up to 100℃ without sleeve
Pathlength	5 mm
Probe material	Stainless steel outer sleeve, aluminum second surface mirror
Pressure	100 psi
Fiber jacketing	Black PVC monocoil
Connectors	SMA 905

PEEK pH Probe

Engineering Specifications	TRANS-PH-KIT-PEEK
Probe diameter	6.35 mm (1/4″)
Probe length	107.9 mm
Fiber length	2 meters
Breakout	1.5 meters from the end of the probe
Temperature limit	Up to 200℃ with PEEK sleeve
Pathlength	Adjustable (2 – 10 mm)
Probe material	PEEK
Fiber jacketing	Black PVC monocoil
Connectors	SMA 905

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

Thin Film Metrology

Spectroscopic Reflectometry Systems

Sample NanoCalc Applications

* Transmission and reflection measurements of anti-reflective and hardness coatings
* Analysis of medical coatings and catheter balloon foils
* Testing of the hardness and wear of coatings
* Measurement of the thickness of thinned silicon wafers
* Determination of photoresist layers for masks
* Analysis of coatings applied for weather or dirt resistance (Lotus Effect)
* Measurement of coatings inside beverage containers
* Air gap measurements
* Analysis of optical disk coatings

NanoCalc Features

* Resolution to 0.1 nm
* Able to measure stacks of up to 10 layers
* Thickness and refractive index data
* Sophisticated algorithms for defect and roughness tolerance measurements
* Large database to ensure accuracy of a broad range of materials
* Adapters for complex geometries and accessories for thickness mapping

Specifications

Item	NANOCALC-VIS-PRECON	NANOCALC-XR-PRECON	NANOCALC-DUV	NANOCALC-NIR
Wavelength range	400 - 850 nm	250 - 1050 nm	~200 - 1100 nm	900 - 1700 nm
Thickness range	50 nm - 20 µm	10 nm - 100 µm	1 nm - 100 µm	100 nm - 250 µm
Optical resolution	0.1 nm	0.1 nm	0.1 nm	0.1 nm
Repeatability	0.3 nm	0.3 nm	0.3 nm	1.0 nm
Angle of incidence	90°	90°	90°	90°
Number of layers	Up to 10	Up to 10	Up to 10	Up to 10
Refractive index	Yes	Yes	Yes	Yes
Test materials	Transparent or semi-transparent thin film materials	Transparent or semi-transparent thin film materials	Transparent or semi-transparent thin film materials	Transparent or semi-transparent thin film materials
Reference needed	Yes (bare substrate)	Yes (bare substrate)	Yes (bare substrate)	Yes (bare substrate)
Measurement modes	Reflection and Transmission	Reflection and Transmission	Reflection and Transmission	Reflection and Transmission
Rough materials capable	Yes	Yes	Yes	Yes
Measurement speed	100 ms to 1 s	100 ms to 1 s	100 ms to 1 s	100 ms to 1 s
On-line capable	Yes	Yes	Yes	Yes
Height adjustment	with COL-UV-6.35 (10-50 mm)	with COL-UV-6.35 (10-50 mm)	with COL-UV-6.35 (10-50 mm)	with COL-UV-6.35 (10-50 mm)
Spot size	200 µm or 400 µm standard; 100 µm available upon request	200 µm or 400 µm standard; 100 µm available upon request	400 µm standard; 200 µm available upon request	400 µm standard; 200 µm available upon request
Microspot	Yes (w/microscope)	Yes (w/microscope)	Yes (w/microscope)	Yes (w/microscope)
CCD color	Yes (w/microscope)	Yes (w/microscope)	Yes (w/microscope)	Yes (w/microscope)
Mapping option	150 mm (6") and 300 mm (12") xy-scanning stages	150 mm (6") and 300 mm (12") xy-scanning stages	150 mm (6") and 300 mm (12") xy-scanning stages	150 mm (6") and 300 mm (12") xy-scanning stages
Vacuum capable	Yes	Yes	Yes	Yes

Item	Wavelength Range	Optical Layer Thicknesses
NANOCALC-VIS-PRECON	400 - 850 nm	50 nm - 20µm
NANOCALC-XR-PRECON	250 - 1050 nm	10 nm - 100µm
NANOCALC-DUV	~200 - 1100 nm	1 nm - 100µm
NANOCALC-NIR	900 -1700 nm	100 nm - 250µm

Specifications Standard Operating Software (Required)

Item	Description	Required for
NANOCALC-10-N	Thin film measurement software for Windows; measurement, simulation and analysis of up to 10 layers; refractive index analysis also possible (refractive index for multiple layers requires SCOUT software)	Any NanoCalc measurement of thin films up to 10 layers

拉曼 / 螢光 量測系統

拉曼 / 螢光 量測配件

含氧量量測

薄膜量測

LED 光學 特性量測

穿透 / 反射 光譜量測

Add-on Software Options

Item	Description	Required for
SCOUT-FULL VERSION	Spectrum simulation program for Windows XP/7 (32 bit). Computes reflectance, transmittance, absorbance or ellipsometry spectra and fits your model to measured spectra by manual, graphical or automatic parameter variation. SCOUT can be controlled by OLE automation controllers.	Spectral simulation; use w/NANOCALC-10-N
NANOCALC-MAPPING	Mapping module software (needs NANOCALC -10-N) is 3D-mapping module with control of 150 mm and 300 mm mapping stages	Systems using mapping stages
NANOCALC-ONLINE	On-line module software (needs NANOCALC-10-N) includes external trigger and manual multipoint measurement with data transfer into Excel, plus statistical feature and 1D-Plot; also provides online display of XY-graphs and histograms of layer thickness and removal rate	On-line applications
NANOCALC-MULTIPOINT	Multipoint module software (needs NANOCALC -10-N) for manual multipoint measurement; provides result list with data transfer into Excel, CSV data, statistical and 1D-graphic; lets you measure on a mouse click, keyboard key or external trigger	Multipoint measurements
NANOCALC-REMOTE	Remote module (needs NANOCALC -10-N). Active-X functionality allows control of most NanoCalc functions from any other software.	Controlling NanoCalc functions w/other software

Fiber Assemblies for NanoCalc Systems

Item	Description	Use with NanoCalc Models
NC-2UV-VIS400-2	Bifurcated UV-VIS fiber, 400 μm, 2 m long, 2 x SMA 905 connectors, flexible metal jacketing, common end with stainless steel ferrule 6.35 mm x 50 mm	NANOCALC-VIS NANOCALC-XR
NC-7UVS400-2	NANOCALC-DUV reflection probe, 400 μm, 2 m long, 6 illuminated fibers, flexible metal jacketing, common end with stainless steel ferrule 6.35 mm x 50 mm	NANOCALC-DUV
NC-7VIS-NIR400-2	NANOCALC-NIR reflection probe, 400 μm, 2 m long, 6 illuminated fibers, flexible metal jacketing, common end with stainless steel ferrule 6.35 mm x 50 mm	NANOCALC-NIR

Reflection Probes for NanoCalc Systems

Item	Description	Use with NanoCalc Models
NC-7UV-VIS200-2	Reflection probe, 6 illumination, 1 read fiber, 200 μm UV-VIS fibers, 2 m long, flexible metal jacketing, stainless steel ferrule 6.35 mm x 50 mm, 2 x SMA 905 connectors	NANOCALC-VIS NANOCALC-XR
NC-7UV-VIS200-2-SMA	Reflection probe for use w/MFA-PT microscope adapter, 6 illumination, 1 read fiber, 200 μm UVVIS fibers, 2 m long, with flexible metal jacketing, stainless steel ferrule 6.35 mm x 50 mm, 3 x SMA 905 connectors	NANOCALC-VIS NANOCALC-XR

Accessories
Reference Wafers

We offer two Si-SiO^2 reference wafer options for measuring the thickness of thin,transparent films on substrates such as silicon wafers and optical layers.The STEP-WAFER covers UV-VIS wavelengths and the STEP-WAFER-600-1100 covers VIS-NIR wavelengths.Each wafer is a 100mm diameter,5-step wafer with calibrated thickness range of 0-500nm or 600-1100nm.

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測

Thin Film Metrology

SpecEl-2000 Ellipsometry System

The SpecEl-2000 is a benchtop thin film measurement system utilizing spectroscopic ellipsometry to measure multilayer, semi-transparent samples such as flat wafers or glass plates. The Spec-El-2000 is affordable, compact (52 cm x 33 cm x 24 cm) and convenient, with easy placement of the sample and one-button operation. SpecEl is part of the Mikropack line of thin film metrology systems. Models are available for 300-1000 nm (SPECEL-2000-UV-VIS-NIR) and 400-1000 nm (SPECEL-2000-VIS-NIR). SpecEl systems include an integrated spectrometer, broadband light source and controller; software is available separately.

SpecEl Features

∗ Film thickness accuracy to 1.0 nm
∗ Resolution to 0.1 nm
∗ Multi-layer stack measurements up to 25 layers
∗ Single film thickness up to 10 µm
∗ Spectral ranges from 300-1000 nm
∗ Standard spot size 0.4 mm x 1.2 mm
∗ Ideal for flat, semi-transparent samples such as wafers, glass, films and foils
∗ 3D mapping, reference wafers, accessories and other options available
∗ Accompanying software allows generation and recall of measurement recipes for one-step, repetitive measurements
∗ Accessories for thickness mapping

Software for SpecEl-2000 Systems

Powerful SpecEl software offers a range of modeling possibilities such as Cauchy, OJL, Tauc-Lorentz, Drude, EMA and different types of oscillators. The software also stores specific measurement routines, reducing the tedium of repetitive measurements and easing integration.

Specifications

System Performance	
Thickness range	1 nm - 10 µm
Resolution	0.1 nm
n and k analyzer	Values calculated for complete spectral range
Mathematical models	Extensive range of options includes constant refractive index, harmonic oscillator and imported dielectric functions
Measurement speed	7 - 13 seconds
Repeatibility	70 nm for SiO^2 on Si, cos(Delta) ±0.0003, tan(Psi) ±0.0002
Sample size	Desktop up to 150 mm diameter; mapping up to 300 mm diameter
Sample thickness	5 mm (maximum)
Optical	
Wavelength range	(UV-NIR) 300 - 1000 nm or (VIS-NIR) 400 - 1000 nm
Optical resolution	1.0 nm
Beam diameter	400 - 1200µm
Angle	70°
Computer	
Software	Windows XP/7 (32bit) software; also, recipe structure, administrator-user compatible
Hardware	PC with Windows XP/7 (32bit)
Standard Operating Software (required)	
SPECEL-ELLICALC	User-friendly 32-bit Windows software for ex situ direct measurement of thickness and n and k coefficients; recipe structure and administrator/user capabilities
SCOUT-FULL VERSION	SCOUT software. Spectrum simulation program for Windows XP/7 (32 bit). Computes reflectance, transmittance, absorbance or ellipsometry spectra and fits your model to measured spectra by manual, graphical or automatic parameter variation. SCOUT can be controlled by OLE automation controllers.
Add-on Software Option	
SPECEL-MAPPING	Mapping module software (must be used with SPECEL-ELLICALC software). Complete mapping module with software control of 150 mm and 300 mm mapping stages; includes XYZ controls and 3D-graphics

Accessories for SpecEl-2000 Systems

We offer reference wafers and mapping stages for use with SpecEl systems. Mapping stages must be purchased at time of SpecEl system order. Replacement parts are also available.

Item	Description
MAPPING-6-INCH-SE	150 mm x 150 mm XY-scanning stage; fully automatic w/vacuum chuck, 2 motors with encoders, control system integrated 2-axis CNC controller, RS-232 interface; portal structure
MAPPING-12-INCH-SE	300 mm x 300 mm XYZ-scanning stage; fully automatic w/vacuum chuck, 2 motors with encoders, control system integrated 2-axis CNC controller, RS-232 interface; portal structure
STEP-WAFER	Reference Si-SiO2-step-wafer, 5 steps from 0-500 nm, calibrated, 100 mm diameter
STEP-WAFER-600-1100	Reference Si-SiO2-step-wafer, 5 steps from 600-1100 nm, calibrated, 100 mm diameter

Thin Film Metrology

PlasCalc-2000 Plasma Monitoring and Control System

The PlasCalc-2000 system provides real-time, in situ analysis of the optical emission spectra acquired during plasma processes. The system has all the tools necessary for monitoring and controlling a running process, with sophisticated algorithms for data acquisition and signal treatment. Wavelength, recipe and formula editors allow quick creation of efficient recipe functions for data handling and easy combination of many recipes to build comprehensive strategies for system response during monitoring. PlasCalc-2000 (item PLASCALC-2000-UV-VIS-NIR) is part of the Mikropack line of thin film metrology systems.

The PlasCalc-2000 is 257 mm x 152 mm x 263 mm and includes a spectrometer (200-1100 nm) with 16-bit D/A converter and 12 VDC power supply. Operating the system requires PlasCalc software and 400 μm optical fibers, which are available separately.

Sample Plasma Monitoring Applications

∗ Plasma etching
∗ Plasma chamber health control
∗ Planarization of blanket polysilicon
∗ Application of protection coatings
∗ Abnormal process phenomena
∗ Process optimization
∗ Surface cleaning processes

Spectroscopic

Spectral range	200 - 1100 nm
Optical resolution	1.0 nm (FWHM)
Fiber optic connector	SMA 905

Electronics

Power supply	12 VDC, 1.25 A
Power requirements	90 - 240 VAC, 50/60 Hz
D/A converter	14 bit " I/O "
Digital I/O	8x TTL
Analog output / voltage sign	4x [0-10V]

Computer

Software	PlasCalc software (basic operating software); also, SpecLine atomic emission line analysis software (add-on package)
Hardware	PC with Windows XP/7 (32 bit)

Software for PlasCalc-2000-UV-VIS-NIR System
Standard Operating Software (Required)

Item	Description
PLASCALC-SOFTWARE	Real-time and in situ access to all functions via easy menu-oriented software interface. Multiple plasma species can be picked by a mouseclick, mathematically calculated, subtracted and monitored in real time and in situ. Capabilities: four digital inputs/outputs, 4 analog output channels; display messages with tone signal can be set up for end point, start, stop and limit.

Add-on Software Option

Item	Description
SPECLINE	Software for spectroscopy, astrophysics, plasma science or plasma processing. This tool supports and makes it easy to evaluate spectral data, e.g. finding specific lines in spectra, identifying unknown peaks, identifying atomic lines and molecular bands or comparing data from different measurements in spectra data. Almost instantly detects peaks of lines and bands using several powerful filter functions. Extensive database for atoms and molecules included; only for Windows XP/7 (32 bit).

拉曼 / 螢光
量測系統

拉曼 / 螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透 / 反射
光譜量測

Software

SpecLine Software for Compound ID

Flame Series, USB Series, HR Series, QE Pro Series, and MAYA2000 Pro Series.

Identifies Elements and Compounds

SpecLine Software is a powerful tool designed for identifying atomic emission lines and molecular bands in spectral data. SpecLine's advanced evaluation, search, compare and identify functions and its extensive library of over 100 elements and over 400 compounds enable you to quickly identify unknown lines, peaks and bands. SpecLine was designed for scientists, engineers and researchers using emission spectroscopy in fields such as astrophysics, the plasma sciences and plasma processing.

Searching and Comparing Data

In the Line Identification window, you can define all the parameters for your search in a Periodic Table screen (top right), and begin the process with just a single click. SpecLine can analyze even the most complex spectral data, including spectra with double lines, line shoulders and complex band structures. Up to 12 separate spectra, even if they are in different file formats, can be combined for comparative purposes.

Identification

SpecLine applies a variety of sophisticated filter functions such as Wiener-Fourier and polynomial noise removal to identify the elements and compounds in your spectra. After SpecLine applies comparative searches to its extensive atomic, ionic and molecular database of over 100 elements in several ionization states and over 400 elemental compounds, it provides detailed data on each identified peak and line, such as the name of the element, the peak's wavelength, the electron voltage and its transition state and quantum number.

Opening Spectra and Saving Data

SpecLine can analyze spectral data from various spectroscopy software applications; it also can open all Ocean Optics software file formats as well as SPC and ASCII file formats. In addition, you can save all of SpecLine's identification data in its native file format or export it into various applications, such as Excel.

Hardware Keys

SpecLine Software comes with a USB or parallel-port (printer port) hardware key. The key is a security device to protect against unlicensed copies. It connects to an input/output port on your computer and must be used to run the software. SpecLine-U comes with a USB dongle for use with Windows XP, Vista and Windows 7 (32-bit). SpecLine-P comes with a feed-through parallel port hardware key.
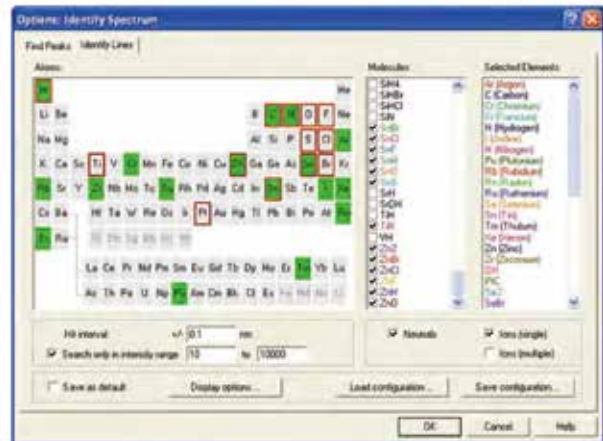
In the Identify Lines window, you can search atoms from a Periodic Table, molecules from an extensive list, and elements in single or multiple ionization states.
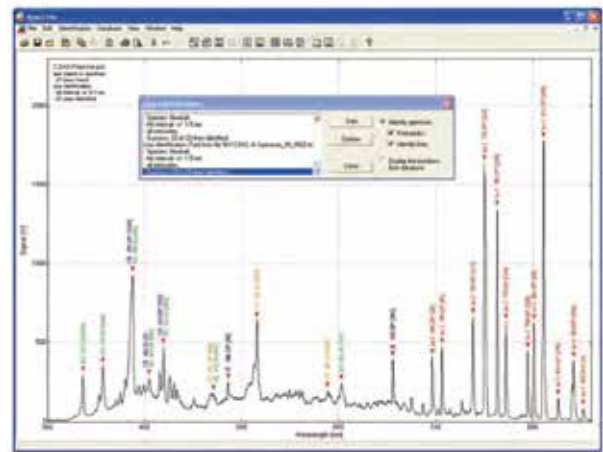
In this window, a search on the peaks and lines in a spectrum has been completed and identified successfully.
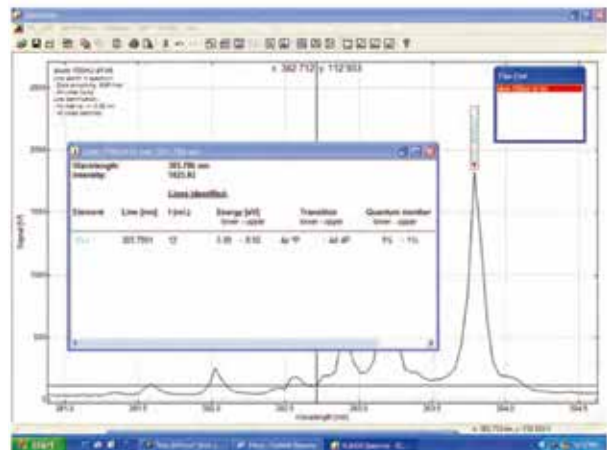
This window demonstrates SpecLine's ability to provide detailed data on just one emission line.

發光二極體 (LED) 光學特性量測系統 / Automatic LED Profile Analyzer

發光二極體 (LED) 光學特性量測系統，是一自行整合開發之全方位 LED 光學特性量測系統。其設計主要提供 LED 開發或應用廠商測量及分析相關光學數據圖表的多功能整合機台，如總光通量、光強度、光譜相關數據 (放射光譜、色度座標、色溫、主波長、半波寬等) 以及二維 / 三維之光強度分佈等數據圖表，以利相關應用廠商設計參數的參考與驗證。

此量測系統使用影像 CCD 進行精準定位，其中電控自動旋轉軸搭配編碼器，可達到精準的角度控制，以提升量測之精準度。另外因 LED 發光特性與接面溫度息息相關，本系統另加入熱電致冷晶片，搭配電致冷晶片控制器，可自行設定控制 LED 基板溫度，除可提供 LED 在不同基板溫度下之相關光學特性，亦可確保量測過程中 LED 之穩定性，以達到精確量測之目的。

樣品載台部分，除標準型載台以外 (支援標準星型基板、2 公分方型基板與 LED Emitter)，亦可依客戶之需求訂製。

APA-S / APA-100T　　　**APA-ST**

量測項目 (Measurement Function)

項目 / Item	功能 / Function	單位(Unit)
色度量測 / Colorimetry	三刺激值 / Tristimulus Value	-
	CIE1931色度座標(x, y) / CIE1931 Chromaticity Coordinates (x, y)	-
	CIE1960色度座標(u, v) / CIE1960 Chromaticity Coordinates (u, v)	-
	CIE1976色度座標(u', v') /CIE1976 Chromaticity Coordinates (u', v')	-
	色純度 / Color Purity	%
	相關色溫(CCT) / Correlated Color Temperature (CCT)	K
光譜量測 / Spectroradiometry	主波長 / Dominant Wavelength	nm
	峰值波長 / Peak Wavelength	nm
	中心波長 / Center Wavelength	nm
	半高寬(FWHM) / Full Width at Half Maximum (FWHM)	nm
光度量測 / Photometry	光強度 / Luminous Intensity	cd
	照度 / Illumination	lux
	總光通量 / Total Luminous Flux	lm
	2D配光曲線 / 2D Candlepower Distribution	-
	3D配光曲線 / 3D Candlepower Distribution	-

規格 (Specification)

型號 / Model	APA-ST	APA-100T	APA-AT
偵測器 / Sensor	Spectrometer & Si-Photodiode	Spectrometer & Si-Photodiode	Spectrometer & Si-Photodiode
光度範圍 / Photometry Range	Luminance Intensity : 0.01~5000 cd Total Luminous : 0.01~24000 lm	Luminance Intensity : 0.01~5000 cd Total Luminous : 0.01~24000 lm	Luminance Intensity : 0.01~5000 cd Total Luminous : 0.01~24000 lm
波長範圍 / Wavelength Range	350-790nm (Grating Dependent)	350 - 790nm (Grating Dependent)	350 - 790nm (Grating Dependent)
解析度 / Resolution	0.24nm FWHM	0.24nm FWHM	0.24nm FWHM
雜散光 / Stray Light	< 0.05% at 600nm < 0.1% at 435nm	< 0.05% at 600nm < 0.1% at 435nm	< 0.05% at 600nm < 0.1% at 435nm
平台 / Stage	XYZ Micro Motion Stage (Manual) Res:0.32mm Delta (δ) & Phi (φ) Rotation Stage (Automatic)	XYZ Micro Motion Stage (Manual) Res:0.32mm Delta (δ) & Phi (φ) Rotation Stage (Automatic)	XYZ Micro Motion Stage (Manual) Res:0.32mm Delta (δ) & Phi (φ) Rotation Stage (Automatic)
操作角度 / Operate Angle	Delta (δ) : ±100 degree Res 0.01d Phi (φ) : 360 degree Res 0.002d	Delta (δ) : ±100 degree Res 0.01d Phi (φ) : 360 degree Res 0.002d	Delta (δ) : ±100 degree Res 0.01d Phi (φ) : 360 degree Res 0.002d
LED定位方式 / LED Alignment	CCD Camera	CCD Camera	CCD Camera
樣品大小 / Sample Size	Max.: 50mm x 50mm	Max.: 50mm x 50mm	Max.: 50mm x 50mm
基板溫度控制 / LED Substrate Temp. Control	NA	Max.: 100℃	Max.: 100℃
環境溫度控制 / Environment Temp.Control	NA	NA	0 - 85℃
輸入電源 / Input Power	AC 110V/60Hz	AC 110V/60Hz	機箱(Case):AC 110V/60Hz 恆溫箱(Chamber):AC 220V/60Hz
外觀尺寸 / Size	700(W) x 1045(D) x 1900 (H) [mm]	700(W) x 1045(D) x 1900 (H) [mm]	機箱(Case): 565 (W) x 615 (D) x 1535 (H) [mm] 恆溫箱(Chamber): 1250 (W) x 965 (D) x 1320 (H) [mm]

＊規格若更動不另通知　＊部分規格可依客戶需求訂製

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

LED 模組配光曲線儀 / LED Module Goniophotometer

Customized Code : K100110

配光曲線儀主要透過旋轉燈具來量測待測光源之光強度分布以及總光通量。搭配光譜儀時,可用來測量光源之各個空間上之光譜、色度座標、色溫和演色性等。並可輸出 IES 檔案,可適用於光學設計模擬軟體。

測試項目包含垂直剖面圖、卡式座標圖、3D 配光曲線圖、光譜圖、光束角、光強度、光通量、色溫和色度座標等項目。

特色
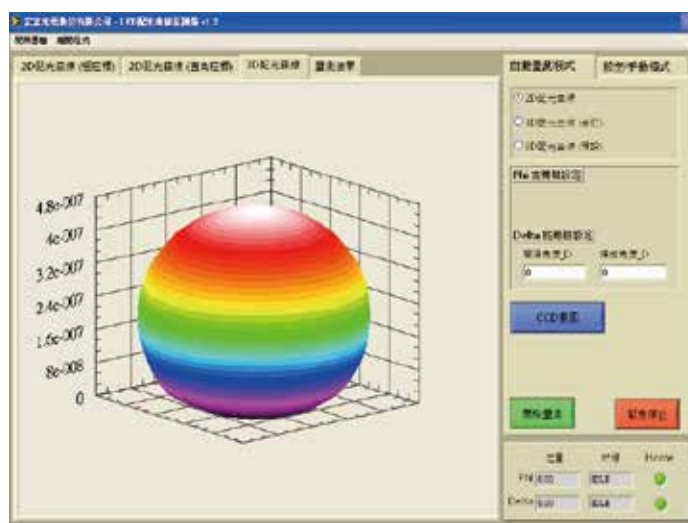＊ 中文操作介面軟體,操作簡易
＊ 全自動化量測
＊ IES 檔案格式輸出
＊ 可選擇搭配 V(λ) sensor 或是光譜儀
＊ 可提供軟硬體客製化服務

硬體規格

項目	內容
光功率量測頭	波長範圍：400nm ~ 900nm 量測誤差： ± 3%
電流計	型號：KEITHLEY 6485 通訊介面：IEEE-488和 RS-232
步進馬達旋轉平台	a.解析度≦0.002度 定位精度≦0.02度 b.旋轉角度phi軸360度 theta軸≧±100度
手動移動平台	a.行程25mm b.解析度0.01mm
量測平台	a.待測光源固定機構 b.待測光源定位裝置 定位精度0.01mm c.暗箱設計 d.測頭端滑軌長度>400mm e.遮光板 *2 f.台面尺寸 Φ70mm
樣品對位裝置	CCD Camera
機台尺寸	820 x 300 x 300cm (L x W x H)
機台重量	50Kgs

軟體畫面

軟體功能

項目	功能
自動量測	依使用者設定之量測角度,自動完成量測
手動量測	手動移動至自訂角度,進行單點光照度測量
量測項目	a. 垂直剖面圖 b. 卡式座標圖 c. 3D配光曲線圖 d. 全光通量 e. 光束角 **選配功能: (須搭配光譜分析儀)** f. 每點之CIE 1931(x, y)與CIE 1976(u', v')色度座標與座標圖 g. 每點之相關色溫 h. 每點之光譜 i. 測每點之主波長 j. 每點之峰值波長 k. 每點之色純度 l. 每點之演色性
IES格式檔案	量測結果輸出為IES檔案格式

手術燈具配光曲線儀 / LED Surgical Lamps Goniophotometer

Customized Code : J140413

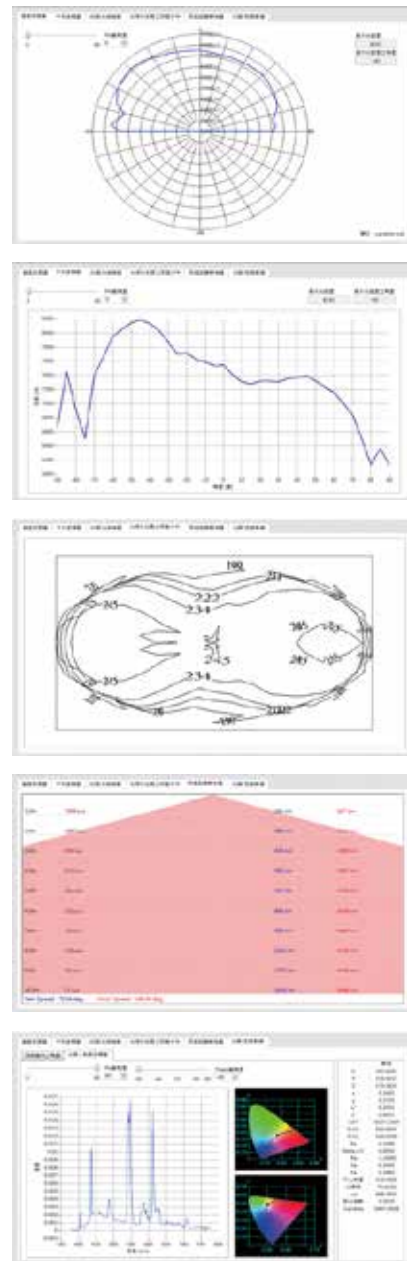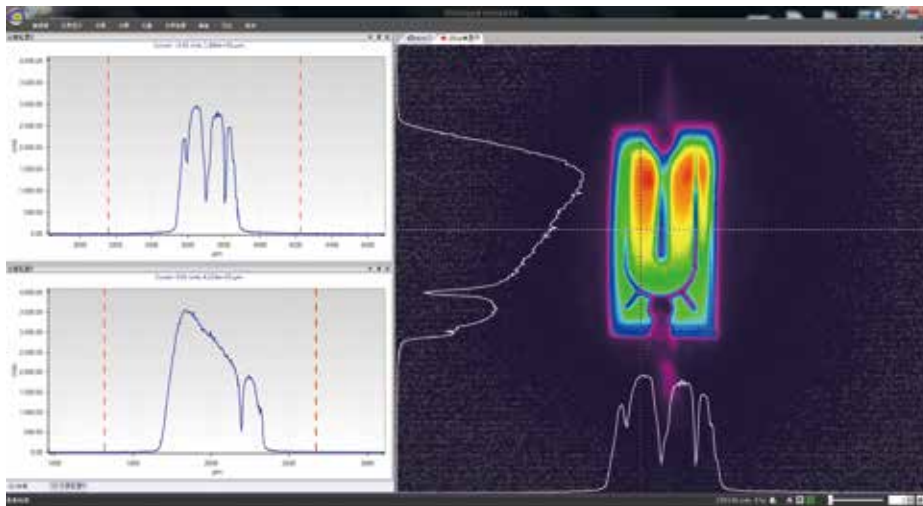配光曲線儀主要透過旋轉燈具來量測待測光源之光強度分布以及總光通量。搭配光譜儀時,可用來測量光源之各個空間上之光譜、色度座標、色溫和演色性等。並可輸出 IES 檔案,可適用於光學設計模擬軟體。

測試項目包含垂直剖面圖、卡式座標圖、3D 配光曲線圖、照度分布圖、照度距離關係圖、光譜圖、中心照度、光束角、平均色度座標、光強度、光通量、色溫和色度座標等項目。

特色

＊ 中文操作介面軟體,操作簡易
＊ 全自動化量測
＊ IES 檔案格式輸出
＊ 可選擇搭配 V（λ）sensor 或是光譜儀
＊ 可提供軟硬體客製化服務

硬體規格

項目	規格內容
偵測器	Spectrometer
電控Phi軸	a. 行程：360° b. 解析度：0.01° c. 重複精度：±0.1°
電控Theta軸	a. 行程： ±170° b. 解析度： 0.01° c. 重複精度：±0.1°
手動Z軸	a. 行程：150mm b. 解析度： - c. 重複精度： -
可量測樣品尺寸	800 x 250mm (LxW)
測量距離	10m (max)
電源	單相三線式220 V/60 Hz
靜態機台尺寸	112x80x150cm (LxWxH)
動態機台尺寸	112x112x150cm (LxWxH)
機台重量	280Kg (不含軌道130Kg)

軟體功能

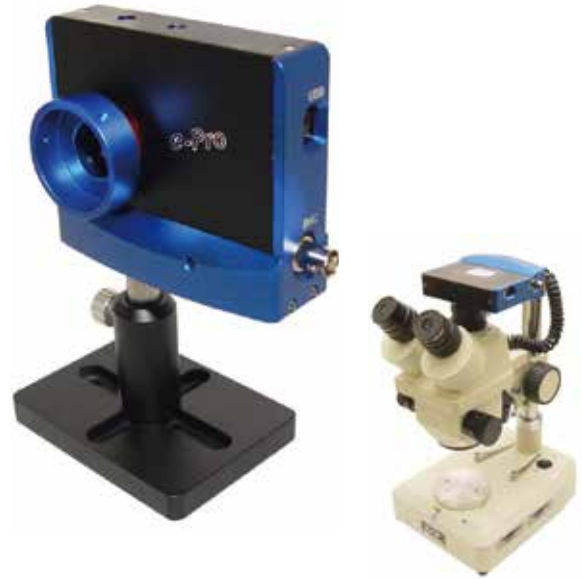| 項目	功能
自動量測	依使用者設定之量測角度,自動完成量測
手動量測	手動移動至自訂角度,進行單點光照度測量
量測項目	a. 垂直剖面圖 b. 卡式座標圖 c. 3D配光曲線圖 d. 光源於地面上之照度分布圖 e. 照度距離關係圖 f. 平均色度座標(Xa, Ya) g. 全光通量 h. 中心照度 i. 光束角 j. 每點之CIE 1931(x, y)與CIE 1976(u', v')色度座標與座標圖 k. 每點之相關色溫 l. 每點之光譜 m. 測每點之主波長 n. 每點之峰值波長 o. 每點之色純度 p. 每點之演色性
IES格式檔案	量測結果輸出為IES檔案格式

軟體畫面

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

LED 光形分佈量測儀 / LED Light Sharping Analyzer

產品特色

＊ 12-bit CCD
＊ USB 2.0 通訊介面
＊高速電子快門 30μs，電子增益 29dB
＊軟體內建視頻觸發，脈衝峰值大於特定 counts 觸發輸出資料
＊硬體內建 Photodiode，可同步觸發脈衝光源頻率至 1KHz
＊硬體內建 BNC 接頭，可外接 Photodiode 同步觸發脈衝光光源

產品應用

＊ LCD、PDP、LED、OLED 及背光模組等之光強度均勻性量測
＊投影系統，如投影機、背投影電視等之輝度均勻性量測
＊ LED 照明燈具等照明燈具之照度均勻性量測
＊其他發光系統之光形量測

產品規格

型號	UBS-LED-C	UBS-LED-S	UBS-LED-P
軟體功能	＊專利背景校正Ultracal ＊多種ISO定義光束寬度 ＊光束質心、峰值位置 ＊手動、全自動量測 ＊手動、自動光圈設置 ＊2D圖、3D圖 ＊統計功能 ＊Pass/Fail功能 ＊數據紀錄 ＊方便的輸出報告PDF	功能同USB-LED-C，增加功能如下： ＊BeamMaker模擬 ＊PC外接功率計，可同步將Counts轉換成雷射功率 ＊1D圖分析 ＊採樣頻率設定：時間、張數 ＊光束發散角量測 ＊高斯、均勻性量測 ＊光束質心穩定性量測 ＊更多數據紀錄，所有Pixel強度	功能同UBS-LED-S，增加功能如下： ＊增加手動調整多個AOI範圍來作分析 ＊提供自動化介面的編輯 ＊(LabVIEW,EXCEL,.NET VB) ＊增加直方圖的強度顯示方式 ＊X、Y軸光束離軸校正
波長範圍	350～1100 nm		
解析度	4.40μm x 4.40μm，1600 x 1200 pixels		
配件	光衰減片：紅色(OD1)* 1pc ， 黑色(OD2)* 2pcs ， 固定支架 & 顯微鏡轉接環		
系統要求	Windows 7 (32/64) VISTA (32/64) and XP (32) Professional		

穿透 / 反射光譜分析儀 / Optical Transmittance / Reflectance Analyzer

Optical Transmittance / Reflectance Analyzer (OTA/ORA)，穿透 / 反射光譜分析儀包含一小型光譜儀與光源，主要用來量測光學鏡片或材料之光譜穿透 / 反射率，除全範圍光譜之穿透 / 反射率以外，亦可自行設定光譜範圍或單一波長之穿透率分析。
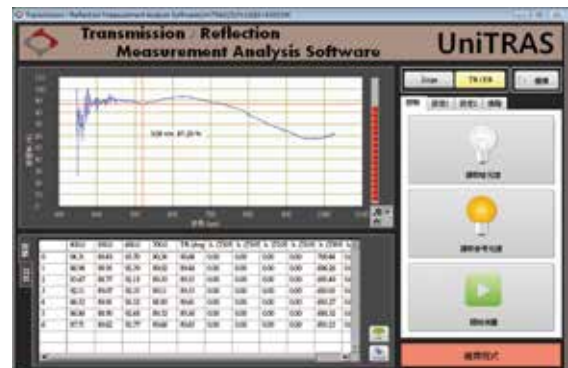
產品特色

＊設計簡單，操作方便
＊自訂資料輸出，可轉成文字檔
＊圖形存檔可供分析報告使用
＊附鋁箱保管存放方便，不佔空間

量測項目

＊單一波長穿透率
＊自訂範圍波長穿透率
＊全波長穿透率

系統規格

模式	穿透光譜分析儀			反射光譜分析儀
型號	09OTA-UV-VIS	09OTA-VIS-NIR	09OTA-VIS-NIR-IS	09ORA-VIS-NIR-IS
波長範圍	250-750nm	350-1000nm	350-1000nm	350-1000nm
光源壽命	10Pulse (在50Hz速率下約230天)	2800K (10,000 hour bulb)	3000K (1,000 hour bulb)	2800K (10,000hour bulb)
積分球	--	--	●	●
解析度	2nm			
介面	USB			
輸入電源	100-240VAC 50/60Hz			
尺寸	110(W) x 170(D) x 360(H)[mm]			
重量	<3kgs			

09OTA-CP 穿透光譜分析儀 / 09OTA-CP Optical Transmittance Analyzer

應用領域
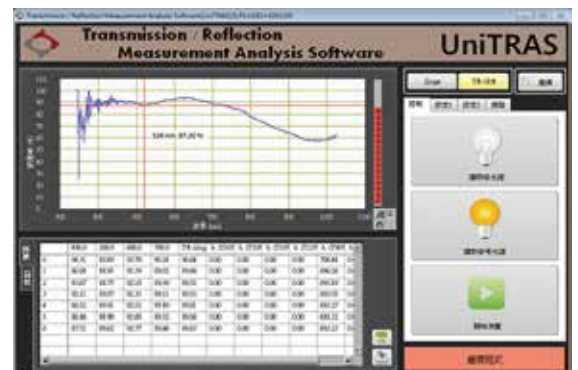
＊玻璃、透明塑膠材質之產品。
＊光學鍍膜如隔熱紙、ITO。
＊濾光片 (IR-cut、Band Pass)。

軟體功能

＊穿透光譜量測
＊可設定 10 點即時監控點
＊特定範圍內之平均穿透率量測
＊批次量測之流水號存檔功能
＊穿透率（ 10%, 50%, 90%）之波長位置計算
＊ GO／NG 功能（單一波長）
＊穿透光譜校正功能

系統規格

型號	09OTA-CP
波長範圍	400-950nm
光譜儀	微型光譜儀USB2000+
傳輸方式	USB
光譜解析度	3.8nm
穿透率穩定度	<1%
波長在現性	0.5nm
光源穩定度	±0.5%
系統飄移度	<2% per hour at 550nm
電源	AC 110V~220V

拉曼／螢光量測系統

拉曼／螢光量測配件

含氧量量測

薄膜量測

LED 光學特性量測

穿透／反射光譜量測

09OTA-NM 穿透光譜分析儀 / 09OTA-NM Optical Transmittance Analyzer

應用領域

＊玻璃、塑膠材質之產品。
＊光學鍍膜等，如：隔熱紙、ITO、濾光片（IR-cut、Band Pass 等）。

軟體功能

＊穿透光譜量測
＊可設定 10 點即時監控點
＊特定範圍內之平均穿透率量測
＊批次量測之流水號存檔功能
＊穿透率（10%, 50%, 90%）之波長位置計算
＊ GO / NG 功能（單一波長）
＊穿透光譜校正功能

系統規格

型號	09OTA-NM
波長範圍	350~1000nm (可依需求改變)
光學解析度	2.1nm (可依需求改變)
波長間隔設定	0.1、0.5、1、2、5 和10nm
波長再現性	<0.5nm
穿透率穩定度	<1%
光源穩定度	0.5% (~30分鐘後)
光源飄移	<0.3% (每小時)
燈泡壽命	1000 小時
燈泡色溫	3000K
樣品載具	依樣品種類共分四種尺寸，分別為 φ30.1mm、φ19.4mm、φ7.1mm及7.3 x 8.9mm。(依需求製作)
操作環境溫度	5~35℃
操作環境濕度	20~70%
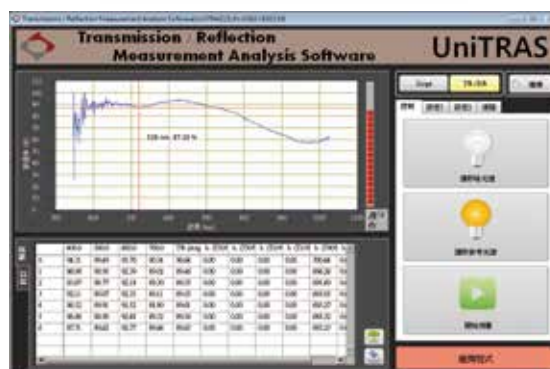
09OTA-NM-XY 穿透光譜分析儀 / 09OTA-NM-XY Optical Transmittance Analyzer

應用領域

＊玻璃、塑膠材質之產品。
＊光學鍍膜等，如隔熱紙、ITO、濾光片 (IR-cut、Band Pass 等)。

軟體功能

＊穿透光譜量測
＊中心波長計算
＊半高寬計算
＊平均穿透率（自訂範圍）
＊相對（絕對）強度 10% 波寬與波長計算
＊相對（絕對）強度 50% 波寬與波長計算
＊相對（絕對）強度 90% 波寬與波長計算
＊多種量測模式（自動、使用者定義與任意點量測）

系統規格

型號	09OTA-NM- XY
波長範圍	350~1000nm (可依需求改變)
光學解析度	1.1nm (可依需求改變)
波長間隔設定	0.1、0.5、1、2、5 和10nm
波長再現性	<0.5nm
穿透率穩定度	<1%
光源穩定度	0.5% (~30分鐘後)
光源飄移	<0.3% (每小時)
燈泡壽命	1000 小時
燈泡色溫	3000K
樣品載具	樣品載盤 (樣品大小60x60mm和80x88mm)。(可依需求製作)
操作環境溫度	5~35℃
操作環境濕度	20~70%

MEMO

拉曼／螢光
量測系統

拉曼／螢光
量測配件

含氧量量測

薄膜量測

LED 光學
特性量測

穿透／反射
光譜量測