EDINBURGH INSTRUMENTS

FLS1000

Photoluminescence Spectrometer

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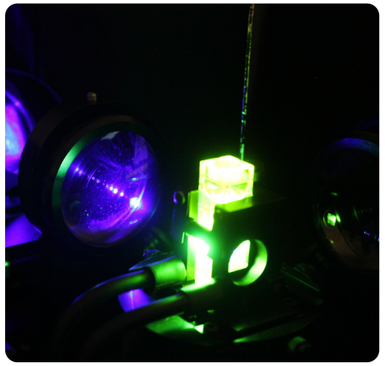
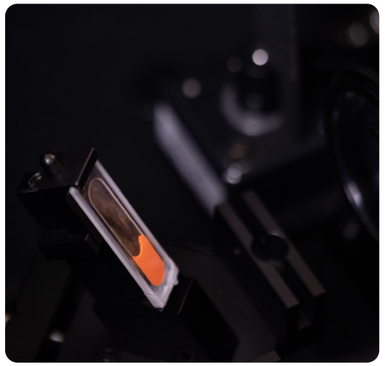
FLS1000 Photoluminescence Spectrometer

The FLS1000 is a highly modular photoluminescence (PL) spectrometer designed for ultimate sensitivity and versatility in steady-state and time-resolved photoluminescence research.

This instrument delivers precise measurements across a broad spectral range – from ultraviolet to mid-infrared (out to 5500 nm) – and captures lifetimes from picoseconds to seconds. Featuring an industry-leading sensitivity of over 35000:1, it excels at detecting weakly photoluminescent samples. With its modular architecture, the FLS1000 is more than an instrument; it's an evolving platform engineered to grow with your research for years to come.





FLS1000 Key Features

Ultimate Sensitivity

Industry-leading signal-to-noise ratio of 35000:1, detecting even the weakest photoluminescence signals.

Modular Design

Configurable with a wide range of light sources, detectors, and sample accessories to match specific research needs.

UV to MIR Coverage

Measure emission from 200 nm to 5500 nm with an extensive choice of detector options.

High Spectral Resolution

Resolve narrow spectral features down to 0.05 nm with precision-engineered monochromators.

Intuitive Software

Comprehensive acquisition and analysis software with built-in automation and device control.

All-in-one Spectrometer

Rapid switching between spectra, lifetime, kinetics, and quantum yield for complete sample characterisation.

PL Lifetime from Picoseconds to Seconds

Study the full timescale of time-resolved PL– from ultrafast dynamics to long-duration kinetics.

Advanced Accessories

Extend capabilities with X-ray and VUV excitation, microspectroscopy, cryogenic measurements, and more.

Upgradable Platform

Add new modules at any time as research requirements evolve.

FLS1000 Platform

1 Sources

Configurable with up to seven excitation sources, including pulsed, continuous-wave, and wavelength tunable options.

2 Monochromators

Long focal-length monochromators provide outstanding stray light rejection and high spectral resolution.

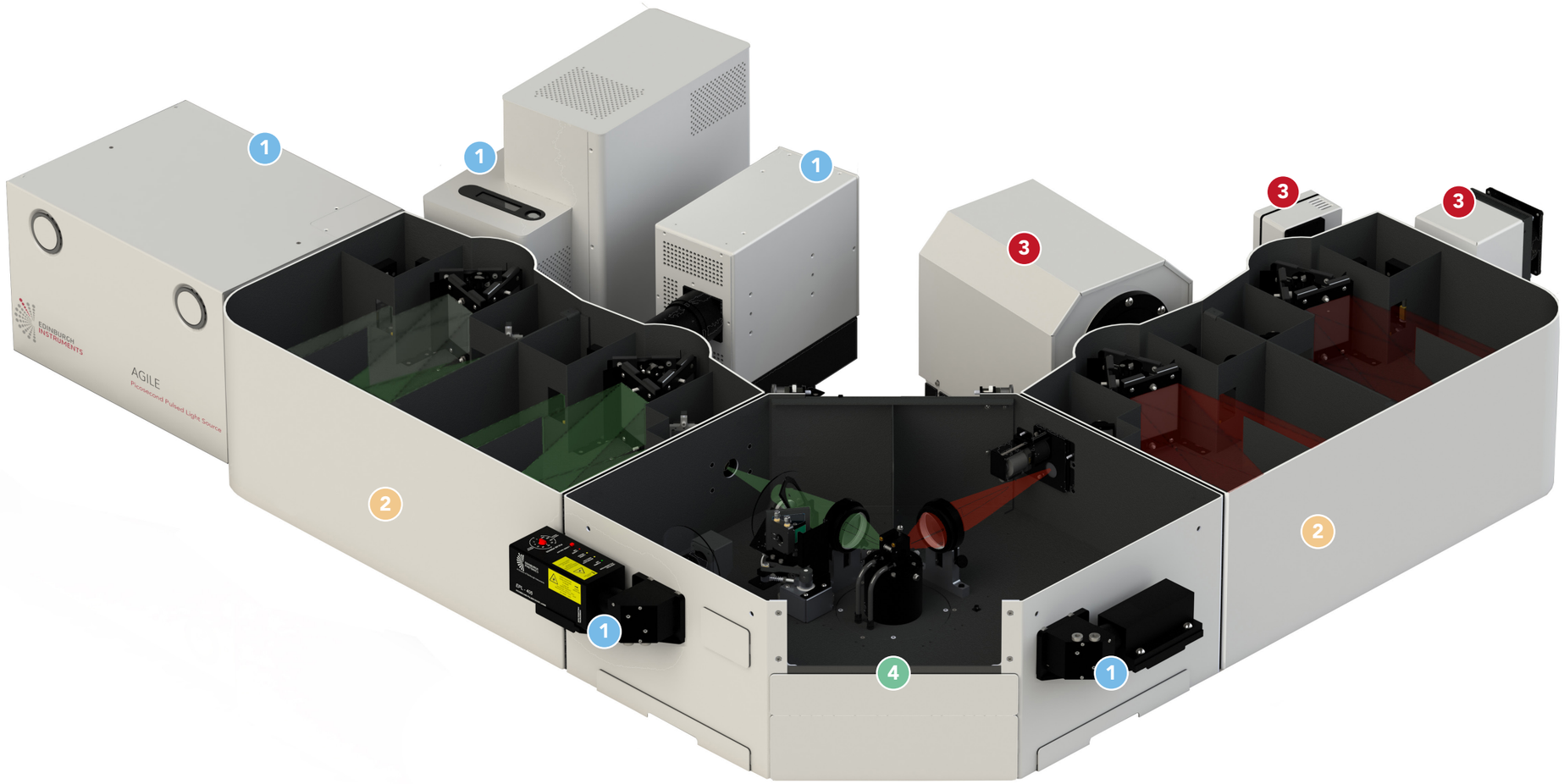
Available in either single or double monochromator configurations with up to three gratings.

3 Detectors

Up to eight detectors covering spectral and time-resolved photoluminescence from UV to MIR.

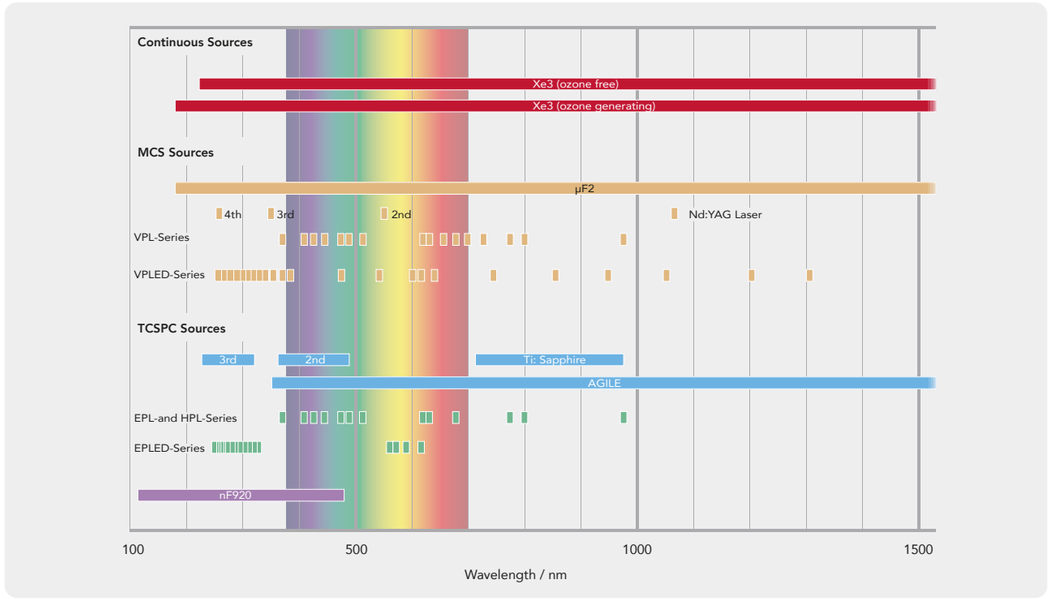
4 Sample Chamber

The large sample chamber accommodates a wide range of accessories, including cryostats, polarisers, mirror optics, and integrating spheres.



Edinburgh Instruments FLS1000 Photoluminescence Spectrometer

Source Options



Continuous Sources Spectral Measurements

- 450 W xenon lamp tunable from 230 nm to >1000 nm (extendable to <200 nm if ozone-generating).
- Continuous wave (CW) lasers for high-power monochromatic excitation.

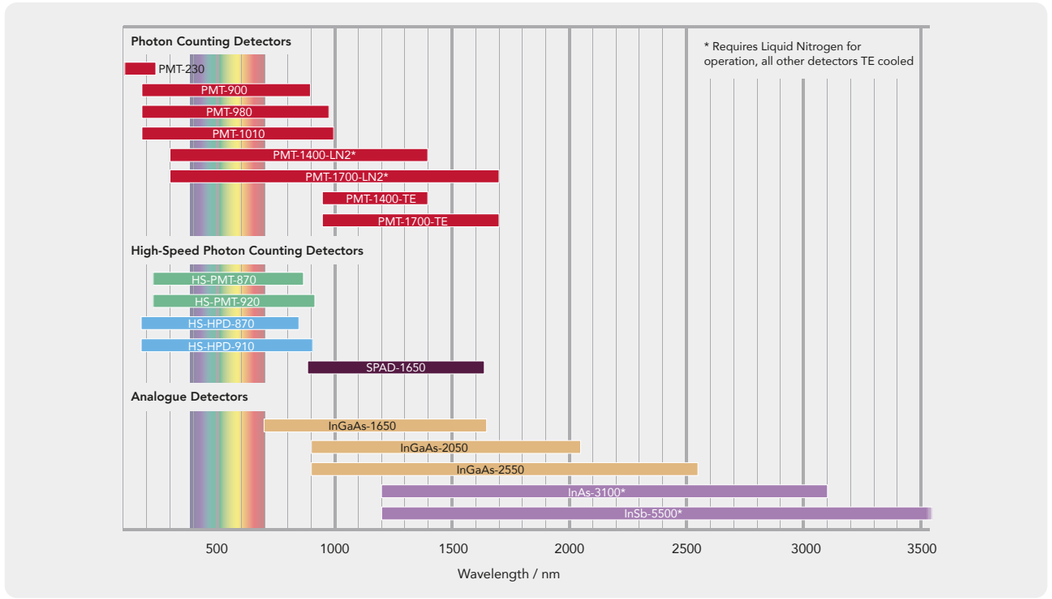
MCS Sources Phosphorescence Lifetime

- µF2 pulsed xenon flashlamp; microsecond pulses tunable from 250 nm to >1000 nm.
- VPL/VPLED single-wavelength sources with variable pulse width from 50 ns to 1 ms.

TCSPC Sources Fluorescence Lifetime

- HPL/EPL/EPLED pico- and nanosecond pulsed sources up to 80 MHz.
- Agile wavelength-tunable picosecond supercontinuum laser.
- nF920 ns-pulsed flashlamp delivering sub-nanosecond pulses from 115 nm.

Detector Options



Photon Counting Detectors

- Provide the highest sensitivity for detecting weak photoluminescence and sub-nanosecond lifetime measurements, with spectral coverage up to 1700 nm.

High-Speed Photon Counting Detectors

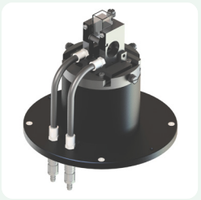
- Optimised lifetime detectors, enabling measurement of photoluminescence lifetimes as short as 5 ps.

Analogue Detectors

- Offer spectral coverage up to 5500 nm with options for spectra, lifetime or combined measurements.

Sample Holder Options

Liquid Samples



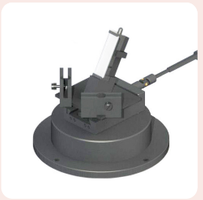
Cuvette Holders

Room-temperature, passively or actively cooled.

Multi-position

Software-controlled holders for multiple cuvettes; room temperature or actively cooled.

Solid Samples



Solid Sample Holder

Optimised for minimum reflections and external position adjust.

Rotational and XY position control options.

Slide Holder

Transmission measurements and rotation capability.

Solid or Liquid Sample Holders

Inert Sample Holder

Holds solid samples or cuvettes under inert atmosphere.

QYPro

Integrating sphere for absolute PL quantum yield of solutions, films, and powders.

Cryogenic Measurements

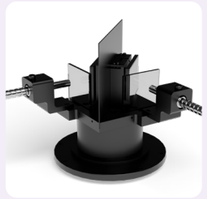
Sample Dewar

Entry-level solution for measuring solutions and powders at 77 K.

Cryostats

Liquid nitrogen and liquid helium options for 2 K – 800 K, solid samples, cuvettes, and powders.

External Accessories



Fibre Coupling

Integrate your own accessories or remote probes into the spectrometer.

Microplate Reader

Fibre-coupled microplate reader for high-throughput measurements of up to 384 samples in multiwell plates.

XS1

Sample accessory for radioluminescence spectra and lifetimes external to the spectrometer.

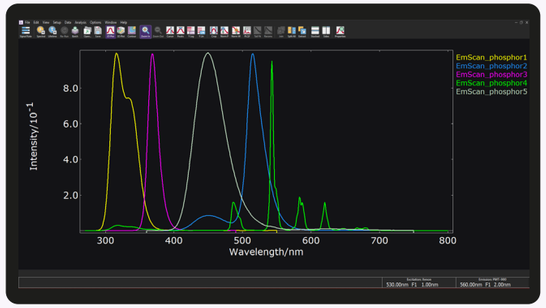
MicroPL

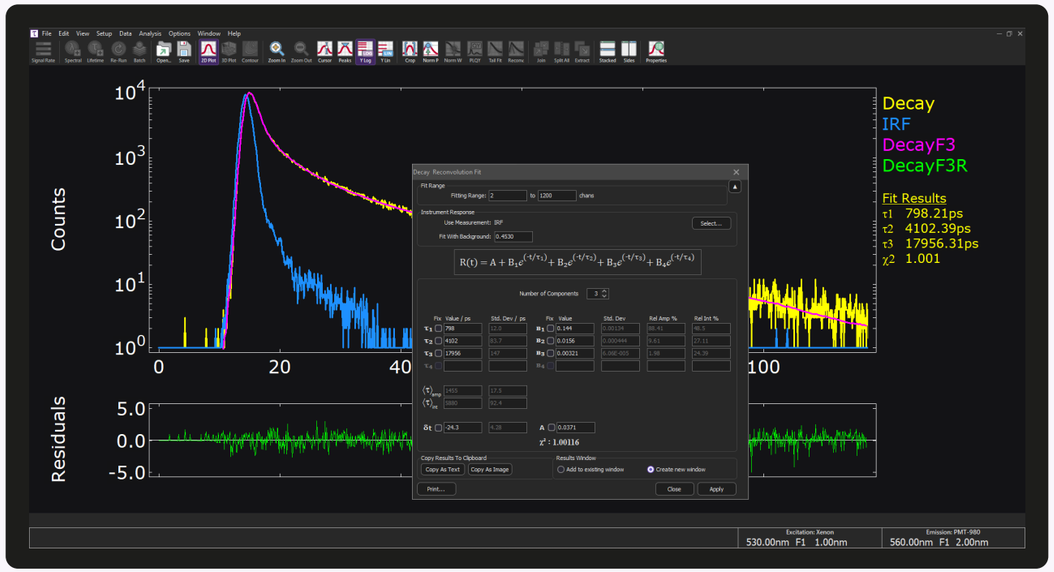
External microspectroscopy accessory with optional fluorescence lifetime imaging.

Fluoracle® Software

The latest version of Fluoracle brings improvements to data acquisition, analysis, and presentation, making photoluminescence spectroscopy easier than ever.

Fully integrated with the FLS1000, it offers seamless software control over excitation sources, acquisition techniques, and detectors.





Fluoracle Standard Features

- FluoAuto
- Quantitation
- Spectral Correction
- Chromaticity Analysis
- Trend Analysis
- Validation Scans

Upgrade Features

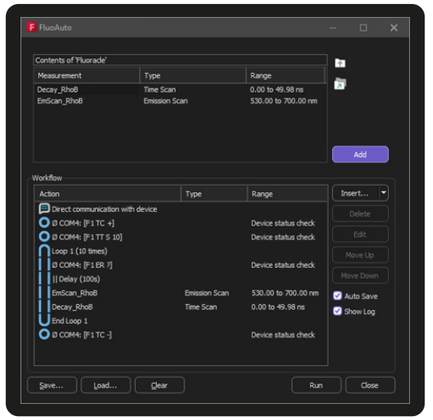
- Lifetime Exponential Component Analysis
- Time-Resolved Emission Spectra
- Quantum Yield Analysis
- Temperature Maps
- Spectral and Time-Resolved Anisotropy
- Circularly Polarised Luminescence

FluoAuto

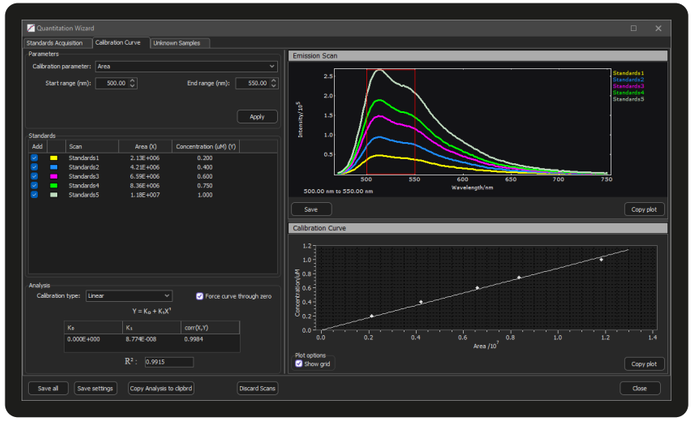
FluoAuto lets you program a sequence of automated measurements, streamlining experiments that once took hours into a single setup. It supports temperature control, multi-position sample holders, delays, loops, and sending commands to external accessories.

Quantitation

Fluoracle's quantitation feature allows you to generate calibration curves based on intensity, band area, or ratios. It also includes spectral band analysis and estimated decay lifetimes, enabling quick decision-making in research.



FluoAuto setup



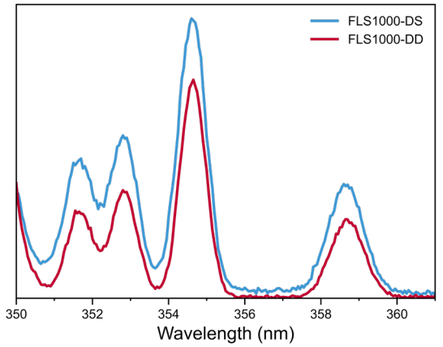
Calibration curve measurement

Excitation-Emission Map (EEM) of river water

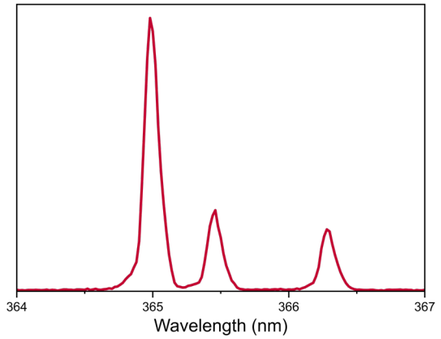
Core System Capabilities

Spectral Measurements

- Market-leading signal-to-noise ratio, ready for the most demanding applications.
- Sensitivity where you need it: optimise the system to your spectral range of interest with the choice of gratings and detectors.
- Choose double excitation and emission monochromators for the maximum spectral resolution and stray light rejection.
- Add a transmission detector to measure fluorescence and absorption in the same instrument.



Raman spectrum of CCl_4 measured with an FLS1000-DS (single monochromator) and FLS1000-DD (double monochromator)

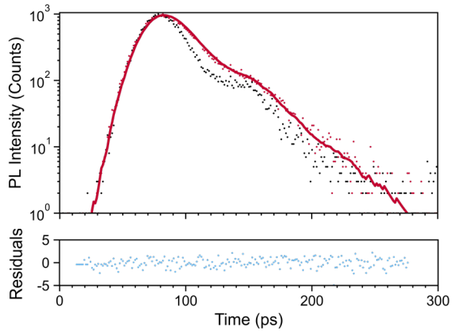


Mercury-argon emission spectrum acquired with narrow bandwidth

PL Lifetime Upgrades

TCSPC: Fluorescence Lifetime

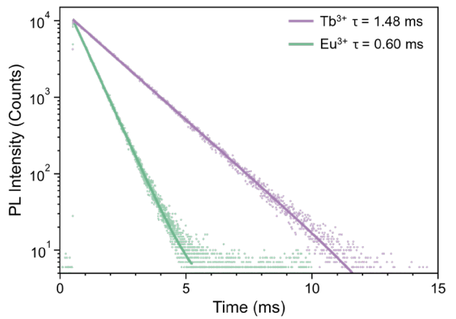
- Advanced TCSPC electronics deliver picosecond time resolution for precise fluorescence lifetime measurements.
- Intuitive, automated operation streamlines experiments from setup to analysis.
- Easily upgraded with new pulsed sources and detectors as your research evolves.



Picosecond lifetime measurement of 4-DASPI using the HS-HPD lifetime detector

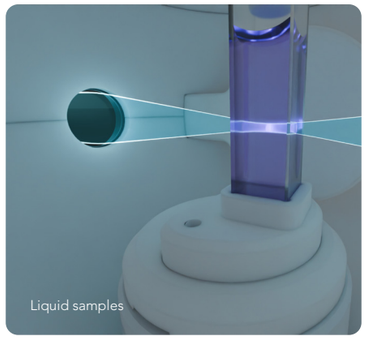
MCS: Phosphorescence Lifetime

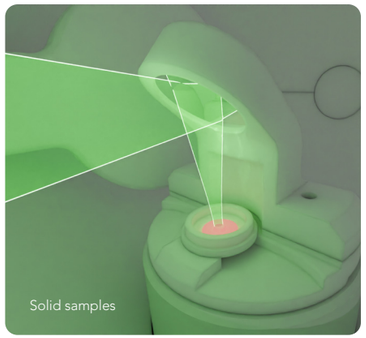
- Multi-Channel Scaling (MCS) electronics enable rapid, sensitive measurement of photoluminescence lifetimes from tens of nanoseconds to seconds.
- Ideal for studying triplet states, upconversion materials, and quantum dots, with faster acquisition than TCSPC.
- A gated PMT detector upgrade reveals phosphorescence spectra overlapping with fluorescence.

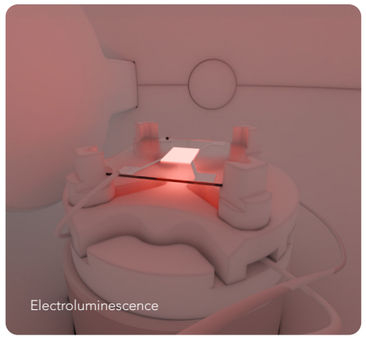


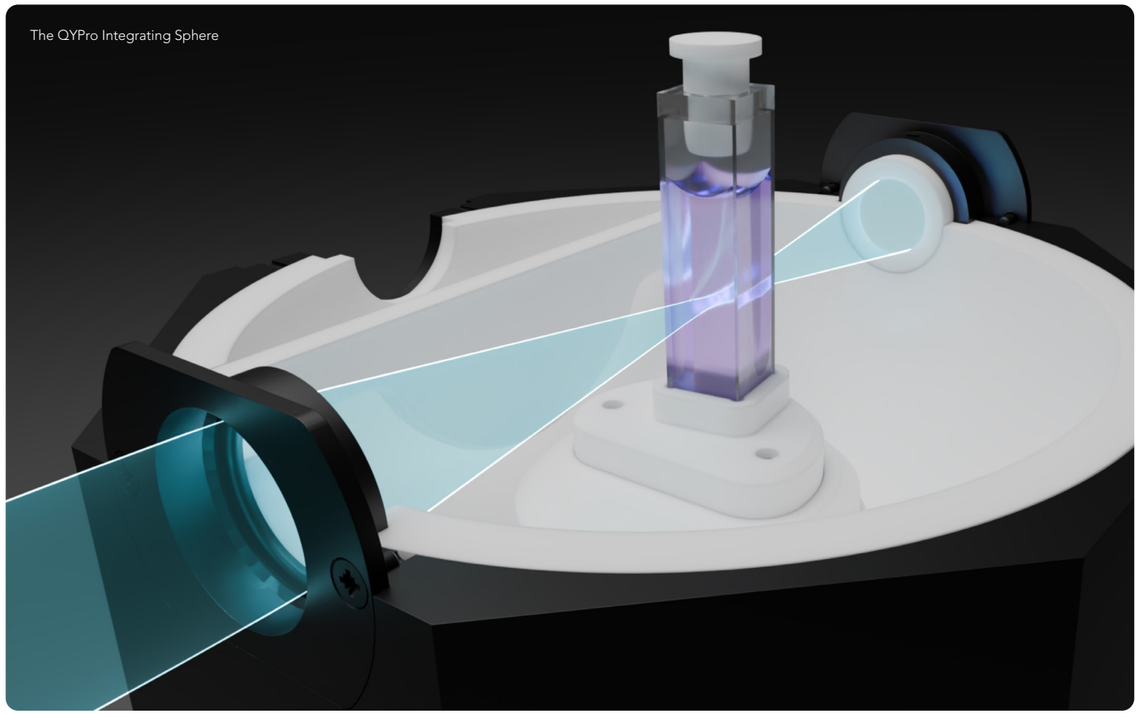
Decays of Eu^{3+} and Tb^{3+} with a µs Xe flashlamp excitation source

Time-Resolved Emission Spectrum (TRES) of InP/ZnS quantum dots

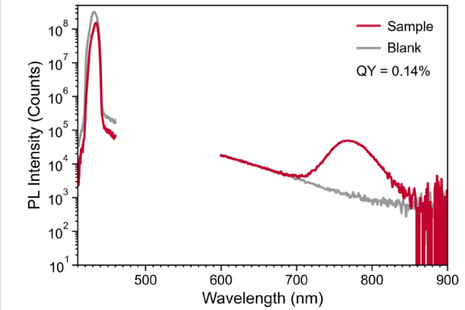

Liquid samples


Solid samples


Electroluminescence


The QYPro Integrating Sphere

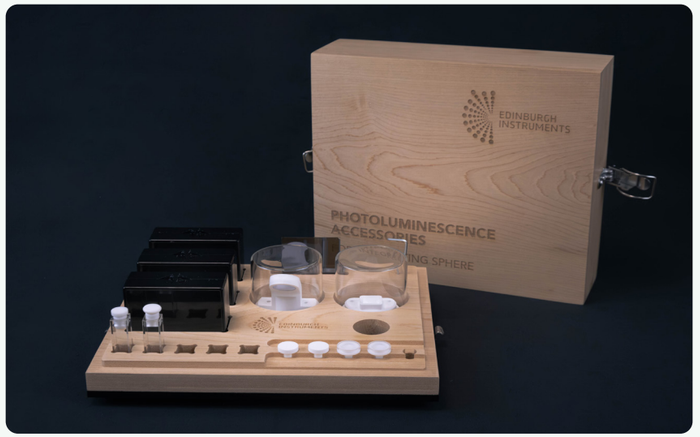
Quantum Yield Upgrade



Quantum Yield of perovskite solar cell, demonstrating that the QYPro is capable of measuring low QY semiconductors

QYPro Integrating Sphere

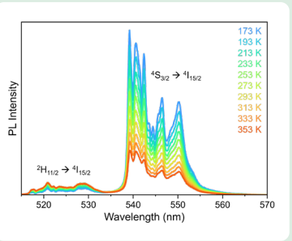
- Accurately characterise the photoluminescence quantum yield (PLQY) and reflectance of solid, liquid, or powder samples.
- Delivers trusted, calibrated performance up to 2500 nm for reliable and reproducible results.
- Contamination-free, consistent and quick sample loading with the motorised sample loading mechanism.



Spectral Range Upgrades

Upconversion

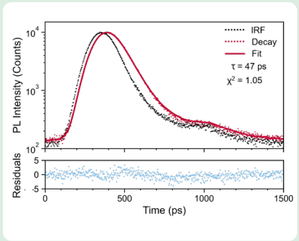
- A PMT-1010 detector extending up to 1010 nm is ideal for lanthanide upconversion quantum yield with 980 nm excitation.
- Plug-and-play continuous and pulsed lasers make spectra, lifetime, and quantum yield easy.



Upconversion thermometry with a lanthanide-doped material. The ratio of intensities between the two transitions can be used to probe the temperature of a sample

Photon-Counting NIR Detectors

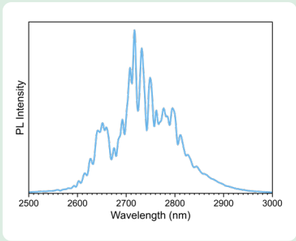
- NIR PMTs offer the highest sensitivity in the NIR range, up to 1700 nm.
- Perform TCSPC or MCS lifetime with the same detector, saving time and cost.



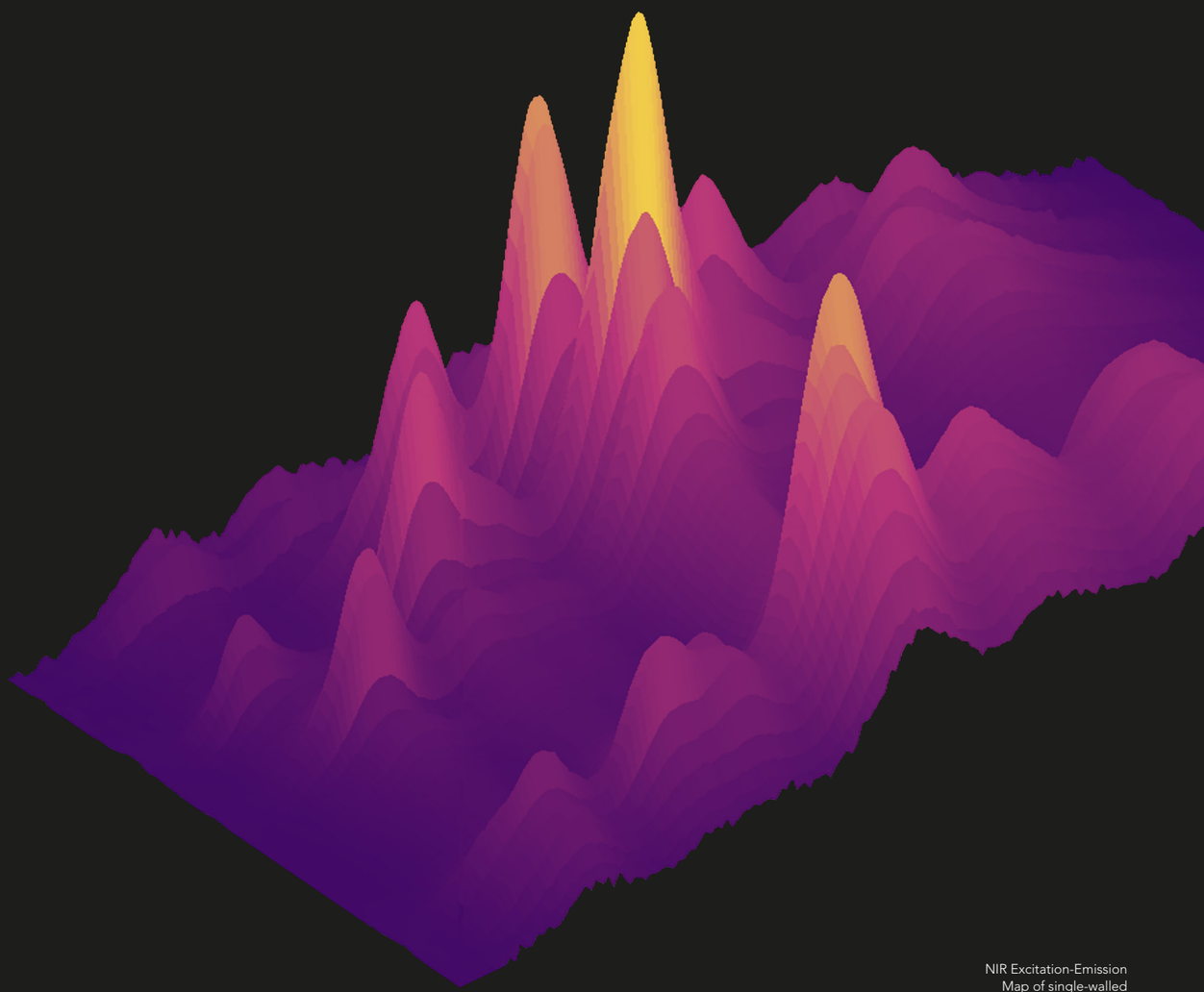
IR1061 fluorescence decay acquired with a high-speed NIR SPAD photodetector

Analogue NIR & MIR Detectors

- Detect PL signals up to 5.5 µm with analogue InAs and InSb modules which can operate in spectral or lifetime mode in the MIR range.
- InGaAs detectors are a cost-effective option for spectra or lifetimes >50 ns in the NIR.



High-resolution emission spectrum of the $^4I_{11/2}$ --> $^4I_{13/2}$ transition in Er^{3+}, excitation with a CW980 laser and detection with an InAs detector

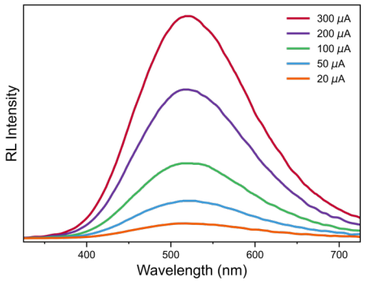


NIR Excitation-Emission Map of single-walled carbon nanotubes

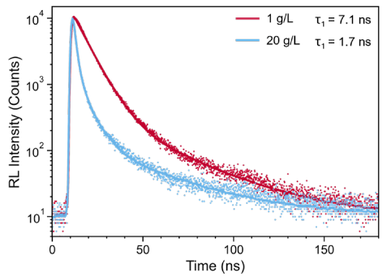
Spectral Range Upgrades

X-ray Radioluminescence

- Studying scintillators is easy with the XS1 sample chamber, which couples to the spectrometer via light guides so you can excite a sample with x-rays.
- Spectral and time-resolved experiments are possible enabling a full characterisation of radioluminescence in the same instrument.



Scintillator radioluminescence spectra acquired with different x-ray source currents



Radioluminescence decays of LAB/PPO scintillator at different concentrations of PPO, acquired using the XS1 accessory in TCSPC mode

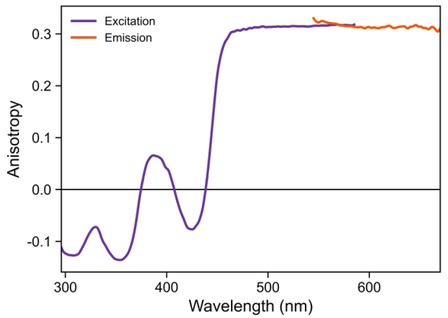
VUV Photoluminescence

- Go beyond the UV range with a system equipped for excitation and detection down to 115 nm (VUV).
- Configure your FLS1000-VUV for spectral and/or lifetime, cryogenic measurements, and more.

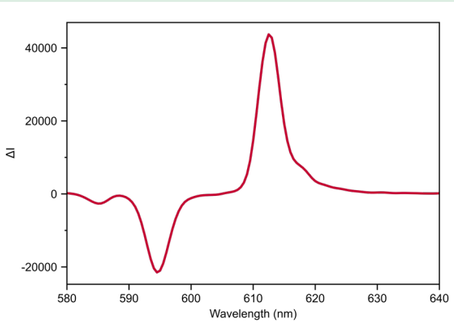
Polarisation Upgrades

Fluorescence Anisotropy

- PL anisotropy studies are effortless thanks to software-controlled polarisers.
- Fluoracle guides you through the acquisition process and performs the analysis so you can spend more time on results interpretation.
- Anisotropy lifetime is just as easy if your instrument is equipped for time-resolved PL.



Excitation and emission anisotropy spectra from Rhodamine 6G in glycerol



Circularly polarised luminescence spectrum of $Eu(facam)_3$ in DMSO

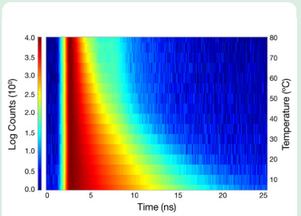
Circularly Polarised Luminescence (CPL)

- Measure CPL from chiral emitters in your FLS1000 – no need for a separate spectrometer.
- The upgrade fits a software-controlled photoelastic modulator (PEM) in the sample chamber so you can switch between CPL and standard PL spectra in seconds.

Temperature Control

TE-Cooled Sample Holders

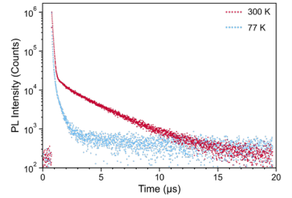
- TE-cooled modules allow temperature-dependent cuvette measurements from -50 °C to +150 °C, fully controlled in Fluoracle.
- Multi-cuvette sample holders are available for further automation.



Temperature lifetime map of Rhodamine B in H_2O

Liquid Nitrogen Dewar

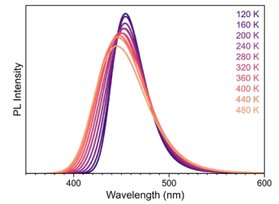
- A sample Dewar is a cost-effective solution for measurements at room temperature or 77 K.
- Measure both solutions and powder samples in quartz EPR tubes.



PL decay of a TADF material acquired at room temperature and 77 K

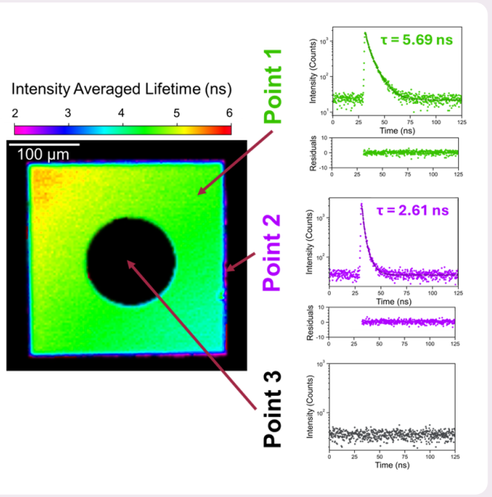
Cryogenic Sample Holders

- Software-controlled cryostats enable cryogenic measurements on solids, powders and cuvettes; with options from 2 K to 800 K.
- Acquire automated temperature maps in Fluoracle saving valuable lab time.



Temperature map of PL emission spectrum of a phosphor in a liquid N_2 cryostat, excited at 255 nm

MicroPL Upgrade



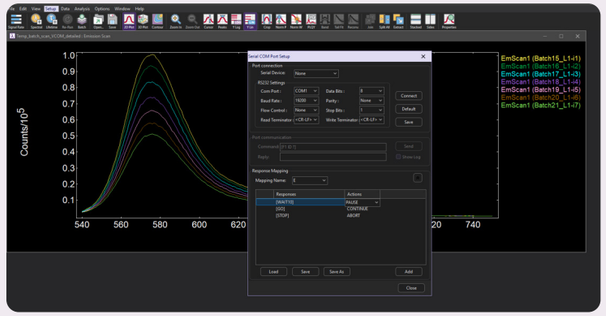
FLIM Map of of AlInGaP/GaAs LED chip

- Transform your FLS1000 into a spectromicroscopy setup with the MicroPL upgrade.
- Easily switch between bulk and microscale measurements with this plug-and-play upgrade connecting a microscope to the spectrometer.
- Configure your MicroPL for your application needs: spectral and time-resolved PL microscopy, laser or widefield excitation, Fluorescence or Phosphorescence Lifetime Imaging (FLIM/PLIM) are all possible.

FLIM image of *convallaria* rhizome stained with acridine orange

Measurement Automation

- Automate PL acquisition according to your needs, from sample changers to in-line measurements.
- Use your own commands to control external accessories and define custom actions for each response.
- Choose the plate reader option for high-throughput PL spectra and lifetimes saving hours of lab work.

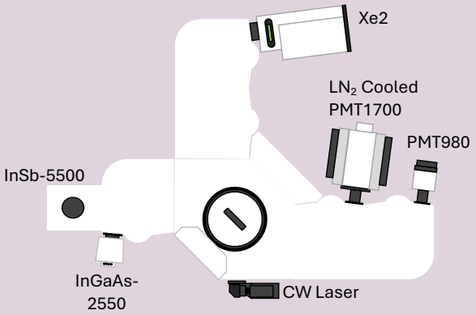


FluoAuto external command setup

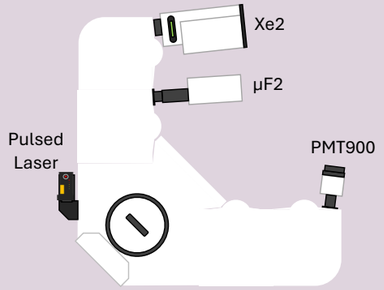
Modular System Configuration

With thousands of configurations available, you can fine tune the FLS1000 to your exact requirements. These are just a few examples.

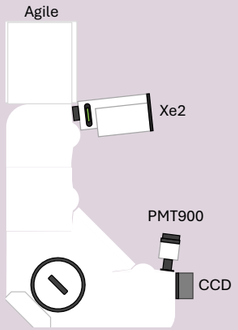
FLS1000-DDS for steady state, laser excitation, NIR and MIR emitting samples



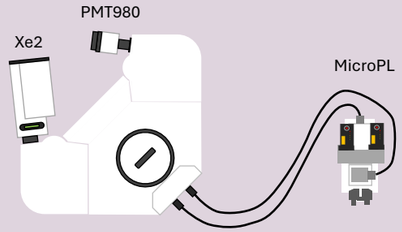
FLS1000-DD for steady state, MCS and TCSPC



FLS1000-DS for steady state, TCSPC with a tunable source, and fast spectra with CCD



FLS1000-SS for steady state, MCS and TCSPC on a microscope



Specifications

System	Overall System	Modular, versatile, photoluminescence spectrometer, fully assembled, mounted to baseplate and optically pre-aligned at factory
	Sample Chamber	Large sample chamber volume (>40 litres), 5 optical access ports plus 3 access ports for sample handling
	Sample Chamber Optics	Lens optics, optional mirror optics
	Sample Geometry	Right angle geometry, additional geometries are available to match a large variety of applications
Sensitivity	SNR_{SQRT}	>35000 : 1 Standard* water Raman Signal-to-Noise Ratio
	*SQRT method. λ_{ex} = 350 nm, bandpass = 5 nm, integration time = 1 s, λ_{peak} = 397 nm, noise measured at 450 nm. SNR specification is configuration dependent.	
	Options	Optimisation of sensitivity in Visible and NIR spectral range with optional gratings and detectors
Spectral Range	Excitation	200 nm – 900 nm standard, 115 nm – 2500 nm optional * *source and grating dependent
	Emission	200 nm – 900 nm standard, 115 nm – 5500 nm optional ** **detector and grating dependent
Lifetime Ranges	Photon Counting	1 ms – hours (spectral acquisitions and kinetic measurements)
	MCS	10 ns to 50 s * (phosphorescence lifetime measurements)
	TCSPC	5 ps to 10 µs * (fluorescence lifetime measurements) *source and detector dependent
Excitation Sources	Continuous Source	Standard Xe3 – xenon arc source
	MCS Source	Standard µF2 – xenon flashlamp VPL / VPLED Series – adjustable pulse width diode lasers and LEDs at discrete wavelengths
	TCSPC Sources	EPL / EPLED Series – picosecond pulsed diode lasers and LEDs at discrete wavelengths HPL Series – high repetition rate / high power picosecond pulsed diode lasers AGILE – tunable white-light picosecond light source
	Options	nF920 – nanosecond flashlamp High power continuous and pulsed lasers available for IR emission and upconversion applications VUV and X-ray excitation available

Monochromators	Type	Symmetrical Czerny-Turner	
	Focal Length	325 mm, double monochromators: 2 x 325 mm (350 mm available upon request)	
	Ports	up to 3 entrance and 3 exit ports	
	Accuracy	± 0.2 nm*	
	Resolution	0.05 nm*	
	Min Step Size	0.01 nm*	* with standard gratings
	Option	Spectrographs available for operation of CCDs and Diode array detectors VUV excitation and emission monochromators	
Detectors	Photon-Counting Detectors	Single Photon Counting Photomultiplier Tubes (PMTs) in cooled housings Standard: PMT-900, Gated Option: PMT-900GT, VUV Option: PMT-230 Enhanced spectral response options: PMT-980, PMT-1010, PMT-1400, PMT-1700, SPAD-1650 Enhanced temporal response options: HS-PMT, MCP-PMT, HS-HPD	
	Analogue Detectors	Semiconductor photodetectors in cooled housings, operated with phase sensitive detection (spectral) or transient digitizer (lifetime) InGaAs-1650, InGaAs-2050, InGaAs-2550, InAs-3100, InSb-5500	
	Array Detectors	CCDs, InGaAs array detectors	
Data Acquisition	Model	CB1	TCC2
	Modes of Acquisition	Counting/MCS	Counting/MCS/TCSPC
	Number of det. channels	4	3 (plus 3 Synch channels)
	Max. number time bins	8000	8000 (MCS), 8192 (TCSPC)
	Min. width of time bins	10 ns	10 ns (MCS), 305 fs (TCSPC)
	Time range selection	5 µs – 1000 s	5 µs - 1000 s (MCS), 2.5ns - 50 µs TCSPC)
Software	Fluoracle®	Comprehensive, all-in-one, intuitive software package	
	Operating System	Windows	
	Main Functionality	Data acquisition, spectrometer control, graphical display (2D, 3D, contour, colour maps, CIE plots), data operations, data analysis algorithms, measurement and analysis wizards, batch mode measurements, data import/export options	
	Option	FAST - Advanced lifetime data analysis add-on, including up to 200 lifetime distributions, stretched exponentials, global analysis, advanced error analysis, micellar quenching, Förster kinetics, advanced time-resolved fluorescence anisotropy analysis	

Edinburgh Instruments Ltd. has a policy of continuous product development and reserve the right to amend specifications without prior notice.

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INSTRUMENTS

Building on our 50-year heritage, the FLS1000 offers unrivalled sensitivity and the industry's widest dynamic range for both steady-state and time-resolved measurements.

Configure the FLS1000 for any application by choosing each component, including multiple detectors, excitation sources, and accessories. Its modular design means that you can continue upgrading the instrument as your research evolves, future-proofing your investment.

Require an all-in-one benchtop solution?

Measure photoluminescence spectra, fluorescence and phosphorescence lifetime, quantum yield, and absorption spectra in a single, compact instrument with the FS5 Spectrofluorometer.

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ISO 9001 SYSTEM CERTIFICATION SGS