

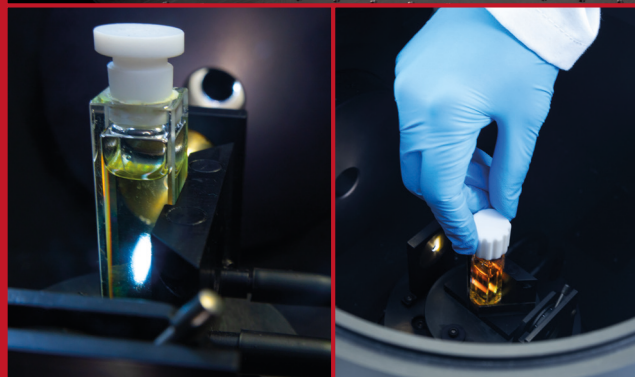
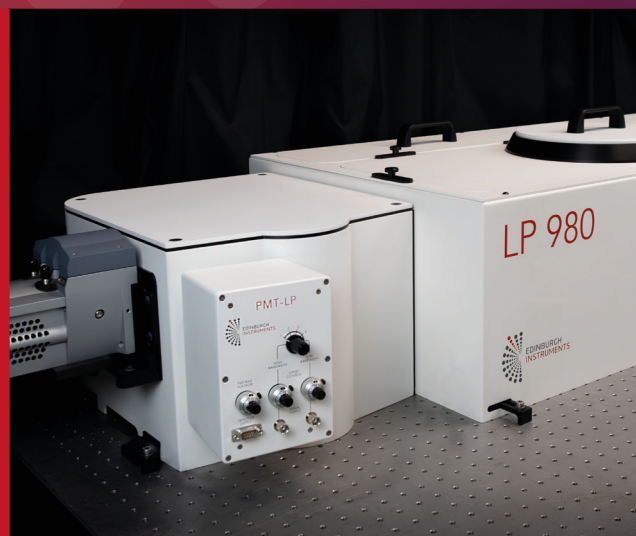


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LP980

Transient Absorption Spectrometer

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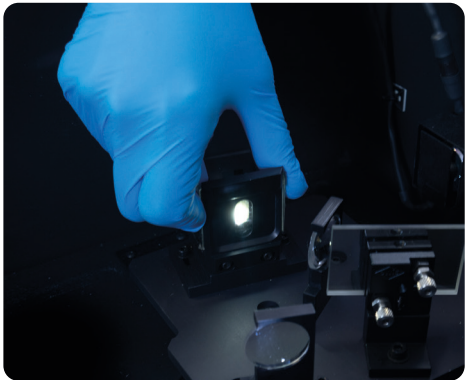
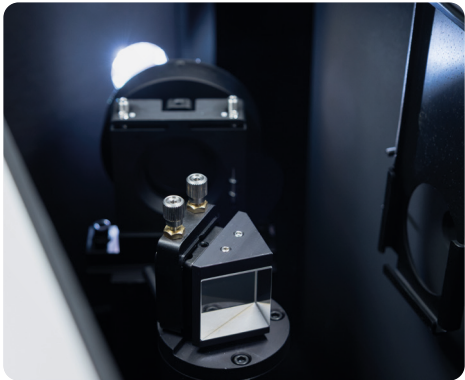


LP980 Transient Absorption Spectrometer

A turn-key spectrometer for nanosecond transient absorption, the LP980 delivers rapid, accurate measurement of transient spectra and lifetimes. Its multimodal design supports transient absorption (TA) and laser-induced fluorescence (LIF) in kinetic and spectral modes, enabling comprehensive characterisation of samples within a small number of laser shots.

With a wide time range spanning nanoseconds to seconds and spectral coverage extending to 2.55 μm , the LP980 has the versatility for any application. Its modular configuration supports a range of excitation sources, sample holders and detector options allowing you to tailor it to your needs and adapt its capabilities as your research evolves.

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LP980 Key Features



All-In-One Platform

Transient absorption and laser-induced fluorescence measurements within a single system.



Single-Shot Acquisition

Acquire full spectra or kinetic traces within a single laser shot with dual-mode detection.



Broad Spectral Coverage

Measurements from 200 nm to 2550 nm across the UV, visible, and NIR range.



Photon-Counting Upgrade

Detect weak photoluminescence signals, including emission in the NIR.



Upgradable and Configurable

Add sample modules and detectors as research requirements evolve.





+ High Sensitivity

Single-shot detection of ΔOD down to 5×10^{-4} .

+ Wide Temporal Range

Measure kinetics from nanoseconds to seconds, capturing decays across nine orders of magnitude.

+ Flexible Sample Configuration

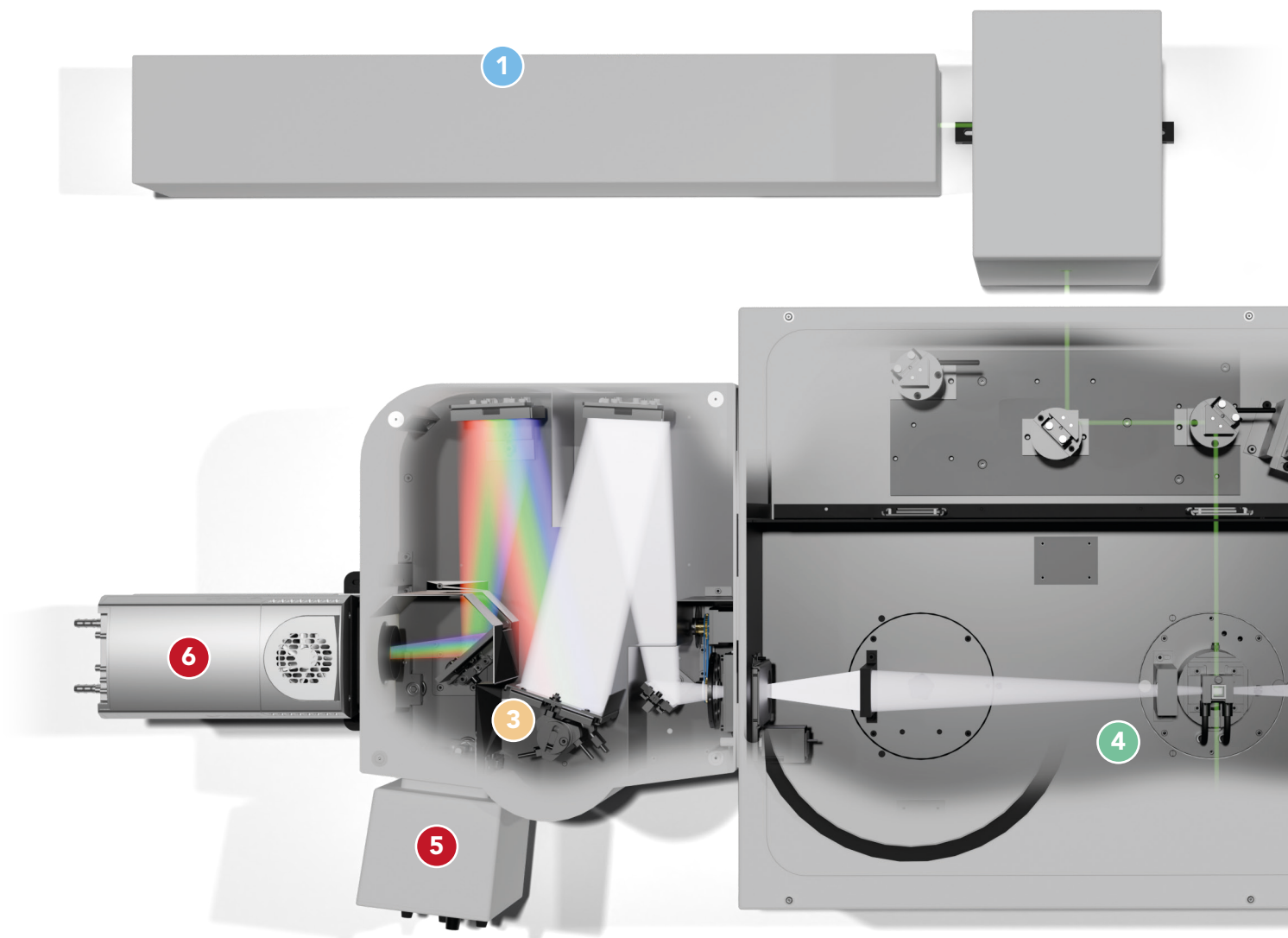
Quick-exchange sample holders including diffuse reflectance, film holders, and collinear excitation.

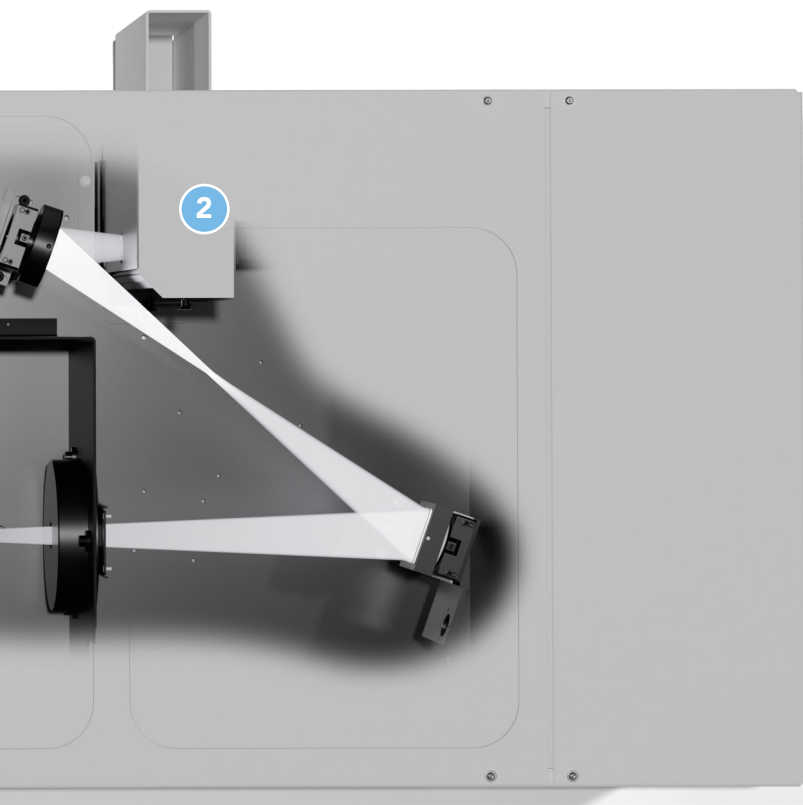
+ Intuitive Software

Acquisition and analysis software with automated workflows and device control.



LP980 Platform





1 Pump Laser

Creates transient species with a nanosecond pulse of mJ energy.

2 Probe Lamp

White-light source for characterising the absorption of the sample in the ground and excited states.

3 Monochromator / Spectrograph

Wavelength separator featuring two ports for kinetic and spectral detection with high resolution and accuracy.

4 Sample Chamber

Separate compartments for pump and probe steering and sample configurations including quasi-collinear geometry and diffuse reflectance.

5 Photomultiplier Tube (PMT)

Single wavelength kinetic detector for single-shot TA and LIF decays with high time resolution.

6 Intensified CCD (ICCD)

Optional spectral detector for single-shot TA and LIF spectra with high wavelength resolution.



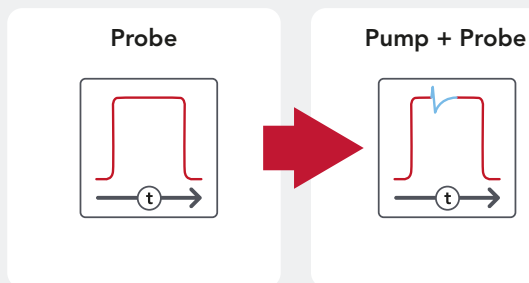
Dual Mode Operation

Two Instruments in One

- + Capture both the time evolution and spectral features of transient species within a single spectrometer, with rapid switching between kinetic and spectral measurement modes.
- + The kinetic detector (PMT or InGaAs) enables precise time-resolved studies at a single wavelength in a single laser shot.
- + The optional ICCD detector provides time-gated spectra from 250 nm to 850 nm and a minimum gate width of 7 ns, in a single laser shot.

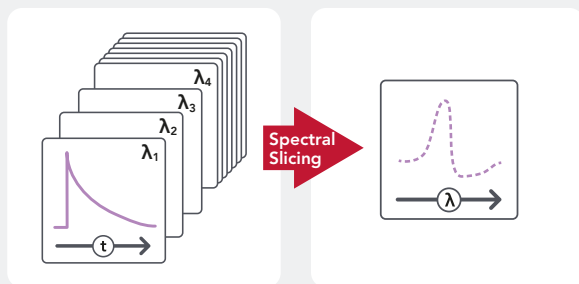


Kinetic Data Acquisition

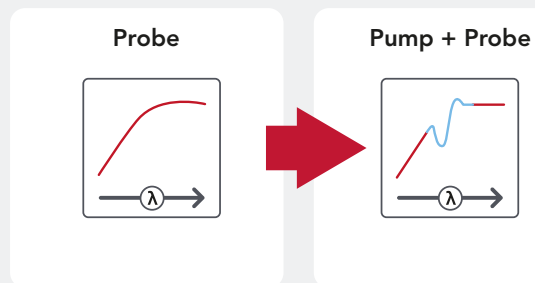


This mode enables accurate measurement of transient kinetics by capturing the complete time-resolved response within a single laser flash.

Transient spectra can be constructed by extracting signal intensity at defined time points from kinetic traces acquired at different wavelengths.

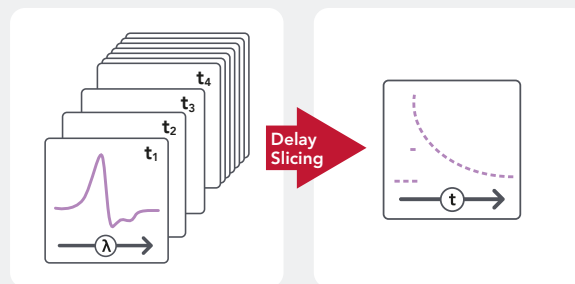


Spectral Data Acquisition



The ICCD detector acquires time-gated spectra within a single laser flash, enabling measurement of photosensitive samples while minimising light exposure.

Time-resolved information is obtained by extracting intensity at defined wavelengths from spectra acquired at different delay times.





Source Options

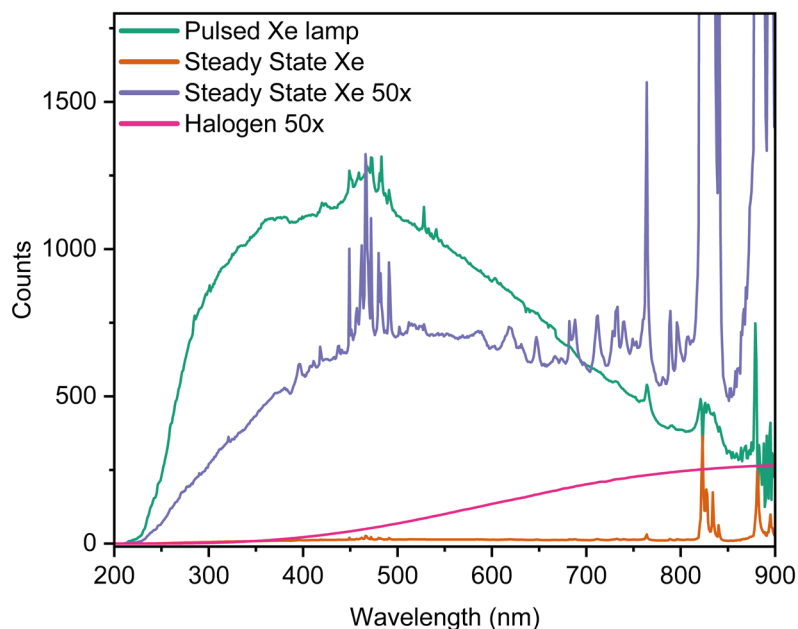
Pump Laser

- + Choose from a range of fixed-wavelength and tunable pump lasers or integrate your own laser source with support from Edinburgh Instruments
- + Fixed-wavelength lasers are typically Nd:YAG, giving 5-7 ns pulses at 1064, 532, 355, or 266 nm with energies in the range of 1 mJ – 100 mJ
- + Optical parametric oscillators (OPOs) provide tunable excitation from 210 nm to 2600 nm, depending on model.



Probe Lamp

- ⊕ The standard xenon flashlamp ensures reliable transient absorption measurements from 230 nm to 1650 nm (grating dependent)
- ⊕ Pulsed operation is available for decays up to 5 ms, improving signal-to-noise ratio
- ⊕ For longer decays (> 5 ms) or at wavelengths beyond 1650 nm, a tungsten probe can be added, offering lower pulse energy with increased stability.



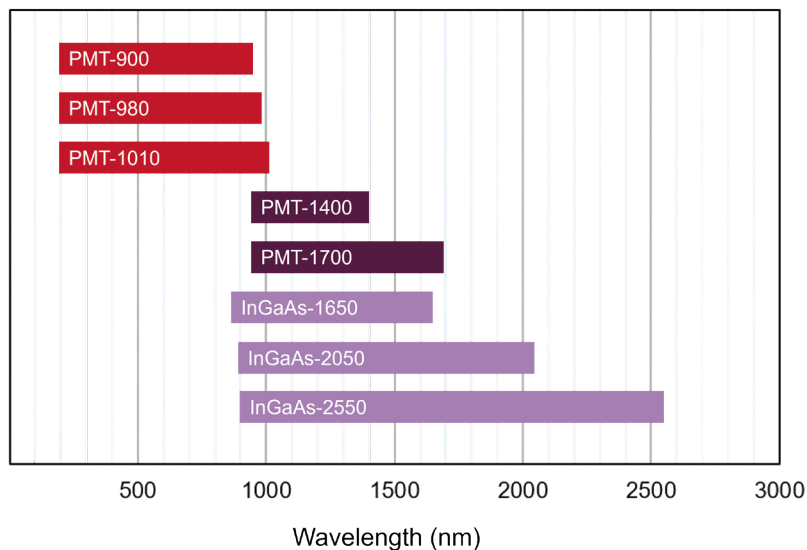
Spectra from Xe and halogen probe lamps showing their relative intensities



Detector Options

Kinetic Detector

- + The standard visible PMT detector provides kinetics from 230 nm to 870 nm with >3 ns resolution
- + Extended-range PMT and InGaAs detector options are available up to 2550 nm
- + Two kinetic detectors (PMT and InGaAs) can be permanently fitted if the spectrometer does not have an ICCD detector



Spectral ranges of LP980 kinetic detectors. PMT-1400 and PMT-1700 are supplied with photon-counting luminescence upgrades (not suitable for transient absorption).

Spectral Detector

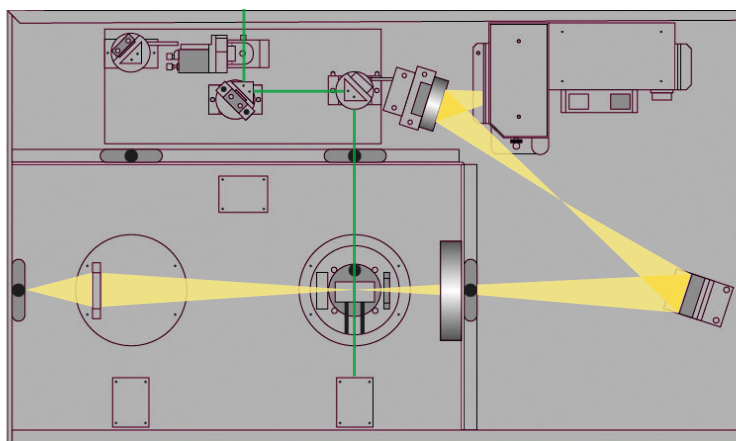
- + The ICCD acquires spectral data between 250 nm and 850 nm at user-set delays with nanosecond resolution
- + Integration time adjustable from 7 ns to seconds for optimal data quality
- + Options available with higher time resolution (down to 3 ns) and extended range (up to 1090 nm)





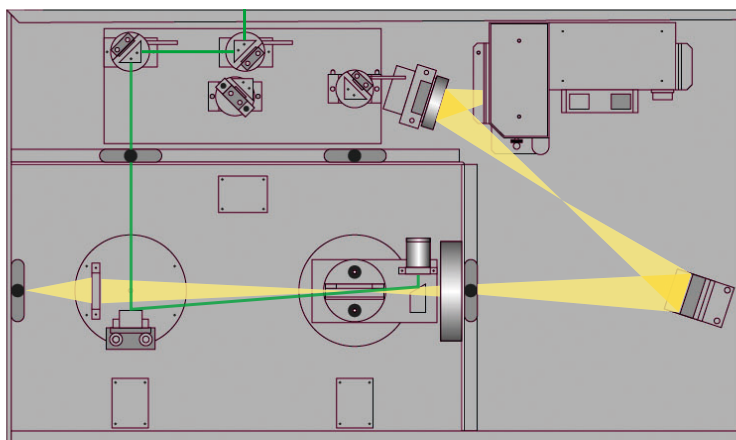
Sample Chamber Configurations

Easily switch between sample types with quick-swap sample holders for transient absorption, diffuse reflectance, or laser-induced fluorescence. No optical realignment is required when changing configurations.



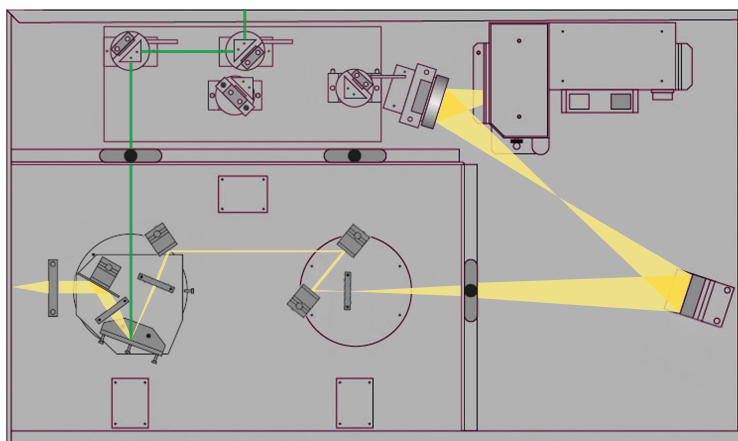
Cross-Beam TA

Compatible with cross-beam cuvette holder, film holder, TE-cooled cuvette, Dewar, cryostat, and stopped flow.



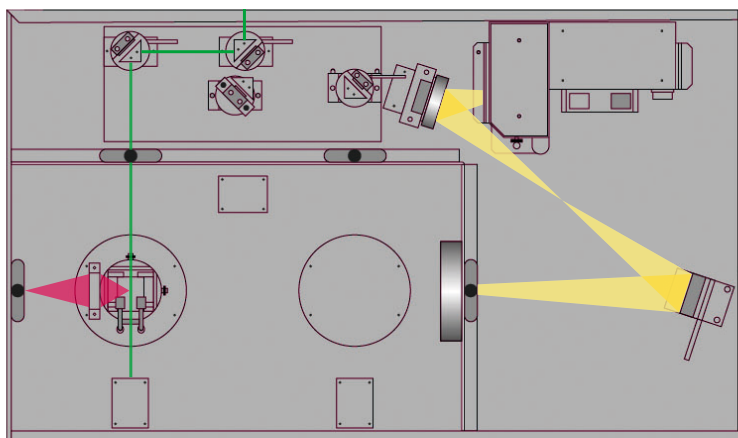
Quasi-Collinear TA

Ideal for low-concentration solutions or gas-phase samples measured directly in cuvettes.



Diffuse Reflectance

Acquire transient reflectance from non-transmissive solids, powders, or highly scattering solutions where standard TA is not suitable.



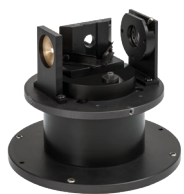
Laser-Induced Fluorescence

Optimal configuration for LIF measurements using a dedicated cuvette holder.



Sample Accessories

Cross-Beam Configuration



Cross-beam Geometry Holder

Measurement of cuvettes in standard TA configuration.



TE-Cooled Cuvette Holder

Software-controlled measurements from -50°C to $+150^{\circ}\text{C}$.



Film Sample Holder

Measurement of films in crossed-beam configuration.



Liquid Nitrogen Dewar

Holds liquid samples at room temperature or -196°C .



Stopped Flow Accessory

Software-controlled accessory for reaction kinetics in cuvettes with millisecond resolution.



Cryostats

Software-controlled, liquid nitrogen or helium options from -269°C to 226°C .

Other Configurations



Diffuse Reflectance Holder

Solid samples, powders, and cuvettes in diffuse reflectance configuration.



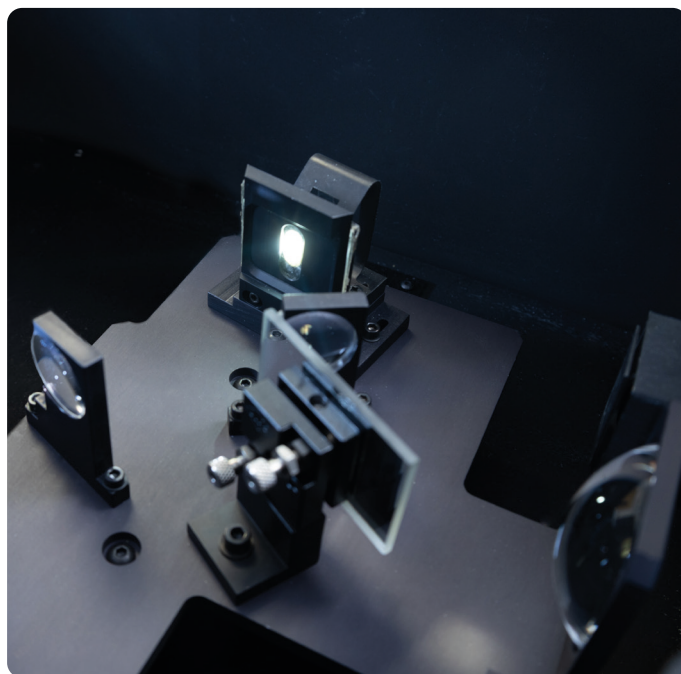
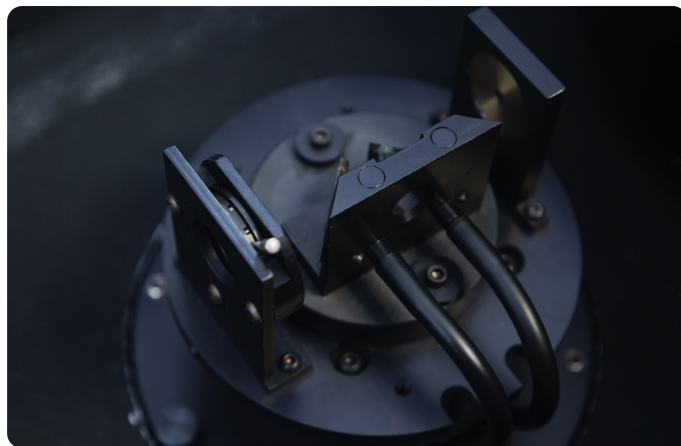
LIF Holder

For LIF measurements in cuvettes with enhanced sensitivity.



Quasi-Collinear Holder

Extended pathlength cuvettes or gas cells in quasi-collinear configuration.

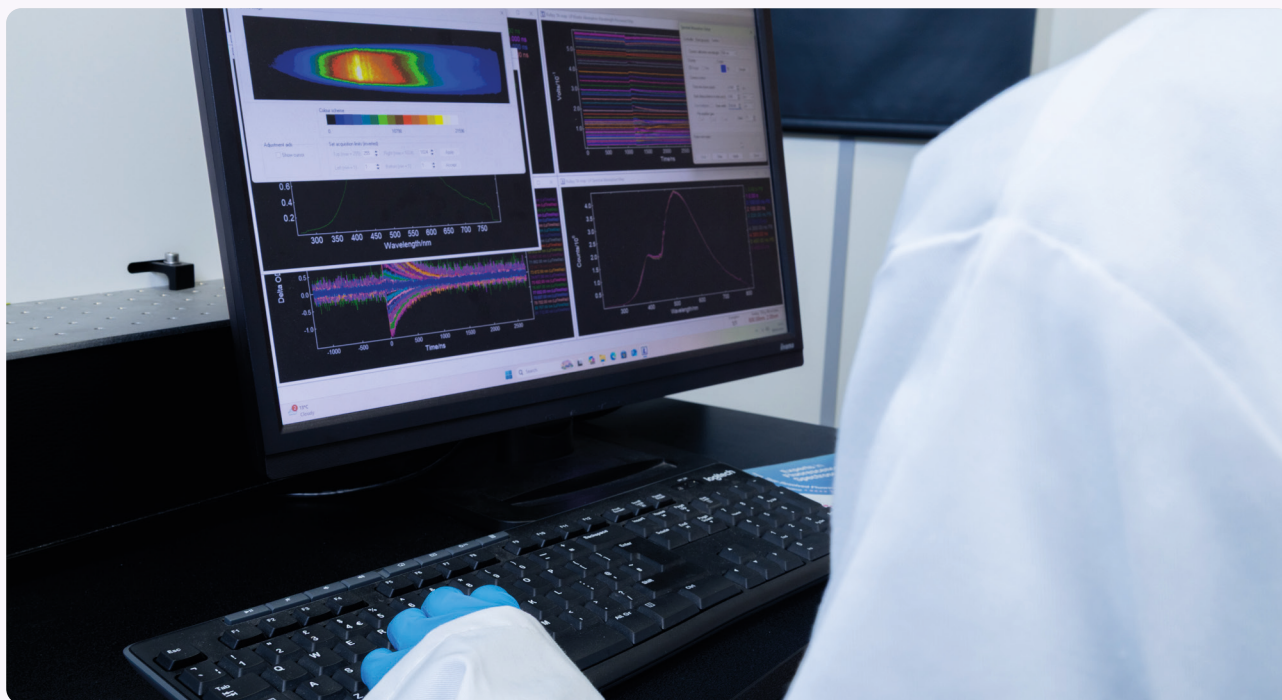




LP900 Software

The L900 software makes transient absorption accessible to all, combining ease of use with advanced applications support.

Data acquisition, analysis, and presentation are carried out in a straightforward workflow, with built-in control of third-party accessories such as cryostats and tunable pump lasers.





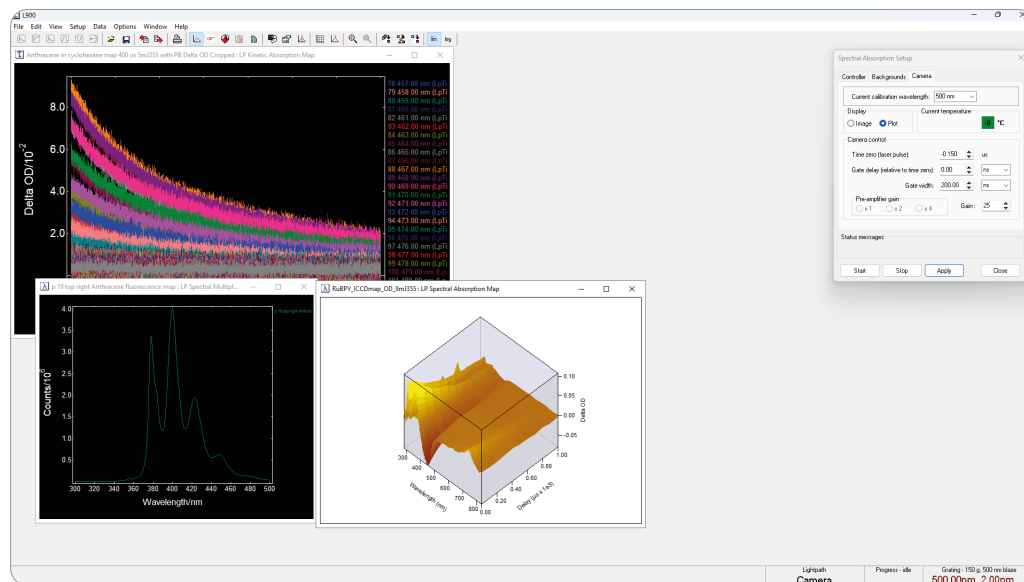
Standard Features

- + Kinetic TA and LIF Decays
- + Pump Laser Control
- + Live Signal Optimisation
- + Averaging Multiple Kinetic Measurements
- + ΔOD Calculation (Automated or Manual)
- + Time-Resolved Absorption Spectra (Slicing)
- + Time-Resolved Emission Spectra (Slicing)
- + Automated Probe and Fluorescence Background Subtraction
- + 4-exponential Reconvolution and Tail Fitting of Growth and Decay Curves



Upgrade Features

- + TA and LIF Spectra with ICCD
- + Averaging Multiple Spectral Measurements
- + Delay Maps of TA Spectra
- + Delay Maps of LIF Spectra
- + Automated Temperature Maps
- + Stopped Flow Accessory Control
- + Wavelength Control of OPOs
- + Photon-Counting Acquisition and Decay Fitting
- + Advanced FLASH Curve Fitting Package (1st, 2nd, and Combined 1st + 2nd Order Kinetics)



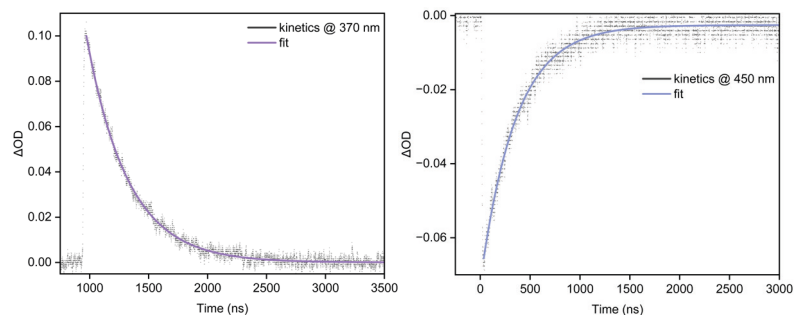
L900 software spectral absorption setup



Core System Capabilities

Transient Absorption and Ground State Depletion

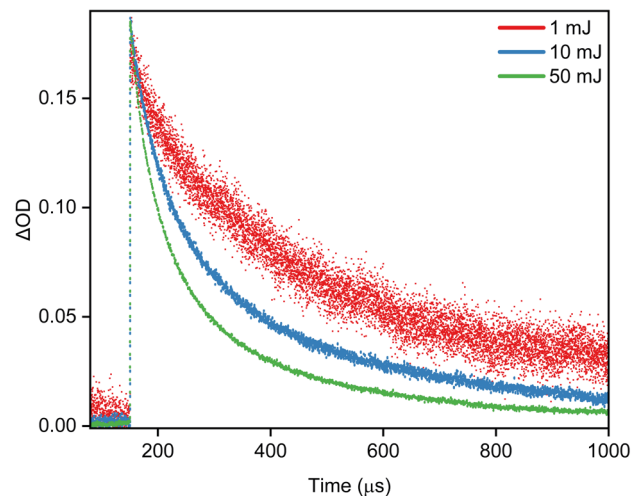
- + Fit both decay and growth processes directly in the software
- + Tail and reconvolution algorithms included
- + Automated ΔOD calculation with optional pump and probe background subtraction



Transient absorption (left) and ground-state depletion (right) from ruthenium bipyridine in water

Decay Fitting

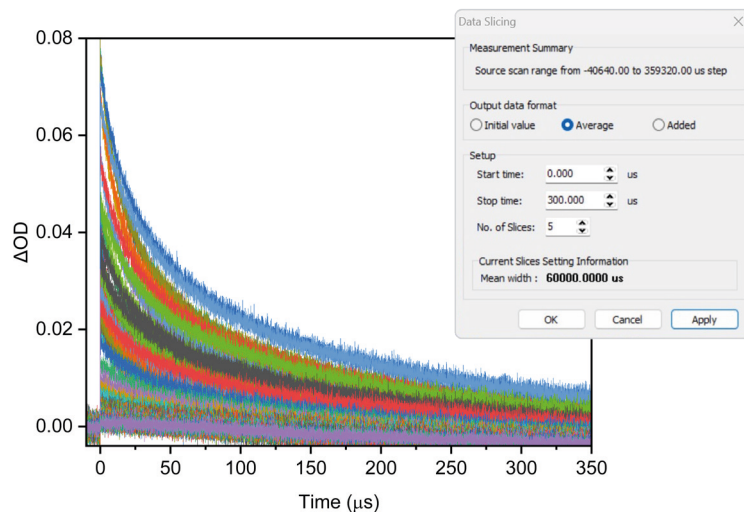
- + Kinetic TA provides detailed kinetics of non-emissive states such as triplets
- + Multiexponential fitting enables analysis of complex triplet-triplet annihilation processes



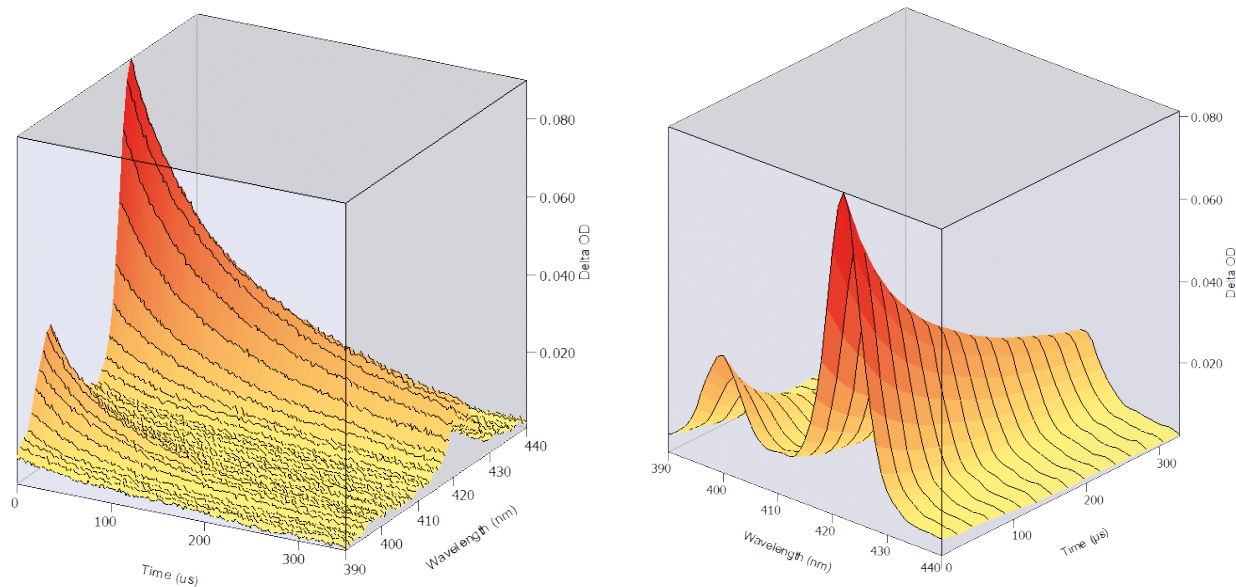
Peak-normalized TA decays from anthracene in cyclohexane at varying pump laser energy

Time-Resolved Spectral Maps

- + Obtain spectral information with a kinetic detector using automated wavelength maps
- + Scan only regions of interest, avoiding unnecessary wavelengths
- + Data slicing analysis and automated correction for probe background offset available



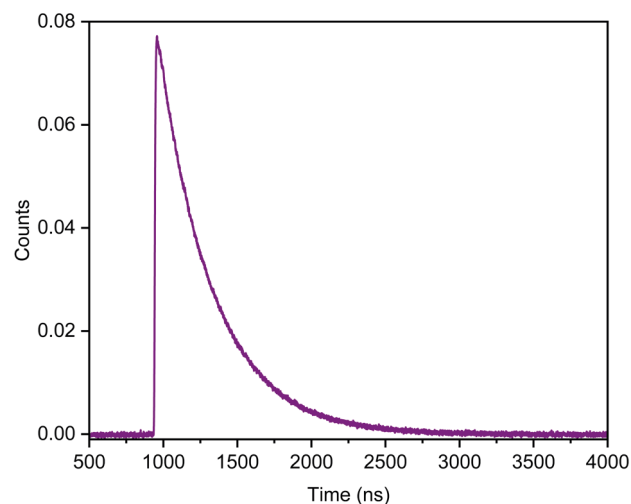
Data slicing of raw time-resolved absorption map



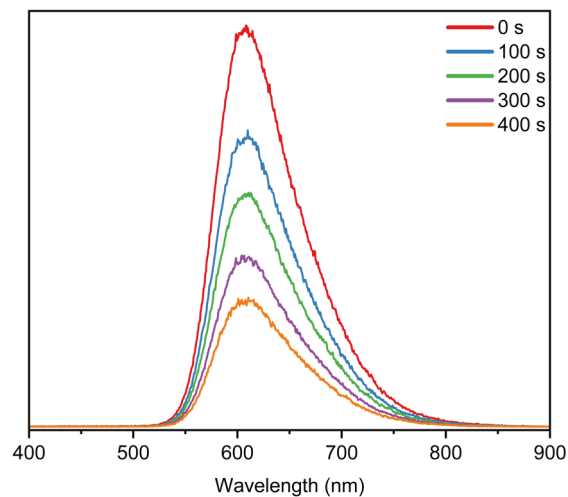
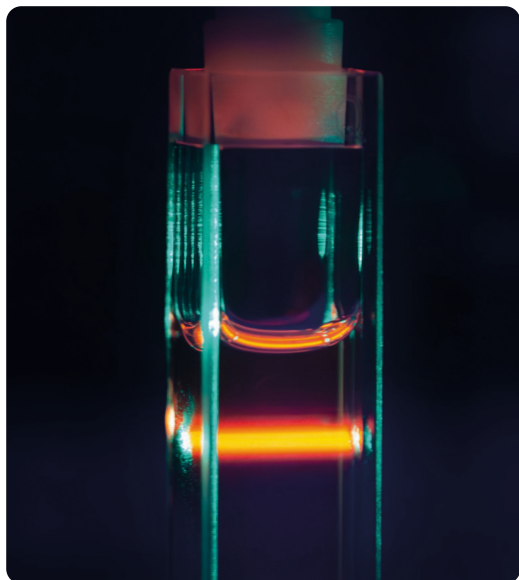
Wavelength map of anthracene in cyclohexane obtained with a PMT (left), and time-resolved spectra resulting from data slicing analysis (right)

Laser-Induced Fluorescence

- + In LIF the sample is excited with the pump laser while the probe beam is blocked
- + Dedicated LIF sample holder provides enhanced performance with up to four times higher signal
- + Averaging, fitting and wavelength maps are included as standard



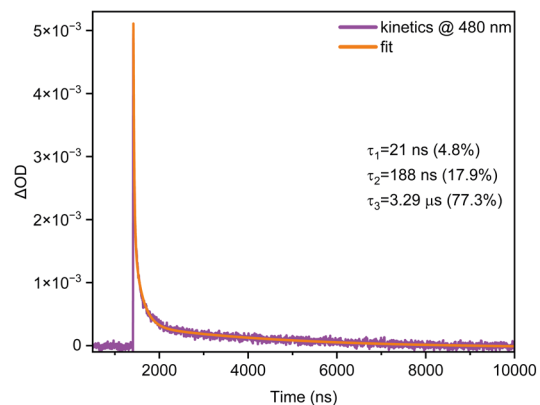
LIF decay from tris(bipyridine)ruthenium(II) in water excited at 355 nm



Time-resolved LIF spectrum of tris(bipyridine)ruthenium(II) in water excited at 355 nm

High Sensitivity

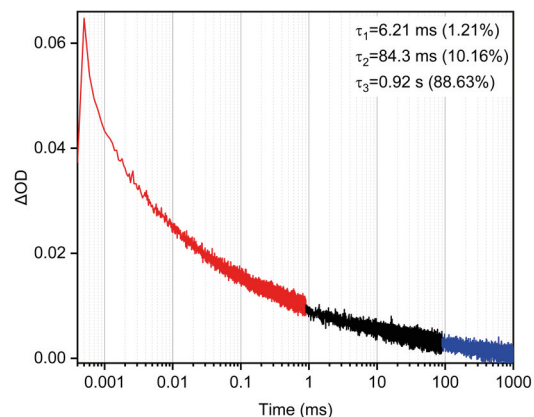
- + The instrument's high sensitivity enables the study of low- ΔOD transients typical of semiconductor samples
- + Multiexponential fitting algorithms help elucidate charge-carrier trapping dynamics



Transient absorption decay from a TiO_2 suspension and fit result to a three-exponential decay

Superior Temporal Coverage

- + Applications such as photocatalysis require transient absorption decays spanning many orders of magnitude
- + The LP980 captures complete kinetic behaviour, resolving rapid nanosecond processes through to long-lived millisecond and second dynamics

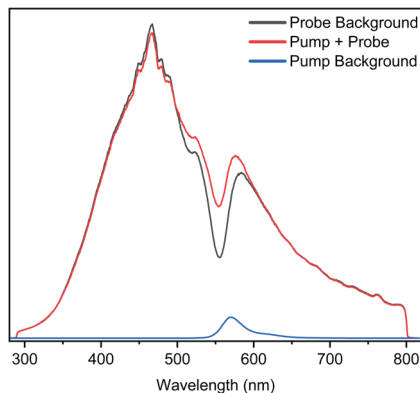


Transient absorption decay from TiO_2 , microseconds to second time range

Temperature map of kinetic
transient absorption from
tris(bipyridine)ruthenium(II) in water



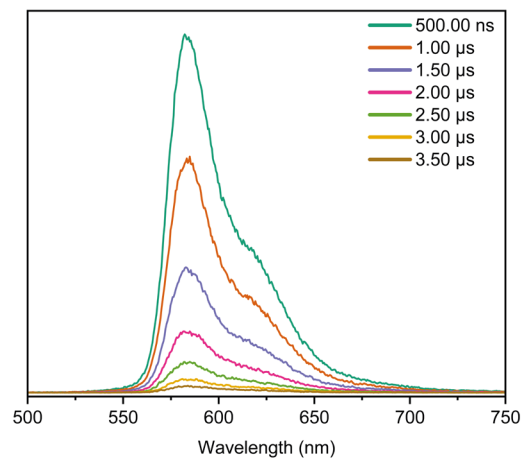
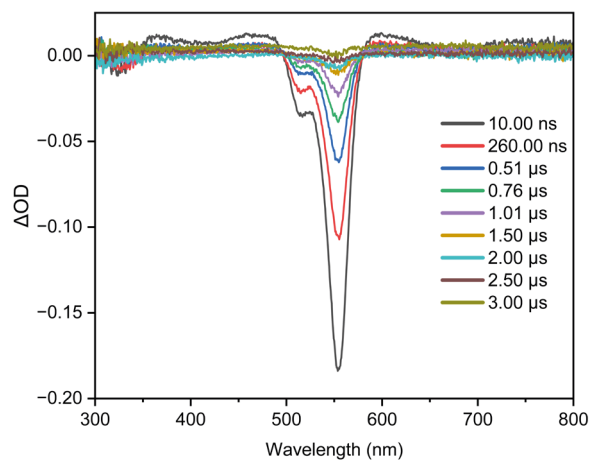
Spectral Acquisition Upgrade



Spectral TA measurement showing pump and probe backgrounds

Single-Shot Spectra

- + The ICCD detector in LP980-KS affords spectra in a single laser shot, saving experimental time
- + Ideal for photosensitive samples such as biomolecules that degrade under prolonged illumination
- + Variable gain and gate width allow fine-tuning of sensitivity for each experiment



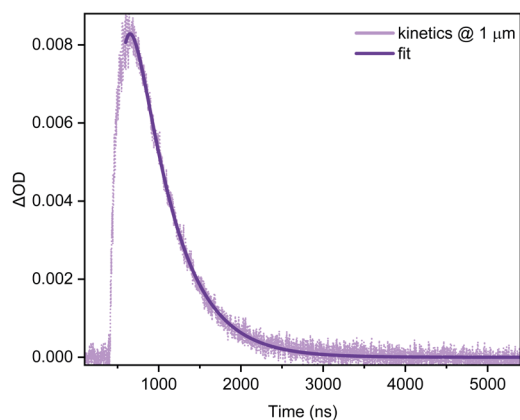
TA (left) and LIF (right) spectra from rose Bengal in acetonitrile at different delays after the pump pulse



Additional Upgrades

NIR Transient Absorption

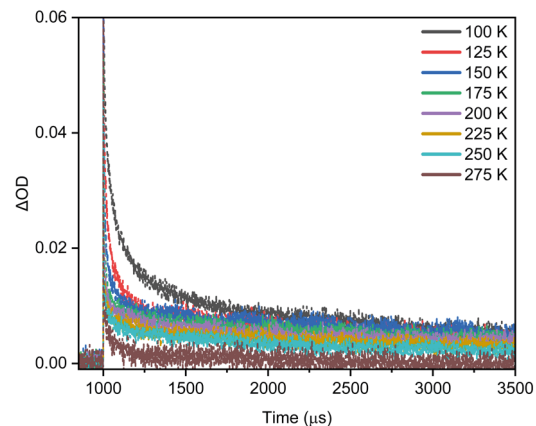
- + Equip the spectrometer with an additional InGaAs detector for TA and LIF decays in the infrared
- + Available options include 1650 nm, 2050 nm, and 2550 nm



TA decay from ruthenium complex acquired at 1000 nm

Temperature Maps

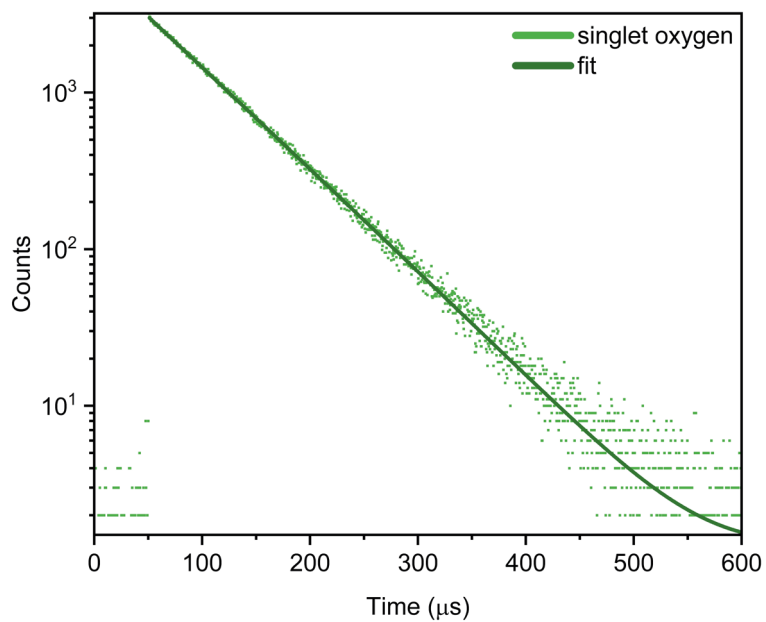
- + TE-cooled cuvettes and cryostats are easy to install and fully controlled through the software
- + Automated temperature-dependent maps of TA or LIF are available in spectral or time-resolved modes



Temperature-dependent TA decay from benzophenone in PMMA

Photon-Counting NIR Luminescence

- + Detect weak luminescence decays in the NIR range using a TE-cooled NIR PMT with multi-channel scaling electronics
- + Offers higher photon counting sensitivity and faster time resolution (10 ns) than the kinetic InGaAs detector
- + Singlet oxygen ($^1\text{O}_2$) luminescence decays can be measured directly with higher accuracy than indirect methods



$^1\text{O}_2$ luminescence decay at 1275 nm, acquired from rose Bengal in acetonitrile excited at 532 nm



Specifications

Kinetic TA Spectrometer (LP980-K)

Sensitivity	Minimum ΔOD	0.002	(single shot, fast detector setting)
		0.0005	(single shot, slow detector setting)
Time Resolution	Instrument Response	5 ns	(200 MHz bandwidth, fast detector setting)*
	Function (FWHM)	10 μs	(slow detector setting)
		100 ns	(InGaAs detector option)
	*Oscilloscope and laser dependent. Faster IRFs are available. Contact Edinburgh Instruments for information.		
Laser Pump Source	Single Wavelength**	Flashlamp-pumped Q-switched Nd:YAG laser operating at 1064 nm, 532 nm, 355 nm, or 266 nm	
	Tunable**	OPO, tunable between 410 nm - 2600 nm with optional UV extension down to 210 nm	
	**Integration of customer-supplied lasers available.		
Probe Source	Type	Pulsed / continuous xenon arc lamp, 150 W, ozone-free	
	Pulsed Operation	Rep. rate 10 Hz to single shot Pulse current up to 100 A Pulse duration 0.2 ms – 6 ms	
Monochromator	Type	325 mm focal length, Czerny-Turner with triple grating turret	
	Filter Wheel	Automated filter wheel for second order removal	
	Slits	5 μm – 10 mm (continuously adjustable), motorized	
	Stray Light Rejection	1:10 ⁵	
	Grating	Plane ruled grating, 180 grooves/mm, 500 nm blaze	
	Dispersion	1.66 nm/mm	
	Options	Gratings with 150 – 2400 grooves/mm and UV to NIR coverage	
	Mirror	Motorised to select detector	

Detector	Type	PMT with 5-stage dynode chain
	Spectral Range	200 nm – 870 nm
	Window Material	UV glass
	Options	PMT980 (200 nm – 980 nm) InGaAs detectors (900 nm – 2550 nm) NIR PMT (950 nm – 1400 nm or 1650 nm)
Data Acquisition	Oscilloscope	Fully controlled by operating software, or manually controlled when offline
	Bandwidth	200 MHz as standard 300 MHz and 500 MHz options
	Sampling Rate	2 GS/s
	Interface	Ethernet
Software	Operating System	Windows®
	Data Operations	Δ OD calculation (with/without background correction), numerical fits by Marquardt-Levenberg algorithm, analysis of growth and decay kinetics, Time-Resolved Absorption Spectra



Specifications

Kinetic and Spectral TA Spectrometer (LP980-KS)

The LP980-KS technical specification includes all specifications from the LP980-K plus the following in addition:

Sensitivity	Minimum ΔOD	0.0005	(single shot) - ICCD camera
Time Resolution	Minimum Gate Width (FWHM)	7 ns*	(3 ns ultrafast option available)
	*Lasers with pulse width >6 ns will result in a broadened instrument response		
Monochromator / Spectrograph	Type	325 mm focal length, Czerny-Turner with Triple Grating Turret	
	Filter Wheel	Integrated, automatic filter wheel for 2nd order light removal	
	Slits	5 μm - 10 mm (continuously adjustable), motorised	
	Grating	K-mode grating AND plane, ruled grating, 150 grooves/mm, 500 nm blaze	
	Dispersion	19.9 nm/mm	
	Spectral Coverage	520 nm (active horizontal ICCD dimension: 25 mm)	
	Spectral Resolution	0.52 nm (spectral coverage / 960 pixels)	
	Options	Gratings with 300 grooves/mm or 270 nm coverage and 0.28 nm resolution	
	Mirror	Motorised to select detector	

Detector LP980-K PMT detector plus:	Type	Image intensified CCD camera
	Spectral Range	200 nm – 850 nm
	Min. Optical Gate Width	7 ns (FWHM)
	Active Pixels	960 x 256
	Active Area	25 mm x 6.7 mm
	Cooling	-20°C (-30°C with additional water circulation)
	Options	3 ns min. optical gate width 380 nm - 1090 nm spectral range
Data Acquisition	ICCD	Fully remote controlled by operating software
	Fast Vertical Binning	16-bit data resolution
	Image	24-bit data resolution
Software	Operating System	Windows®
	Data Manipulation	ΔOD calculation, mathematical, smoothing, automatic kinetic spectra acquisition, transformation into kinetics by data slicing, 2D, 3D graphics, contour plotting

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



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Rooted in Edinburgh Instruments' long history of molecular spectroscopy instrumentation, the LP980 is the ultimate turn-key solution for transient absorption research.

It makes nanosecond transient absorption, fluorescence, and phosphorescence accessible to any user and integrates all techniques within one instrument, saving you both time and cost.

Require photoluminescence spectroscopy?

Looking for photoluminescence to complement your TA studies? Choose the FLS1000 Photoluminescence Spectrometer which offers best-in-class sensitivity and flexibility to adapt to your experimental requirements.



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