

XS1

X-Ray Radioluminescence Chamber
for Photoluminescence Spectrometers



The XS1 sample chamber is an accessory for x-ray radioluminescence spectroscopy in Edinburgh Instruments photoluminescence spectrometers.

The XS1 is the ideal accessory for scintillator luminescence studies. It includes an x-ray safe sample chamber coupled via a liquid light guide to the FLS1000 or FS5 Photoluminescence (PL) Spectrometers. The sample is excited with x-rays and emits UV, visible or NIR radiation which is detected by the spectrometer.

Two sources can be coupled, a continuous (CW) x-ray source for spectral and a pulsed x-ray source for time-resolved radioluminescence measurements with ~ 100 ps resolution. Samples can be solids, liquids or powders. The accessory includes all safety measures and is compatible with standard photoluminescence operation of the spectrometer.

Key Features



Versatile Sample Options
Compatible with solids, liquids, and powders



CW Excitation
For x-ray excited luminescence spectra



Pulsed Excitation
X-ray excited luminescence lifetimes with sub-ns resolution



Turnkey Solution
Easily interfaced with FLS and FS5 Spectrometers



Dual Laser Option
Excitation with x-ray and UV or visible photons



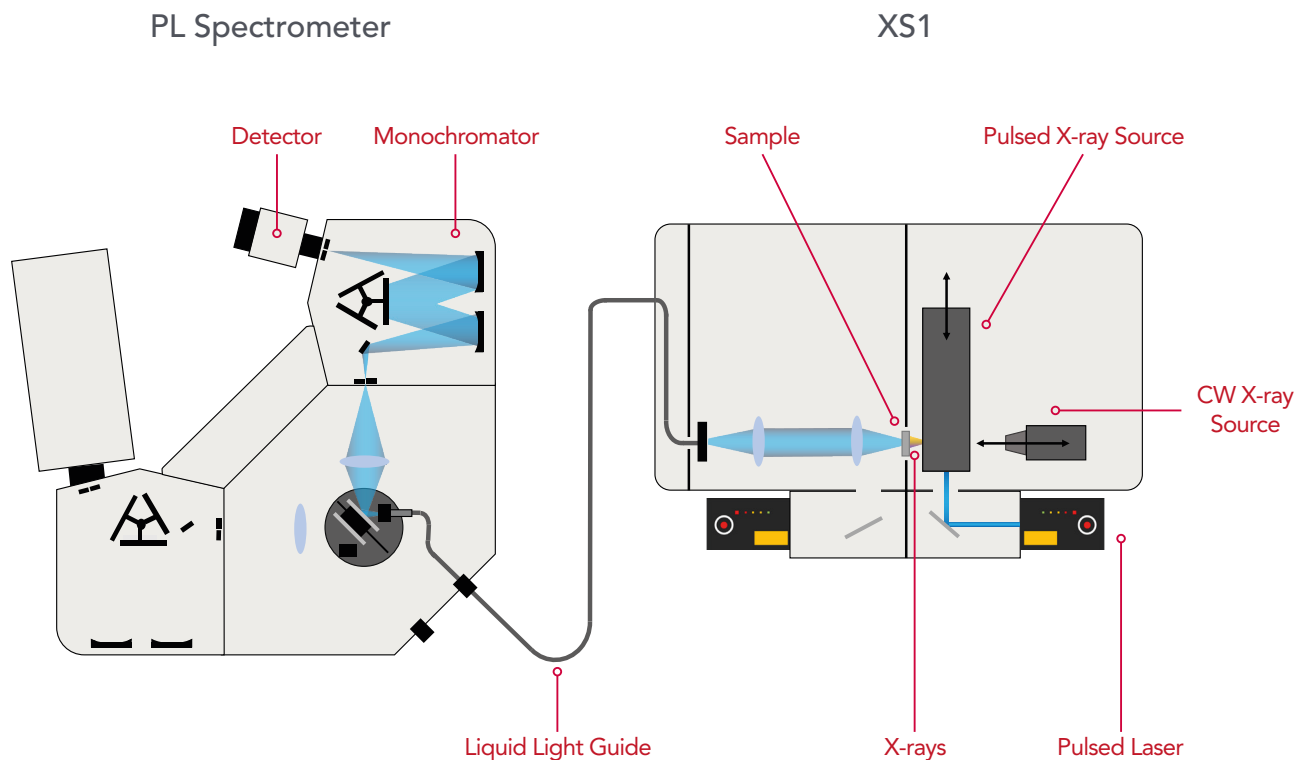
OPERATING PRINCIPLE

The XS1 sample chamber is external to the spectrometer and can be configured with a pulsed, CW, or both CW and pulsed sources.

A single-source XS1 can be upgraded with a second source in the future. Swapping between CW and pulsed excitation only takes a few seconds.

UV/Vis/NIR luminescence is collected by a liquid light guide (LLG) at 180° from the excitation beam and sent to the spectrometer sample chamber. The LLG is configurable to match the spectral range of the sample emission.

The XS1 fully prevents x-ray radiation from leaking outside, featuring a double lid interlock for extra safety.



X-RAY SOURCE OPTIONS

CW EXCITATION

The CW x-ray source is the optimal solution for steady-state radioluminescence spectra, providing x-ray energies up to 60 kV. The energy (kV) and intensity of the x-rays can be controlled in the source software.

There is a range of target materials available to configure the source according to the needs of the samples under investigation.

PULSED EXCITATION

The 40 kV pulsed source is triggered by an Edinburgh Instruments laser diode. The resulting x-ray pulse width is determined by the laser, with a minimum of 100 ps.

Time Correlated Single Photon Counting (TCSPC) requires a HPL-450 diode laser for lifetimes in the nanosecond range.

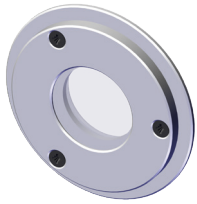
Multichannel Scaling (MCS) requires a HPL-450 or VPL-450 laser for lifetime measurements of microseconds and above.



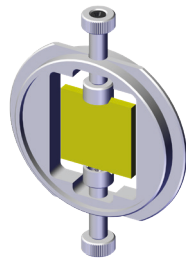
SAMPLE OPTIONS

Sample holders to accommodate powders, solutions, slides, and low volume powders or crystals are available and easily fitted to the chamber.

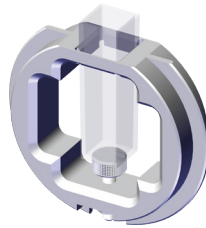
X-ray excitation and luminescence detection take place at 180°. In the pulsed version of the XS1 it is possible to excite the sample from the detection side with a second laser.



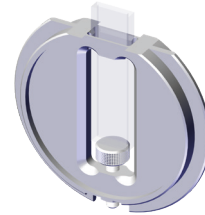
Powder cell
(standard)



Solid sample
(standard)



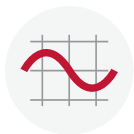
Cuvette
(standard)



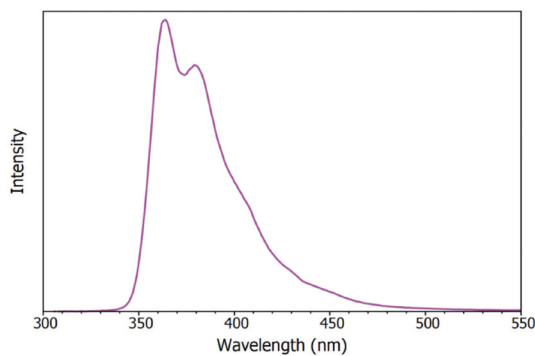
Low-volume cuvette
(standard)



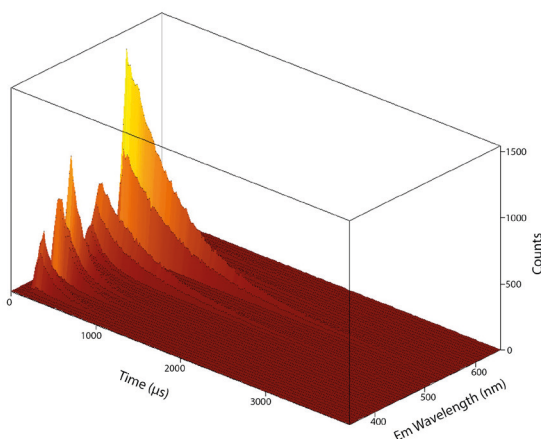
Sample tube
(optional)



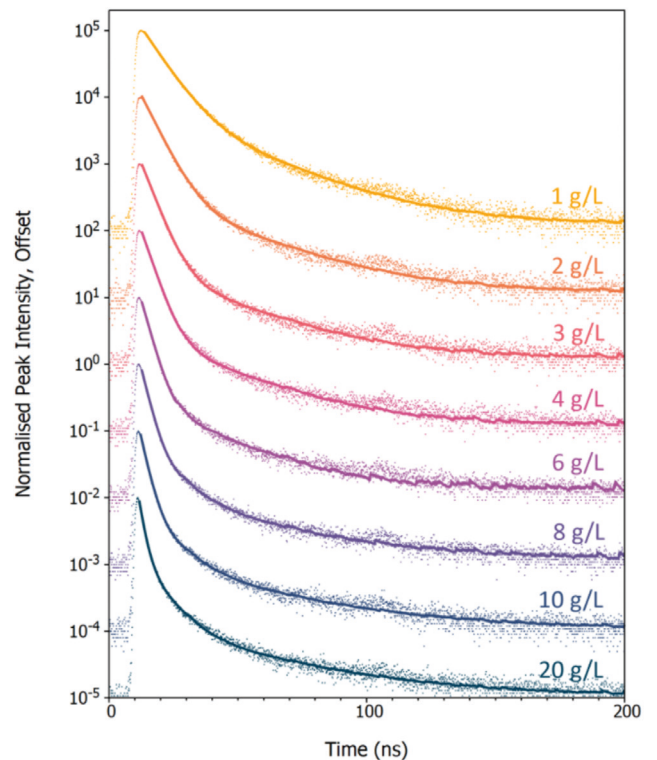
APPLICATION EXAMPLES



X-ray excited luminescence spectrum of LAB/PPO scintillator (8 g/L) using CW source



Time-resolved radioluminescence spectrum of Tb:gadolinium oxysulfide excited with pulsed source in MCS mode



X-ray excited luminescence decays of LAB/PPO at varying PPO concentrations acquired using pulsed source in TCSPC mode



PERFORMANCE SPECIFICATIONS

Specifications

	PULSED SOURCE (XS1-P)	CW SOURCE (XS1-CW)
OPERATION MODES	MCS* TCSPC* *Depending on spectrometer configuration	Steady state
TARGET MATERIAL	W	W, Rh, Ag
HV POTENTIAL	40 kV	4 kV – 60 kV
BEAM CURRENT	Recommended 10 μ A Maximum 50 μ A	5 μ A – 1000 μ A
MINIMUM PULSE DURATION	100 ps (source dependent)	N/A
MAXIMUM CW POWER	N/A	12 W
DIMENSIONS	942 x 915 x 225 mm	942 x 693 x 225 mm
WEIGHT	119 Kg	105 Kg
EMISSION SPECTRAL RANGE	300 nm – 650 nm, 340 nm – 800 nm, and/or 420 nm – 2000 nm (liquid light guide dependent)	
OPERATING TEMPERATURE	15°C – 30°C	



X-ray laboratory safety is the user's responsibility. All laboratories should be examined by an appointed Radiation Protection Advisor to ensure compliance with the locally applicable ionising radiations regulations. Edinburgh Instruments will not be responsible for ensuring an x-ray laboratory is compliant to applicable ionising radiation regulations.

This accessory weighs >100 Kg and requires a suitable supporting structure. An optical table is recommended.