NEW

OPAL-Luxe™

High dynamic range spectrometer C16736-01

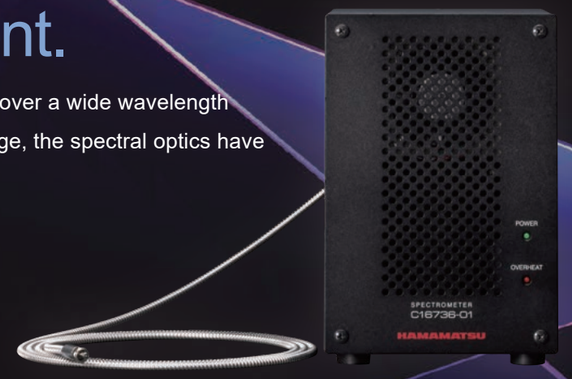
HAMAMATSU

PHOTON IS OUR BUSINESS

The ultra-high dynamic range revolutionizes spectral measurement.

The OPAL-Luxe™ is a compact, multi-channel spectrometer with the unprecedented ultra-high dynamic range. It is capable of simultaneous multi-wavelength spectral measurements over a wide wavelength range with extremely high dynamic range, and is particularly effective when strong and weak signals are present simultaneously. In order to take full advantage of its high dynamic range, the spectral optics have been newly designed and developed as a top-of-the-line model of, with high sensitivity, high wavelength resolution, while minimizing stray light.

Applications | Laser evaluation | Plasma physics | Thin film metrology | Optical density measurement | Color measurement | Photochemistry | Raman spectroscopy



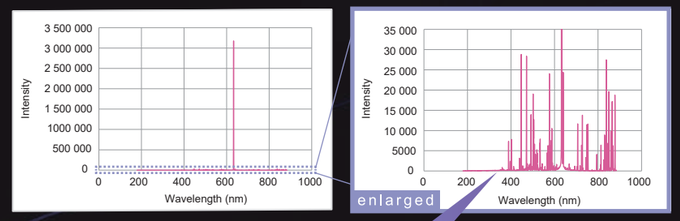
Ultra-high dynamic range of 2 500 000:1

The ultra-high dynamic range performance of the OPAL-Luxe™ allows simultaneous measurement of strong and very weak signals over a wide wavelength range of 200 nm to 900 nm. This is particularly effective in cases where matching the measurement conditions to the weak signal saturates the strong signal, making it difficult to obtain correct data. The high dynamic range is also extremely useful in applications where very large absorption quantities must be accurately evaluated.

Laser measurement

With conventional spectrometers, it is difficult to simultaneously measure weak light at other wavelengths when measuring intense light such as laser light because the detector is saturated by the strong laser signal when the exposure time is prolonged. So it is necessary to cut the laser light with a filter or the like. The OPAL-Luxe™ provides high signal-to-noise measurement even with weak light, making it suitable for plasma emission measurement where strong and weak emissions exist simultaneously.

Laser measurement with the OPAL-Luxe™

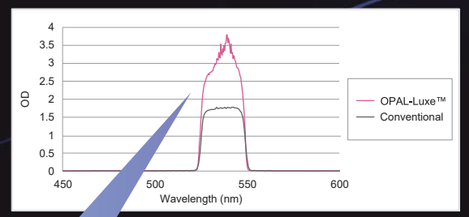


Signals detected by high S/N measurements

Optical density measurement

The ultra-high dynamic range performance also enables high optical density measurements. The graph on the right compares the Optical Density (OD) values of a holographic filter with an OD of 3 for the OPAL-Luxe™ with our conventional model (PMA-12). The OPAL-Luxe™ can detect high OD values that could not be done with our conventional model. In this example, the ultra-high dynamic range performance of the OPAL-Luxe™ is very effective for the chromatographic determination of high-concentration solutions and trace substances.

Measurement of OD value of holographic filter (532 nm)



Higher OD values than the conventional ones can be detected

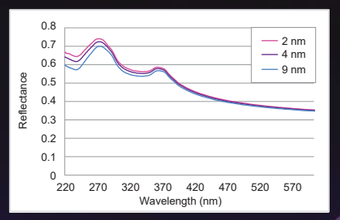
High sensitivity, high wavelength resolution, and minimal stray light to maximize the ultra-high dynamic range

The OPAL-Luxe™ has not only an ultra-high dynamic range, but also excellent performance in terms of sensitivity and accuracy. In the spectrometer, a bright optical system with an F value of 2.2 is used to achieve both brightness and wavelength resolution. Stray light characteristics are also taken into consideration to the maximum extent possible, enabling the detection of signals that could not be measured before.

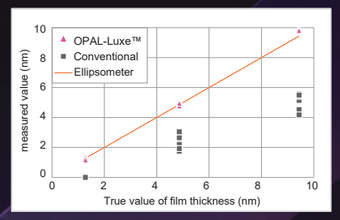
Thin film thickness measurement

The graph on the left shows the results of measuring the reflectance of an ultra-thin film of 10 nm or less in thickness with the OPAL-Luxe™.The OPAL-Luxe™ can measure the difference in reflectance due to the difference in thickness of a few nm, and the film thickness value can be calculated from this waveform.The graph on the right compares film thickness values measured with the OPAL-Luxe™ and our conventional model (PMA-12) with those of an ellipsometer that is capable of high-precision film thickness measurement. The OPAL-Luxe™ has achieved measurement results with a small difference from the ellipsometer one and with no variation.

Reflectance measurement result of thin film by the OPAL-Luxe™



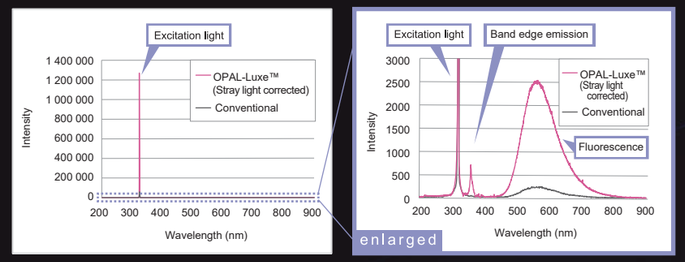
Measurement performance evaluation by oxide film of less than 10 nm thickness



Photoluminescence measurement of gallium nitride

This is an example of photoluminescence measurement of a compound semiconductor gallium nitride excited by a helium-cadmium laser (wavelength: 325 nm). The OPAL-Luxe™ were able to successfully measure band edge emission and fluorescence spectra with high S/N that could not be detected by our conventional model (PMA-12).

Simultaneous measurement results of excitation light, band edge emission, and fluorescence



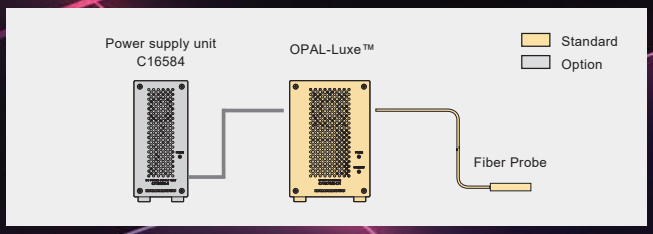
Specifications

OPAL-Luxe™ Main unit (C16736-01)	
Wavelength	200 nm to 900 nm
Wavelength resolution (FWHM)	< 0.9 nm (typ.0.85 nm)
Wavelength accuracy	±0.1 nm
Exposure time	100 µs to 32.7 s
Repetition frequency	100 Hz
Number of photosensitive device channels	2048 ch
Pixel size	12 µm × 1536 µm
Device cooling temperature	−5 °C
Readout noise (typ.)	12 electrons rms
Dark current (typ.)	1.5 electrons/pixel/sec (−5 °C)
Dynamic range (typ.)	2 500 000:1
AD resolution	16 bit
Spectrograph F number	2.2
External trigger input	TTL level/High impedance (D-sub 15-pin connector)
Interface	Ethernet (CAT.6) within 30 m
Power supply	DC24 V
Power consumption	Approx. 40 VA
Ambient operating temperature	+10 °C to +35 °C
Ambient operating humidity	30 % to 80 % (With no condensation)

Fiber Probe	
Length	2.0 m
Fiber type	Bundle fiber
Fiber Bundle diameter	Φ0.95 mm
Minimum bend radius	50 mm
End of fiber	SMA905D
Upper limit temperature	+80 °C

Power supply unit (C16584)	
AC input voltage	AC100 V to AC240 V, 50 Hz/60 Hz
Output voltage	DC24 V
Power consumption	Approx. 40 VA
Output connector	D-Sub 9-pin (1 m cable included)
Ambient storage temperature	−10 °C to +50 °C
Ambient operating temperature	+10 °C to +35 °C
Ambient operating humidity	30 % to 80 % (With no condensation)

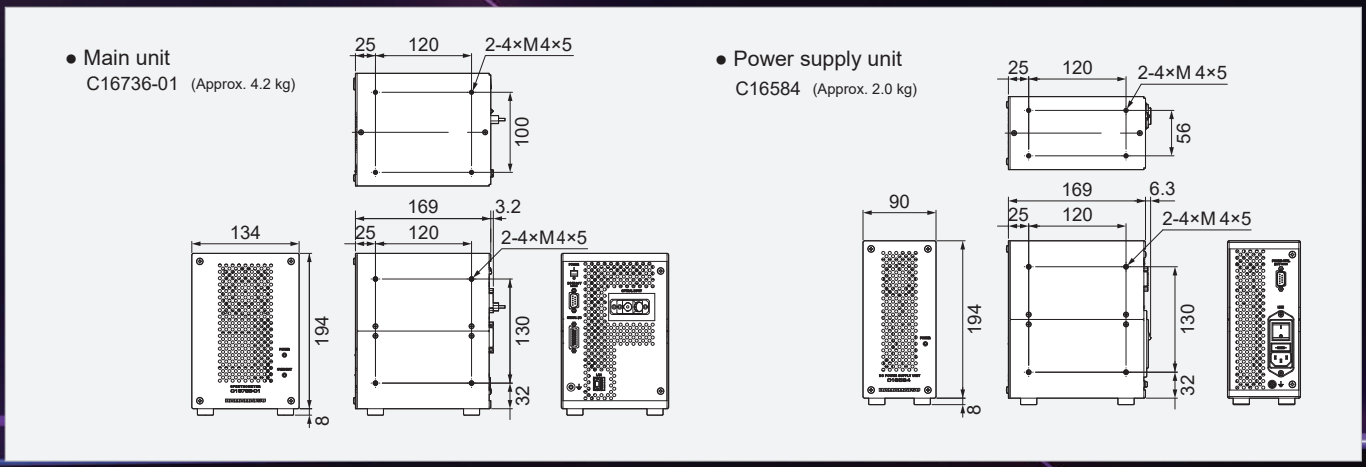
System Configuration



Options

Product number	Product name
C16584	Power supply unit

Dimensional outlines (Unit : mm)



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