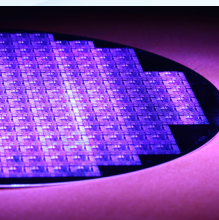
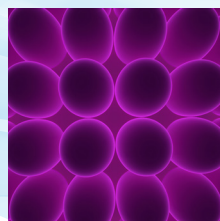
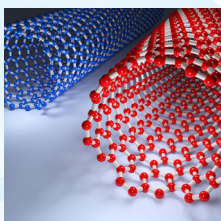
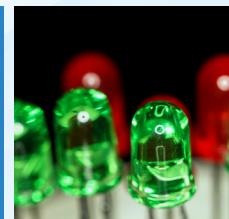
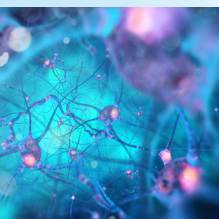


Quantaphi-2

PLQY Integrating Sphere

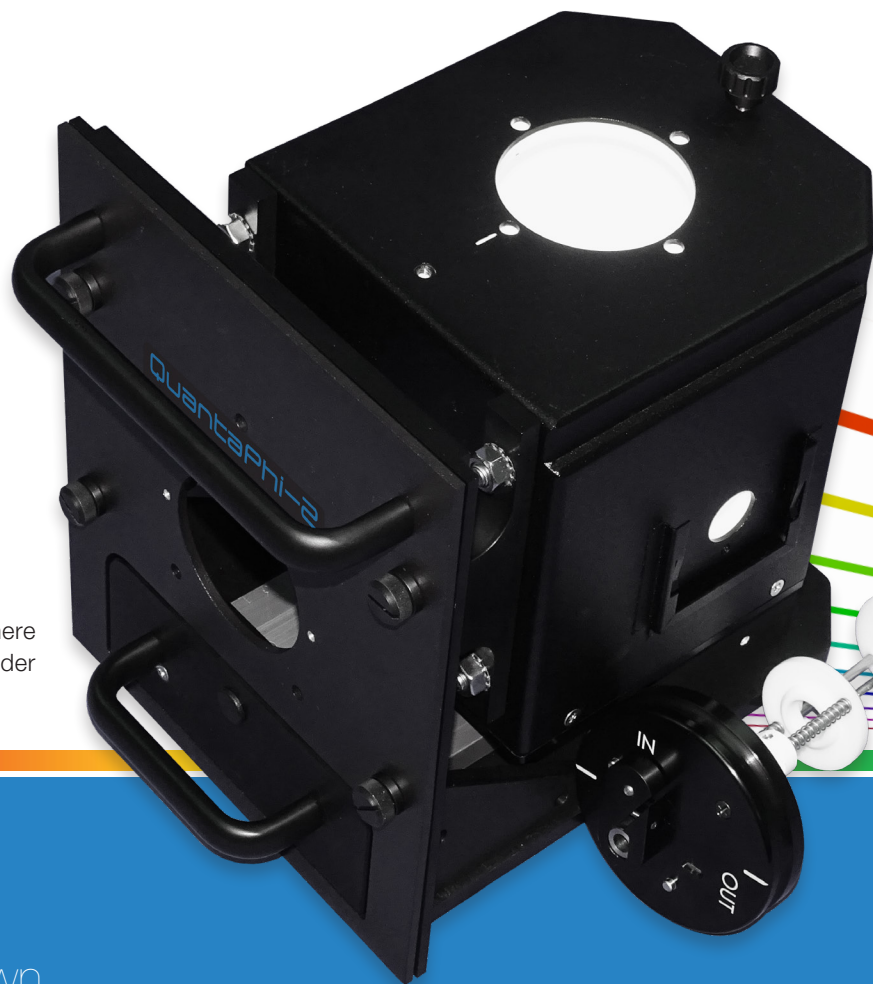


Direct Quantum Yield
Measurements of Unknown
Luminescent Samples

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QuantaPhi-2

PLQY Integrating Sphere



QuantaPhi-2 Integrating Sphere
shown with top mounting cuvette holder

Direct Quantum Yield Measurements of Unknown Luminescent Samples

Quantum yield is one of the most important parameters that characterize photoluminescence of materials. Photoluminescence Quantum Yield (PLQY) measurements are critical for a broad range of applications, including new material development, photovoltaics and the development of new fluorescence probes. With thousands of PLQY citations around the world, HORIBA has long been recognized for its superior quality of PLQY performance for the most demanding applications.

The QuantaPhi-2 is a new internal photoluminescence quantum yield (PLQY) and CIE measurement accessory for compatible HORIBA fluorescence spectrometers. Compatible HORIBA fluorescence systems include the following:

- Fluorolog-QM modular research spectrofluorometer
- Nanolog modular research spectrofluorometer
- FluoroMax Plus bench top research spectrofluorometer

This sample tray accessory includes an all-reflective sphere into which a sample is placed. The measurement of the sample, and of a non-fluorescent blank, allows for the direct measurement of the quantum yield of a solid, powder or solution sample.

Combined with our highest sensitivity and flexible spectrofluorometers, and their simple-to-use, dedicated QY and colorimetry software, the QuantaPhi-2 provides a high quality, simple and absolute PLQY solution.

The quantum yield of a molecule or material is defined as the number of photons emitted as a fraction of the number of photons absorbed. This characteristic property of a fluorophore or fluorescent molecule, is very important for understanding molecular behavior and optimization for many key materials.

$$\Phi = \frac{\text{Number of photons emitted}}{\text{Number of photons absorbed}}$$

Materials and Applications for which PLQY are Important Parameters

- Photovoltaics (PV) and solar cells
- Novel nanomaterials
- Nanoparticles
- Quantum dots
- Graphene/single walled carbon nanotubes
- New fluorescent probes
- Biomarkers and biosensors
- Lighting and display materials (OLED, LED and phosphors)
- Thin films and coatings
- Light emitting devices
- Cured/doped polymers, gels, hydrogels
- Paints, coatings,
- Rare earth materials



A Better PLQY Design

QuantaPhi-2 features a large, 121 mm internal diameter Spectralon® integrating sphere with excellent reflectivity from 250 to 2500 nm. This is an internal slide-in, tray-mounted integrating sphere with two excitation, and two emission ports.

Each port has a Spectralon plug with sphere-matching curvature for when openings are not in use. The QuantaPhi-2 features a unique bottom loading sample tray for solids or powders, ensuring that any sample spills are limited to the small, replaceable Spectralon cup.

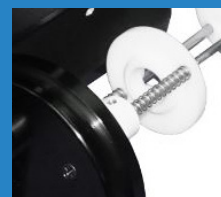
The sample cup is 1 cm in diameter and 3 mm in depth, with a quartz coverslip for powder containment. This bottom loading tray can save a tremendous amount of time and money, as the prevention of sphere contamination is the number one priority when using an integrating sphere.

The QuantaPhi-2 also includes a center-mounted 10 mm cuvette sample holder for PLQY studies of samples in solution.

QuantaPhi-2 shown with bottom loading sample tray for powders and solids



Replacement Spectralon sample cup and coverslip



Cuvette Holder



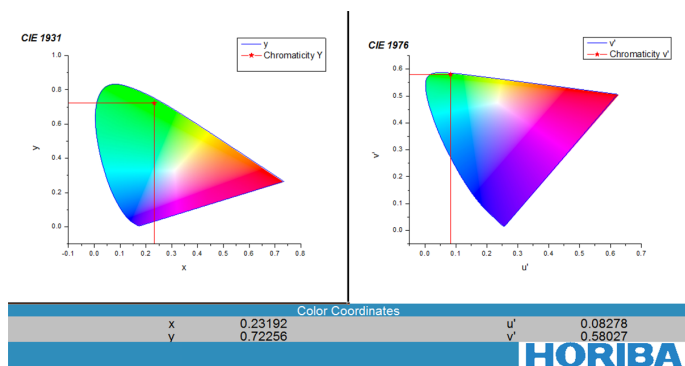
980 nm DPSS laser mounted to the front of the Fluorolog-QM PLQY sample tray

Upconversion PLQY and Laser-excited PLQY

This PLQY sample tray accessory also allows for direct mounting of DPSS lasers on the front of the sample tray for upconversion PLQY or laser-excited PLQY. Contact HORIBA for a list of available DPSS lasers.

Characterize Light-emitting Devices

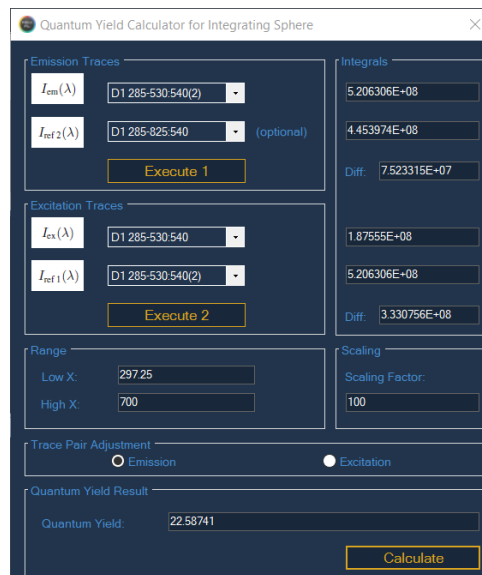
Electroluminescent quantum yield (ELQY) measurements of light-emitting devices, such as LEDs, OLEDs, and other luminescent sources, are fully accommodated by the QuantaPhi-2. Electrical connections to the device are facilitated by a dedicated wiring port in the bottom loading drawer, allowing a customer to feed wires to their custom modified sample cup holder. Shown below are the CIE values and total luminous intensity plots of a simple LED measured using the QuantaPhi-2.



HORIBA FluorEssence software interface for the Fluoromax and Nanolog spectrofluorometers.

Software That Makes PLQY Simple and Accurate

The QuantaPhi-2 integrating sphere accessory is compatible with a number of HORIBA fluorescence spectrometers, and all of these systems have a PLQY App, that simplifies the process of acquiring an accurate QY value for an unknown sample.



FelixFL software on the Fluorolog-QM modular research spectrofluorometer incorporates a quantum yield calculator which, when coupled with an integrating sphere, allows you to calculate the quantum yield with ease.

QuantaPhi-2 Hardware Specifications

Sphere material	*Spectralon®
Reflective wavelength range	> 95%, 250 to 2,500 nm
Sphere inner diameter	121 mm
Port fraction (liquid mode)	1.043%
Port fraction (solid mode)	2.103%
Powder sample cup	13 mm diameter x 3 mm depth with 15 mm quartz coverslip
Liquid sample holder	1 cm path quartz cuvettes (2 to 4 mL)
Gas purge connectors	1/4" ID tubing
PLQY sample tray size	152 x 183 x 190 mm (W x D x H)
PLQY sample tray weight	4.7 kg

QuantaPhi-2 Performance Specifications

PLQY accuracy (Quinine Sulfate, Accepted value QY = 55 ± 10%)	55.1 ± 0.8
PLQY accuracy (Rhodamine, Accepted value QY = 93 ± 10%)	93.2 ± 0.5
Precision, Relative Standard Deviation (RSD)	2%
PLQY wavelength range with Fluorolog-QM	250 to 2,200 nm (detector dependent)
PLQY wavelength range with FluoroMax Plus	250 to 1900 nm (detector dependent)
PLQY wavelength range with Nanolog	250 to 2,200 nm (detector dependent)

* Spectralon is a registered trademark of Labsphere, Inc.

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