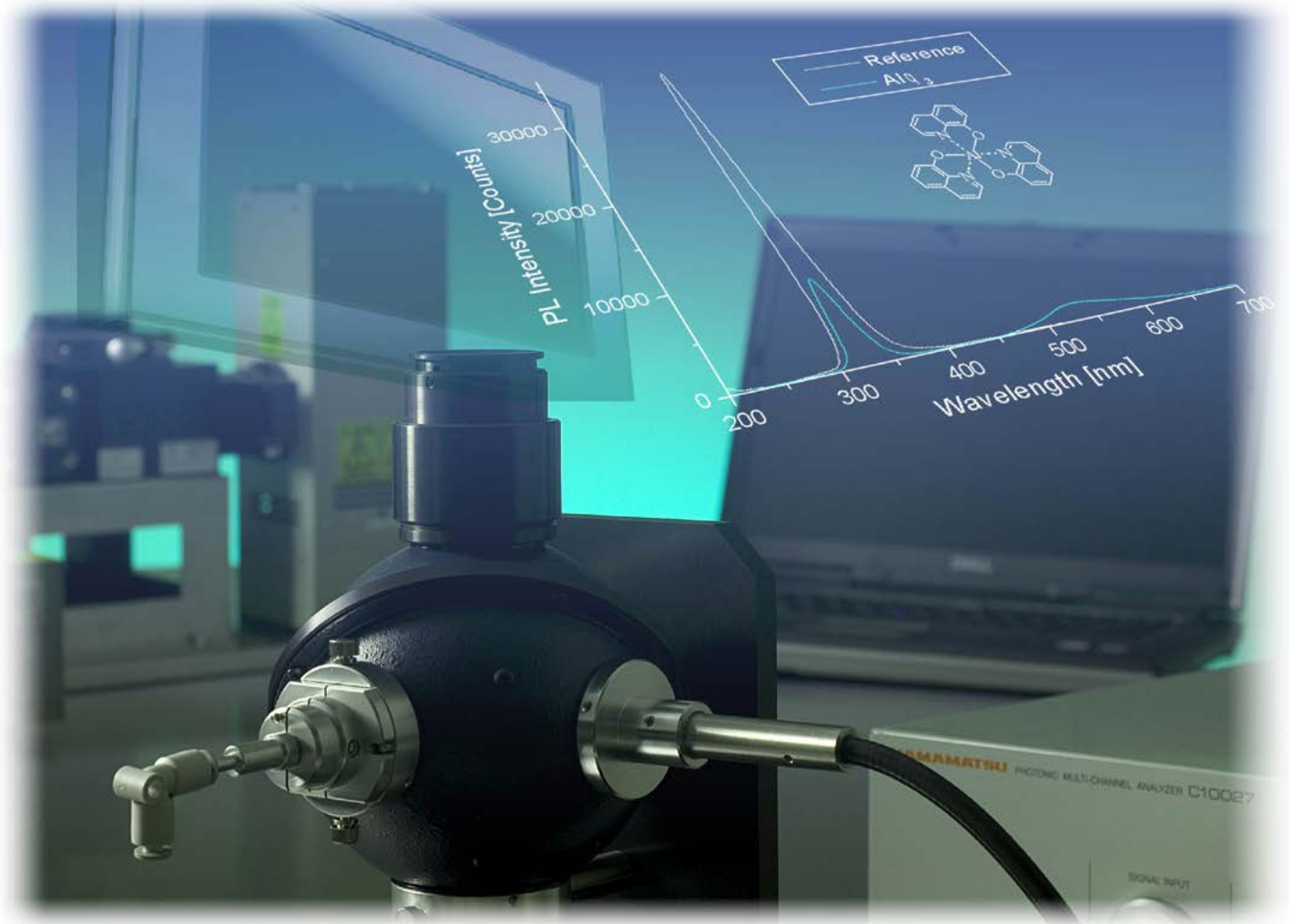


Measurement System for Organic LED Materials C9920 series

Providing a variety of measurement needs from the development of organic LED materials to the development of flat panels.



Hamamatsu Photonics provides a variety of solutions by combining low-light detection, spectroscopic measurement, optical measurement and image processing technologies. The Organic LED Measurement Device Series responds to a variety of needs in organic LED research and production fields, from materials development to device development.

Line-up in our measurement device group for research in the organic LED field

Absolute PL quantum yield spectrometer C9920-02, -02G, -03, -03G

Measurement of the luminous efficiency of a organic LED material using photoluminescence (PL).

External quantum efficiency measurement C9920-12

Measurement of luminous efficiency using current excitation of a organic LED device.

Light distribution measurement system C9920-11

Measurement of brightness and emission angle distribution in a organic LED device.

Picosecond fluorescence lifetime measurement system C11200

Measurement of fluorescent and phosphorous lifetimes.

Time-resolved absorption spectrum analyzing system Flash photolysis system

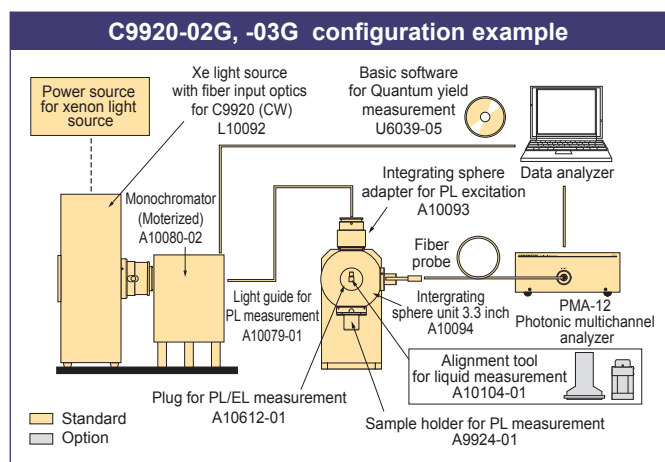
Measurement of transient absorption spectra in organic LED materials.

The C9920 series, which is built around the Multichannel Detector, can make various measurements such as PL quantum yield and external quantum efficiency, as well as light distribution and brightness.

Absolute PL quantum yield spectrometer C9920-02, -02G, -03, -03G

The absolute quantum yield for light emissions is measured using a photoluminescence method. Excitation at various wavelengths is possible by means of xenon lamp and monochromator.

The Absolute PL quantum yield spectrometer C9920-02, -02G, -03, -03G measures the absolute quantum yield for light emissions using a photoluminescence method (PL method in the following). The device is made up of an excitation light source that uses a stable xenon light source (monochromator), a nitrogen gas-flow capable integrating sphere and a PMA multichannel detector capable of simultaneously measuring multiple wavelengths that have been corrected for wavelength sensitivity.



Features

- Absolute quantum yield measurement of light emitting materials by PL method
- Measures total flux by incorporating an integration sphere.
- Measurements with ultra-high sensitivity and high signal-to-noise ratio
- For thin films, solutions and powder samples
- Temperature control
- Automatic control of excitation wavelength (C9920-02G, -03G)
- Various of analysis functions
 - Quantum yield measurement
 - Excitation wavelength dependability (C9920-02G, -03G)
 - Emission spectrum
 - PL excitation spectrum (C9920-02G, -03G)

Specifications

Type number	C9920-02	C9920-02G	C9920-03	C9920-03G
PL measurement wavelength range	300 nm to 950 nm		400 nm to 1100 nm	
Monochromatic light source (150 W xenon light source)				
Excitation wavelength	250 nm to 800 nm	250 nm to 950 nm	375 nm to 800 nm	375 nm to 1000 nm
Bandwidth	10 nm or less (FWHM)	Approx. 2 nm to 5 nm (Varies with slit)	10 nm or less (FWHM)	Approx. 2 nm to 5 nm (Varies with slit)
Prevention of sample deterioration	Excitation light interception by the mechanical shutter			
Excitation wavelength control	Manual	Automatic control	Manual	Automatic control
Multichannel spectroscopy				
Measurement wavelength range	200 nm to 950 nm		350 nm to 1100 nm	
Wavelength resolution	< 2 nm		< 2.5 nm	
Sample holder (Option)				
Thin film	Using Laboratory dish without caps (5 sets) A10095-01 (not including a substrate)			
Powder	Using Laboratory dish with caps (5 sets) A10095-03			
Solution	Using Alignment tool for liquid measurement A10104-01 or Side-arm cell (3 sets) A10095-02			
Temperature control	RT* to +300 °C by using Sample holder for temperature control A13924-03 with Controller for temperature control C13923-01			

*RT : Room temperature

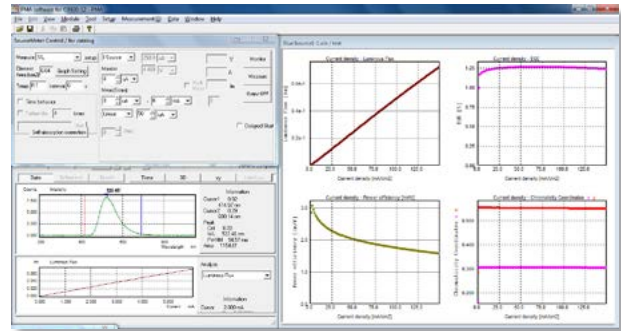
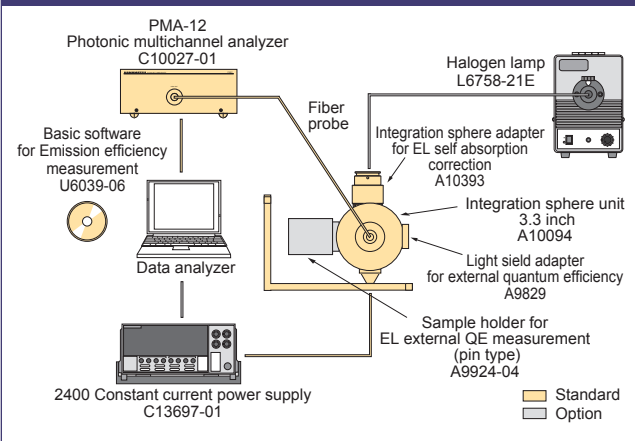
External quantum efficiency measurement C9920-12

Highly precise measurement of emission efficiency does not depend on the emission angle distribution characteristics by using an integrating sphere.

The External quantum efficiency measurement C9920-12 is a device for measuring the external quantum efficiency of a sample by exciting the LED device with current (voltage) and measuring the number of emitted photons. Measurements of emissions versus the current applied can be made, inclusive of elements related to the efficiency, such as absorption by the organic LED material layer and glass substrate, and reflective mirror efficiency.



C9920-12 configuration example



Minimum current/voltage value, maximum current/voltage value, current/voltage value steps and the like can be set in window at the upper left of the display screen. Raw measurement data is displayed in the window at the lower left of the display screen. Sample monitoring measurements, data during a measurement and the like are displayed. Various graphs can be displayed in the figures on the right side of the display screen.

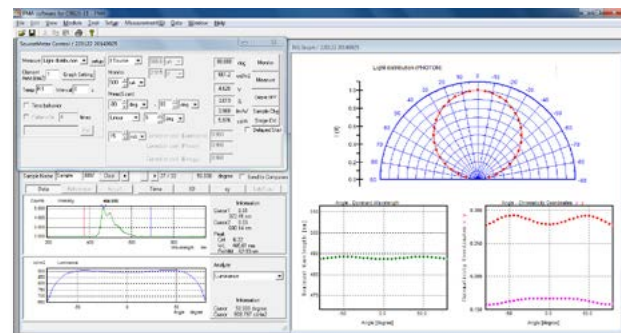
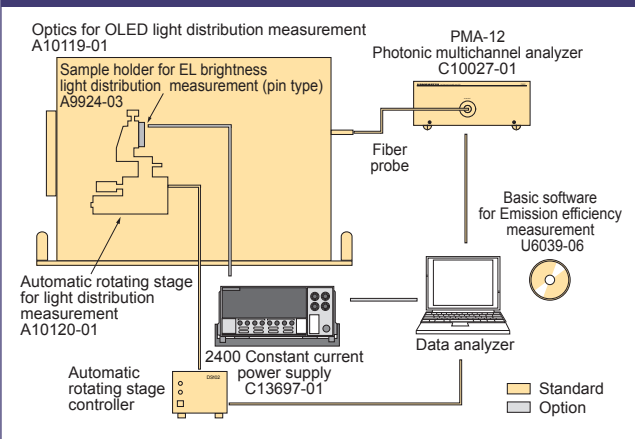
Light distribution measurement system C9920-11

Measurements such as brightness for each emission angle, emission spectrum and color coordinates are possible using a rotating stage.

The Light distribution measurement system C9920-11 is a device where the organic LED sample supplied with current (voltage) is placed on a rotating stage and the organic LED device emission brightness, spectrum and emission angle distribution are measured for each of the angle steps that has been set.



C9920-11 configuration example



Besides angle measurement range and the step for angle measurements, the minimum current/voltage value, maximum current/voltage value and step current/voltage value can be set in window at the upper left of the display screen. Raw measurement data is displayed in the window at the lower left of the display screen. Sample monitoring measurements, data during a measurement are displayed. Various graphs can be displayed in the figures on the right side of the display screen. The graphs specified with a polar plot showing light distribution, can be displayed at the top of the screen.

Sample courtesy of Kido Laboratory, Yamagata University

Providing a Variety of Solutions by Combining Low-Light Observation, Spectroscopic Measurement, Optical Measurement and Image Processing Technologies.

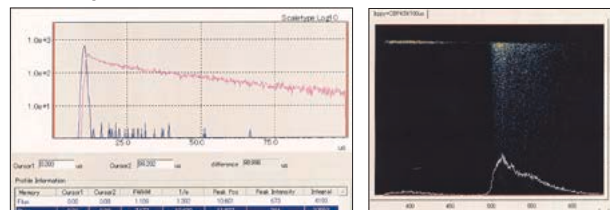
Picosecond fluorescence lifetime measurement system C11200

Fluorescence and Phosphorescence Lifetime Measurements

Picosecond to millisecond fluorescence and phosphorescence lifetime are measured with high dynamic range by combining a laser and a streak camera. The results of the measurements are observed as a two-dimensional image made up of a wavelength axis and time axis, so it is possible to visually grasp the lifetimes for each of the fluorescent and phosphorescent components.



Measurement of Time-Resolved Emission Spectrum of Phosphorous Luminescent Materials



▲ Phosphorescence materials Ir(ppy)₃: Fluorescence, phosphorescence and streak image of temporal resolution luminescent spectra of host CBP thin film at 4.5 K
Data courtesy of Prof. Chihaya Adachi, Kyushu University

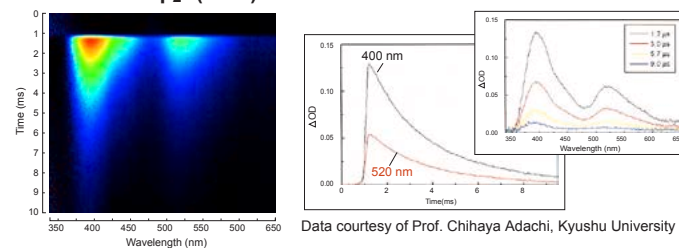
Time-resolved Absorption Spectrum Analyzing System, Flash Photolysis System

Transient Absorption Measurement

The sample is irradiated with a laser, and the absorption of transient species is measured by monitoring the transient species produced using a high-output xenon lamp or other lamp.

By using a streak camera or a gated multi-channel detector as the detector, time measurements in the picosecond to millisecond range are possible. This is useful for measurement of intersystem crossing and elucidation of triplet status that are important for phosphorescence materials and the elucidation of the light emission processes and deterioration processes for organic LED materials.

Transient Absorption Spectrum of phosphorescence material Btp₂Ir(acac) in acetonitrile Solution



Data courtesy of Prof. Chihaya Adachi, Kyushu University

[Streak Camera Specifications]

Time-resolved Absorption Spectrum Analyzing System



[Gated Multi-Channel Detector] Flash Photolysis System



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HAMAMATSU PHOTONICS K.K., Systems Division

812 Joko-cho, Higashi-ku, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-433-8031, E-mail: export@sys.hpk.com.jp

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218 E-mail: usa@hamamatsu.com

Germany: Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509 031 00, Fax: (46)8-509 031 01 E-mail: info@hamamatsu.se

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-93 58 17 33, Fax: (39)02-93 58 17 41 E-mail: info@hamamatsu.it

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

Taiwan: Hamamatsu Photonics Taiwan Co., Ltd.: 8F-3, No.158, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)03-659-0080, Fax: (886)03-659-0081 E-mail: info@hamamatsu.com.tw