External quantum efficiency measurement system
C9920-12

Luminous efficiency for light emitting devices is measured precisely by utilizing an integrating sphere

Light emitting materials are characterized by their fluorescence quantum yield. For light emitting devices like organic and inorganic LEDs the respective physical value is the external quantum efficiency, measured usually by electroluminescence (EL) method. For this application the External quantum efficiency measurement system C9920-12 system is designed.

The luminous efficiency of OLED devices depends on various factors such as absorption of the individual layers and of the glass substrate, reflectance of the surface, radiation angle and waveguiding capacity of the glass substrate. These effects are countered by using an integrating sphere as sample chamber. The sample is placed inside the sphere and excited by constant current or voltage.

Employing a highly sensitive Hamamatsu CCD spectrometer as detector, the whole spectrum is measured instantaneously. The spectral data as well as the external quantum yield, I-V-L characteristics and further calculations are displayed by the dedicated software.

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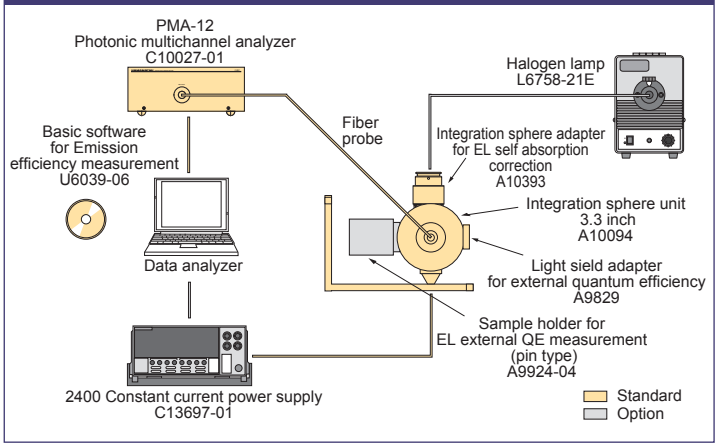
External quantum efficiency (EQE) measurement system utilizing an integrating sphere.

For measuring EQE of a light emitting device, it is placed inside an integrating sphere and excited by constant current. Current or voltage is changed stepwise and each time a complete emission spectrum is taken and displayed by the software.

C9920-12 configuration example



Features

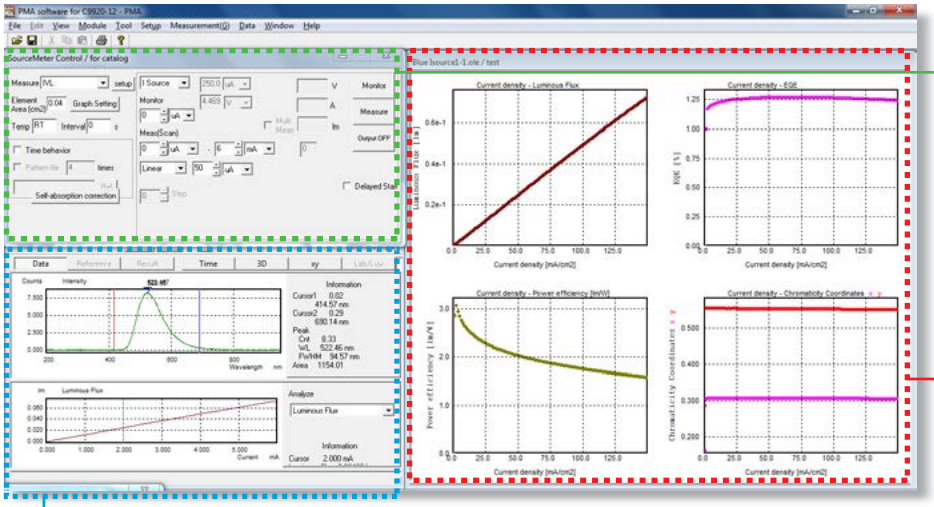
- **Use of an integrating sphere enables to measure EQE independent of the emission angle characteristic of a sample.**
- **Software controls the constant current power supply.**
- **The spectrum for each step of the applied voltage/current is measured instantaneously (I-V-L measurement).**
- **Cooled BT-CCD enables high sensitive measurement.**
- **Easy to handle intuitive software for measuring, calculating and controlling the system.**
- **Display of combination of several variables (current, voltage, luminous efficiency, chromaticity, etc).**
- **The system can be easily extended to absolute PL quantum yield measurement system and light distribution measurement system.**

Specifications

Integrating sphere	3.3 inch inside diameter, reflective material: Spectralon
Detector	BT- CCD
Cooling temperature	–15 ˚C
Number of photosensitive device channels	1024 ch
Wavelength	380 nm to 780 nm (Detector: 200 nm to 950 nm)
Fiber length	1.5 m
Range of measurement for luminous flux	0.00013 lm to 0.12 lm (with an emission area 2 mm square and white light)

Simple and intuitive handling is realized through the dedicated analysis software.

Software windows



Set up

- Minimum current
- Minimum voltage
- Maximum current
- Maximum voltage
- Step current
- Step voltage etc.

Results

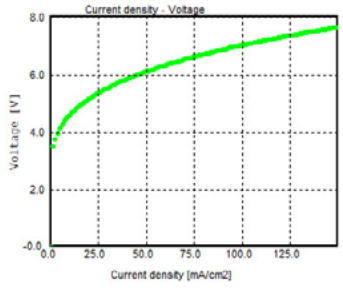
- Current density/EQE
- Current density/Luminous efficiency (cd/A)
- Current density/Power efficiency
- Current density/Voltage
- Current density/Dominant wavelength
- Current density/Chromaticity coordinates
- Current density/Excitation purity
- Current/External differential quantum efficiency
- Time/Current (voltage)
- Time/Emission spectrum
- Wavelength/Intensity

Measurement data

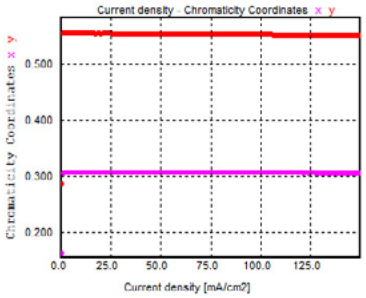
Example of measurement results

Measurement results can be displayed in various graphic representations.

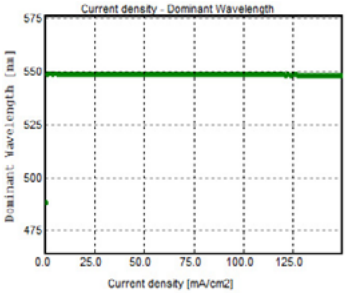
Current density/Voltage



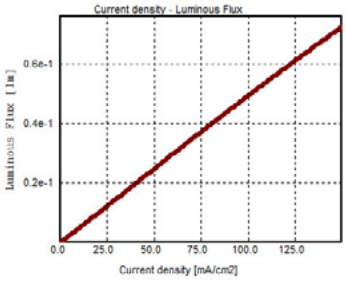
Current density/Chromaticity coordinates



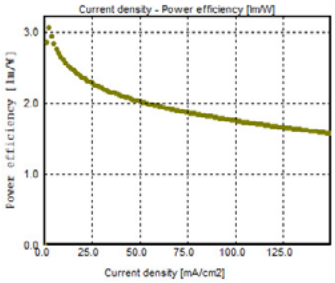
Current density/Dominant wavelength



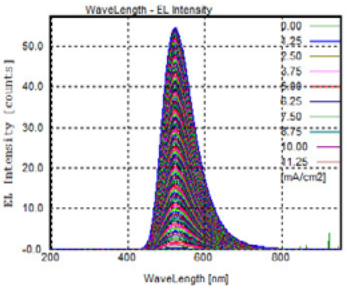
Current density/Luminous flux



Current density/Power efficiency



Wavelength/Intensity



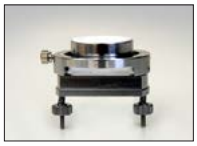
* The Voltage parameter is alternatives for Current Density.

Addition of optional parts and components accommodates a wide variety of measurement objects.

Options

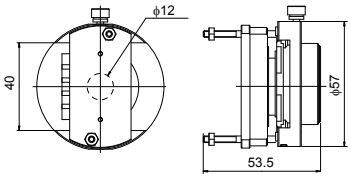
Integration sphere adapter for EL self absorption correction
A10393
Adapter to joint an integrating sphere and a fiber of light source for absorption correction.
(for L6758-21)

Sample holder for EL external QE measurement (pin type)
A9924-04
A sample holder with pin connectors.



Sample holder for EL external measurement (simple type)
A9924-06
A general-purpose sample holder with alligator clips. It comes with a light shielding cover.

(unit : mm)



Related Products

With many shared components, the C9920 series offers easy upgrades to the following products.

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

These systems measure the absolute values of luminous quantum yields of light-emitting materials using the photoluminescence method.

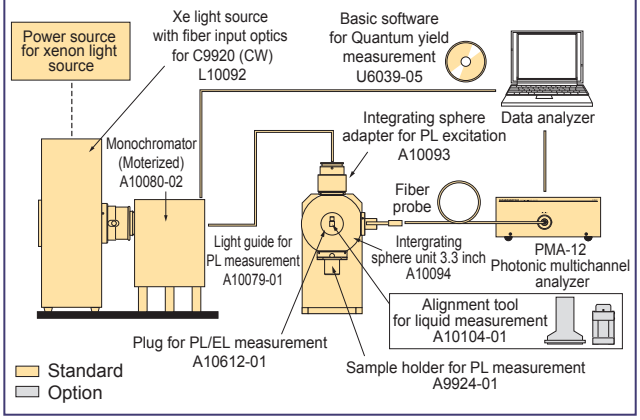
Absolute PL quantum yield measurement systems C9920-02, -02G, -03, and -03G measure the absolute values of luminous quantum yields of light-emitting materials using the photoluminescence method. Use of a spectrometer enables excitation at a variety of wavelengths. We have various sample holders that can accommodate measurement of thin films as well as solutions and powders.

Light distribution measurement system
C9920-11

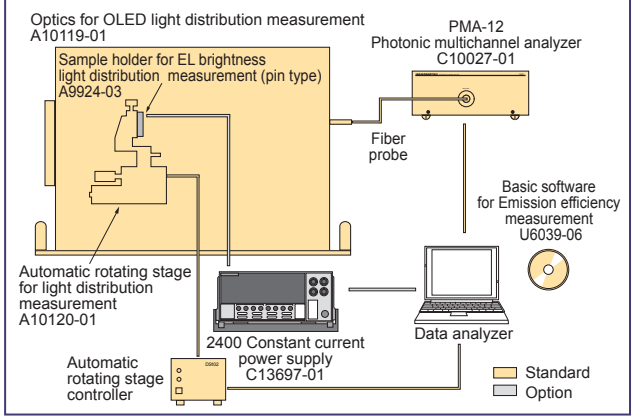
This system integrates a rotating stage to measure the brightness, emission spectrum, chromaticity coordinates, and other elements for each emission angle.

The C9920-11 luminous intensity distribution characteristic measurement system measures the emission brightness, spectrum, and emission angle distribution of a light-emitting device for every preconfigured step angle by placing the light-emitting device supplied with electric current (or voltage) on the rotating stage.

C9920-02G, -03G configuration example



C9920-11 configuration example



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