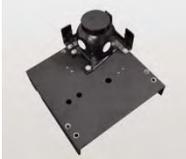


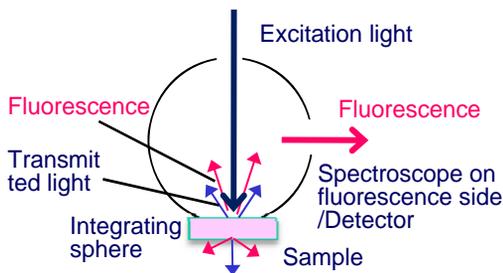
Fluorescence Spectra Measurement of The Transmission Direction of The Fluorescence Resin Board

INTRODUCTION

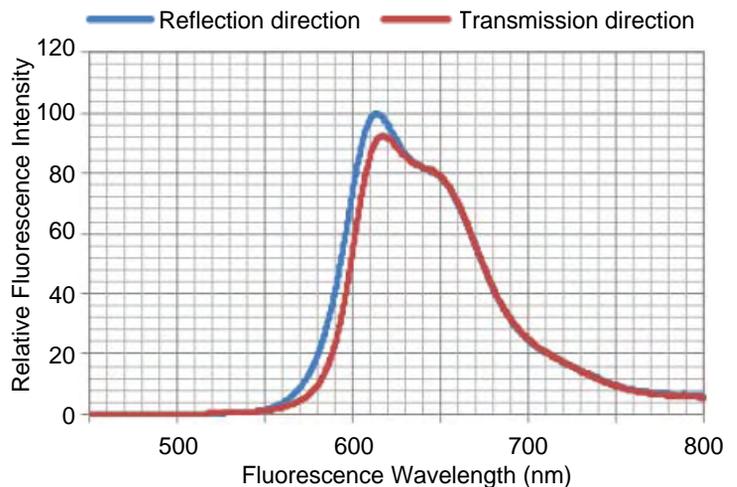
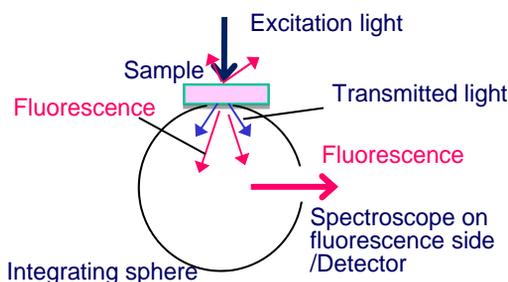
When embedding a fluorescent material in a device (display, solar cell, optical equipment, etc.), the fluorescence in the transmission direction is sometimes utilized. For a solid fluorescent sample, the fluorescence spectrum in the reflectance direction generated from the sample surface is generally evaluated. However, the fluorescence generated in the transmission direction may differ from the fluorescence spectral shape of that in the reflectance direction as self-absorption occurs when it passes through the sample inside. Therefore, the evaluation of fluorescence spectra considering the actual condition of embedding into a device is important. By using F-7000 fluorescence spectrophotometer with the integrating sphere accessory and custom-made transmission holder, the fluorescence spectra in the reflectance direction and in the transmission direction can be measured. An analysis example of the fluorescence spectrum for a plate-like fluorescence resin board in the transmission direction is introduced here.

SAMPLE		ACCESSORY
Sample: Fluorescence resin board	  <p>Under normal lighting Under UV irradiation</p>	Transmission holder (custom-made)  Quantum Yield Measurement Unit (P/N : 5J0-0148) 
ANALYTICAL CONDITIONS		
Instrument	: F-7000	
Excitation wavelength	: 435 nm	Scan speed : 1200 nm/min
Fluorescence start wavelength	: 450 nm	Response : Automatic
Fluorescence end wavelength	: 800 nm	Detector : R928F
Slit on excitation side	: 5 nm	Photomultiplier Vol.: 400 V
Slit on fluorescence side	: 5 nm	Filter : Y52CF

Optical System for Fluorescence Measurement in Reflection Direction



Optical System for Fluorescence Measurement in Transmission Direction



Fluorescence Spectrum of Fluorescence Resin Board

An integrating sphere is used for the sample setup. A sample is set in the front-end of the integrating sphere and the transmitted light and fluorescence are directed to the detector after they are averaged in the inside of the integrating sphere. As the integrating sphere is used, the method is also applicable for diffusive samples.

KEY WORDS

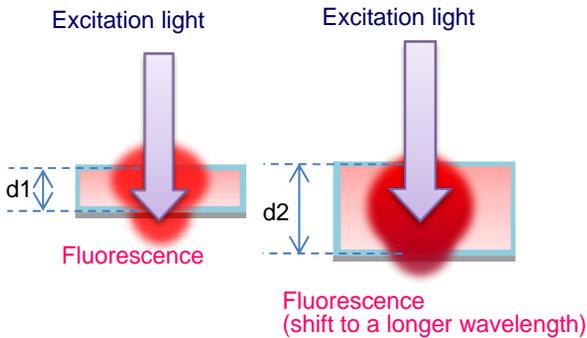
Material/Processing Material Related, Glass/Ceramic, Fluorescence Resin Board, Solar Cell, Display, Transmittance, Fluorescence Spectrum, UV-ray Cut, Sealing Film, Fluorescence Resin, FL, F-7000

Fluorophotometer (FL)

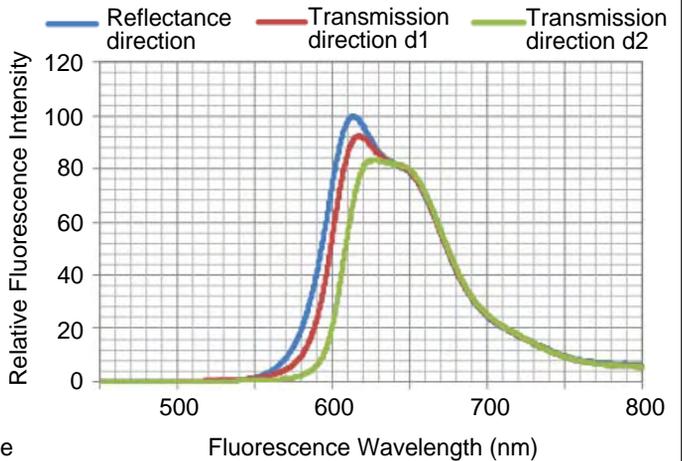
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Measurement Model

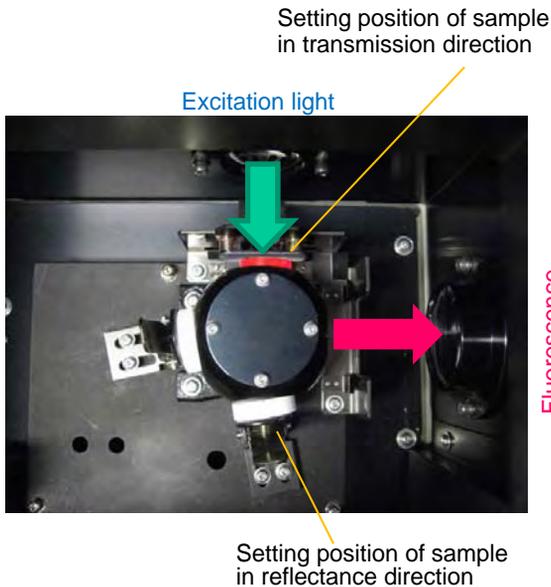


Pattern diagram for self-absorption of sample
 d1 : Sample thickness 5 mm
 d2 : Sample thickness 10 mm



Fluorescence Spectrum of Fluorescence Resin Board
 (Comparison of Thickness)

When the fluorescence passes through the sample, there is a phenomenon called self-absorption in which the sample absorbs its own fluorescence. Therefore, the fluorescence spectral shape in the transmission direction changes depending on the thickness of the sample. In general, the absorption band exists in the short wavelength region and the fluorescence on the short wavelength side disappears and the fluorescence peak shifts to the long wavelength side.



Appearance of Sample Setting

An integrating sphere and a transmission holder are used for the sample setup. A sample is set in the front-end of the integrating sphere. The transmitted light is dispersed by the back-end spectroscopy after averaged by the integrating sphere and then, the light (fluorescence) of the target wavelength is directed to the detector.

By using an optional filter set, the effect of the secondary or tertiary light can be reduced.

- **Fluorescence in transmission direction and in reflectance direction can be measured by one system (integrating sphere)**
 ⇒ Applicable only by changing the sample setting position*1
- **Dynamic range of 6 or more orders of magnitude**
 ⇒ There is an intensity difference between the transmitted light and fluorescence. As the instrument has a dynamic range of 6 or more orders of magnitude, the amount of transmitted light can also be evaluated under the same condition.
- **High-speed scan (60000 nm/min)**
 ⇒ 3D fluorescence spectrum (excitation and fluorescence properties) of a fluorescent sample can be obtained in a short period of time.
- **Applicable to transmittance measurement**
 ⇒ By using the synchronous spectrum mode, the transmittance without the effect of the fluorescence from a transparent sample can be measured.

*1 For the setting of a sample in the reflectance direction, the use of the sample stopper (custom-made) with a transmission hole is recommended so as to let the transmitted light of the excitation light escape from the integrating sphere.

KEY WORDS

Material/Processing Material Related, Glass/Ceramic, Fluorescence Resin Board, Solar Cell, Display, Transmittance, Fluorescence Spectrum, UV-ray Cut, Sealing Film, Fluorescence Resin, FL, F-7000

Fluorophotometer (FL)

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