Introduction of the Solid Sample Holder (650-0161) for Hitachi Fluorescence Spectrophotometer

INTRODUCTION

When measuring the fluorescence in a solid sample or high concentration solution, a solid sample holder is used and the fluorescence from the sample surface is measured.
The solid sample holder for Hitachi fluorescence spectrophtometer is designed to incline the upper surface to 10˚ in addition to its incident angle of 30°. Therefore, specular reflection light and scattered light can be reduced and the efficient fluorescence measurement is possible. This time, the effects of the incident angle and upper surface inclination are introduced.

SAMPLE	ACCESSORY
Sample: Rhodamine B	Solid sample holder (P/N : 650-0161) Filter set

ANALYTICAL CONDITIONS

Instrument	: F-7000				
Excitation wavelength	: 500 nm	Slit on excitation side	: 5 nm	Response	: Automatic
Fluorescence start wavelength	: 400 m	Slit on fluorescence side	: 5 nm	Detector	: R928F
Fluorescence end wavelength	: 800 nm	Scan speed	: 1200 nm/min	Photomultiplier Vol.	: 250 V

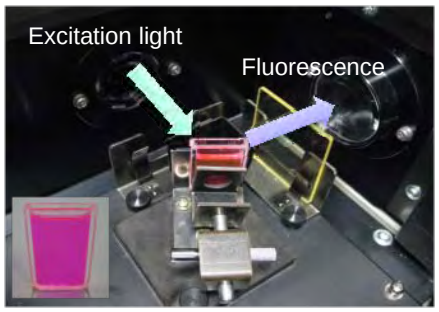


Figure 1. Appearance of Solid Sample Holder Setting

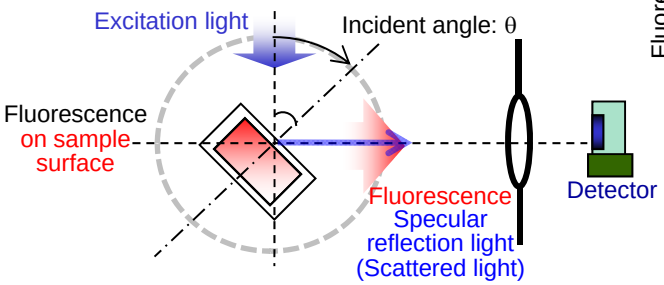


Figure 2. Pattern Diagram of Surface Photometry

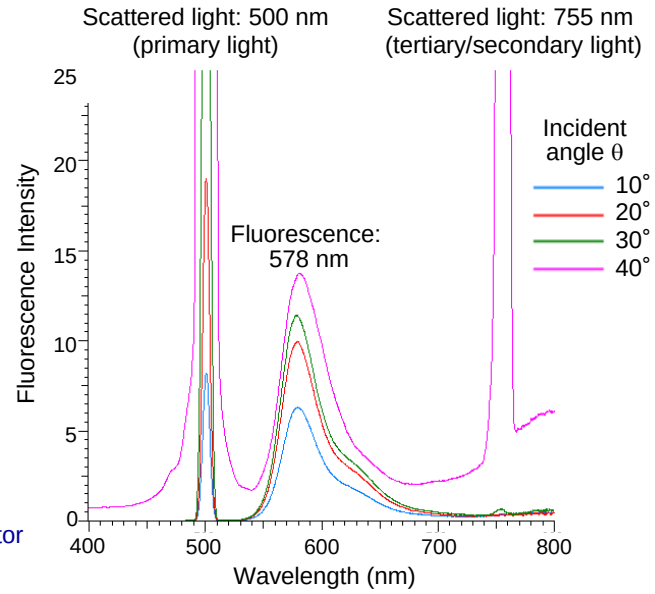


Figure 3. Fluorescence Spectra of Rhodamine B (10 µM) at Different Incident Angles

Figure 1 shows the appearance of the solid sample holder. This time, the effects of the incident angle and inclined upper surface were studied by using a high concentration solution of rhodamine B.

As shown in Figure 2, lights other than fluorescence, such as specular reflection light and scattered light originating from the excitation light, occur on the sample surface.

As specular reflection light and scattered light increase the background of fluorescence, it is desired that an optical system which rarely detects those lights is used.

Figure 3 shows fluorescence spectra of rhodamine B at difference incidence angles. The fluorescence intensity increases as the incident angle increases.

However, when the incident angle is increased too much, scattered light occurs, resulting in increased background.

The optimal incident angle was found to be 20° to 30°.

KEY WORDS
Material/Processing Material Related, Glass/Ceramic,
Fluorescence Resin Plate, Solar Cell, Display, Fluorescence Spectrum, Fluorescence Resin, FL, F-7000, F-2700

Fluorophotometer (FL)

Sheet No. FL120005-01

Introduction of the Solid Sample Holder (650-0161) for Hitachi Fluorescence Spectrophotometer

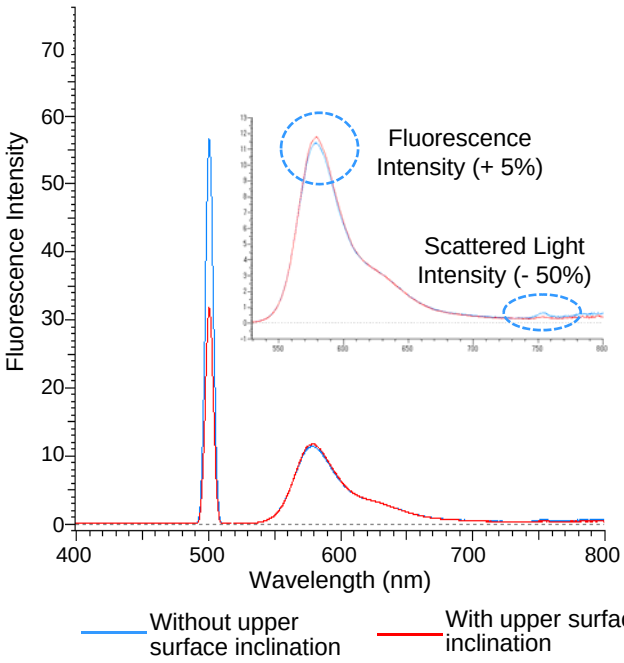


Figure 4. Effect of Upper Surface Inclination (Incident Angle of 30º)

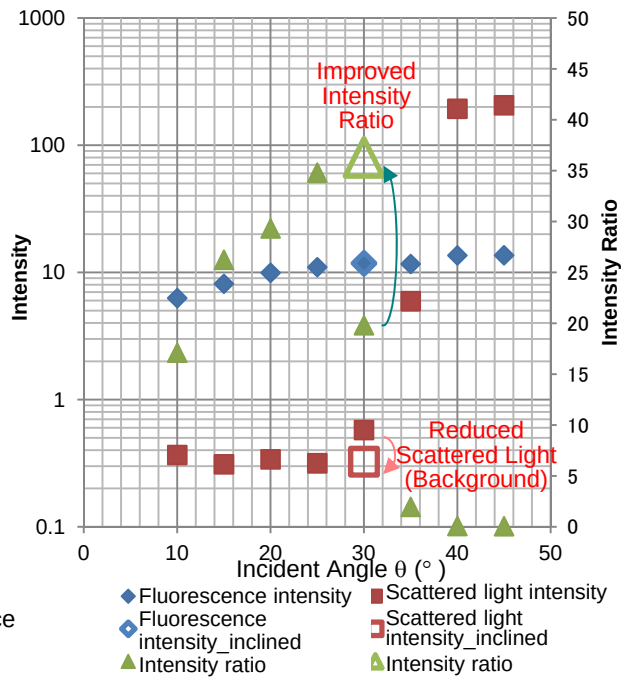
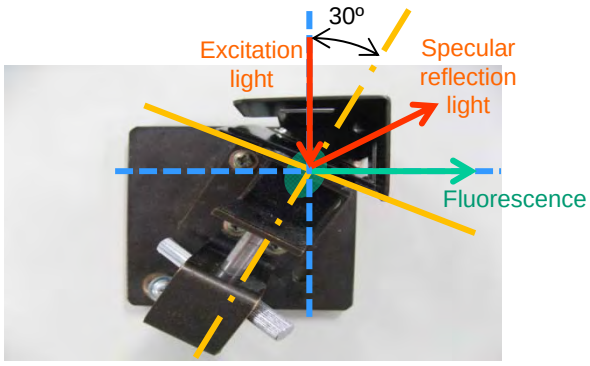


Figure 5. Relationship Between Incident Angle and Fluorescence Intensity / Scattered Light Intensity



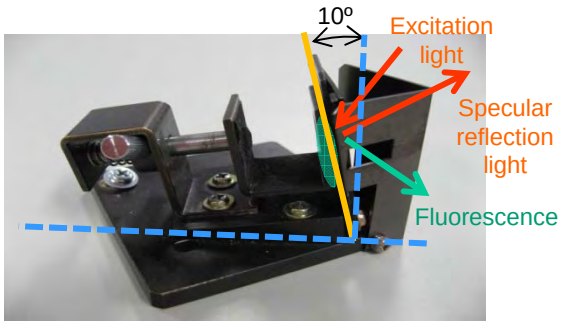


Figure 6. Appearance of Solid Sample Holder Left: Top View Right: Side View

Figure 4 shows the differences between when the upper surface is inclined and when it's not. By inclining the upper surface, the specular reflection light from the sample is three-dimensionally removed and thus, the intensity of scattered light can be reduced.

Figure 5 shows the relationship between the incident angle and fluorescence intensity / scattered light intensity. It is shown that with the incident angle of 30º and the upper surface inclined to 10º, the intensity of the scattered light was sufficiently reduced and the fluorescence was measured with a good efficiency. The highest fluorescence intensity ratio was achieved.

The reflection of the specular reflection light depends on the incident angle, but fluorescence occurs in all directions. As shown in Figure 6, the solid sample holder for Hitachi fluorescence spectrophtometer is designed to incline the upper surface to 10º in addition to its incident angle of 30º. Therefore, the optical system allows the reduction of specular reflection light and scattered light, resulting in the efficient fluorescence measurement. (The incident angle of other companies' solid sample holders is 45º or they are not designed to incline the upper surface, even if its incident angle is 30º.)

*1 The experiments without the upper surface inclination shown in Figure 2, 3, and 4 were conducted by using a custom-made accessory with the capability to change the incident angle.

*2 The solid sample holder (P/N: 650-0161) can be used for both F-7000 and F-2700 series.

KEY WORDS

Material/Processing Material Related, Glass/Ceramics, Fluorescence Resin Plate, Solar Cell, Display, Fluorescence Spectrum, Fluorescence Resin, FL, F-7000, F-2700

Fluorophotometer (FL)

Sheet No. FL120005-02