Application Note

CD-0032

CPL spectrum measurement of europium complex [Eu(facam)$_3$] exhibiting a sharp fluorescence spectrum

Introduction

Circularly Polarized Luminescence (CPL) measures the difference of intensity between right-handed and left-handed circular polarized fluorescence light. Luminescent molecules which generate CPL may find technological applications in the field of 3D displays and security markers. Chiral lanthanide complexes have been extensively applied in this field, while exhibiting sharp fluorescent bands[1)] and requiring, in CPL spectrum measurement, the use of narrow bandwidth. Two monochromators are installed in CPL-300, one is in the excitation side, and the other is in emission side, both equipped with continuously variable slits, in order to select the appropriate excitation wavelength and a suitable fluorescence bandwidth.

So the CPL-300 can measure the sample which shows sharp CPL spectrum with high resolution.

In this application note, the high resolution CPL spectrum measurement of europium tris[3-(trifluoromethylhydroxymethylene)-(+)-camphorate] (Eu(facam)$_3$)/DMSO solution using CPL-300 is presented. The CPL of this sample, well known as NMR shift reagent, has been extensively studied in the past[2-3-4)].

Keyword: CPL, Lanthanides, Luminescent material

Sample preparation

5.5 mM Eu(facam)$_3$/DMSO solution was prepared.

Experimental Condition

[CPL-300]

Excitation wavelength:	373 nm	Excitation slitwidth:	4000 µm
Emission bandwidth:	3 nm	Scan speed:	20 nm/min
Response:	4 sec	Data acquisition interval:	0.1 nm
Accumulation:	4 times	Optical path length:	10 mm

Results

The absorption spectrum of Eu(facam)$_3$/DMSO solution was measured in a 0.1mm cell and the absorption peak was detected at 309 nm., while the expected maximum peak of emission is at 613 nm. Measuring the fluorescence with an FP-8300 spectrofluorometer in a conventional 10x10 mm cell, the excitation spectrum with 613 nm fluorescence detection shows an apparent maximum at 373 nm (figure 1), well distorted due to sample absorption. So excitation wavelength was set at 373 nm, and CPL spectrum and fluorescence spectrum of Eu(facam)$_3$/DMSO solution were measured.

Figure 2 shows the g_{lum} spectrum, CPL spectrum and the fluorescence spectrum of Eu(facam)$_3$/DMSO solution measured by CPL-300. The sharp fluorescence peak and corresponding CPL spectrum observed at 570-630 nm were measured with high resolution. These results are in agreement with previous reports[2-3-4)].

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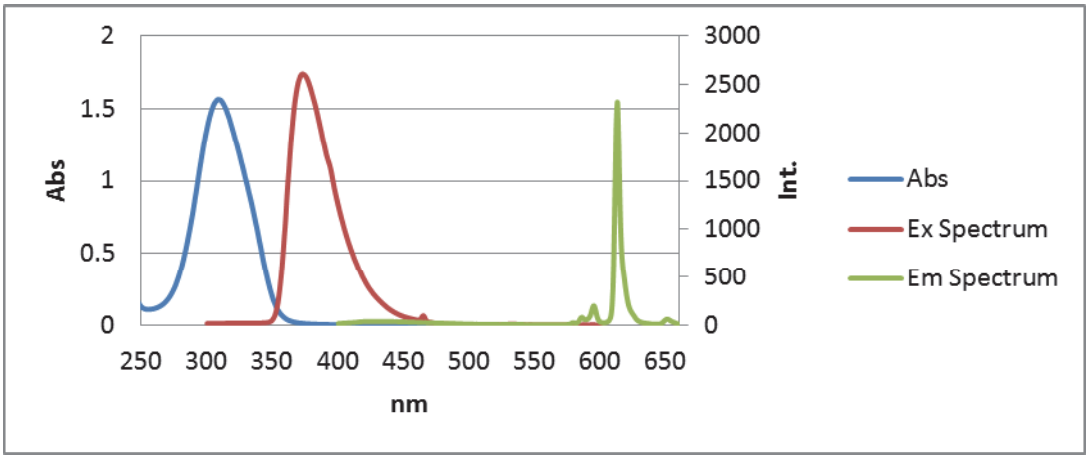

Fig.1 The absorption/excitation/fluorescence spectra of Eu(facam)$_3$/DMSO solution
(Absorption spectrum: V-760, cylindrical cell holder, 0.1 mm optical path cylindrical cell)
(Excitation/fluorescence spectra: FP-8300, 10 mm x 10 mm rectangular cell)

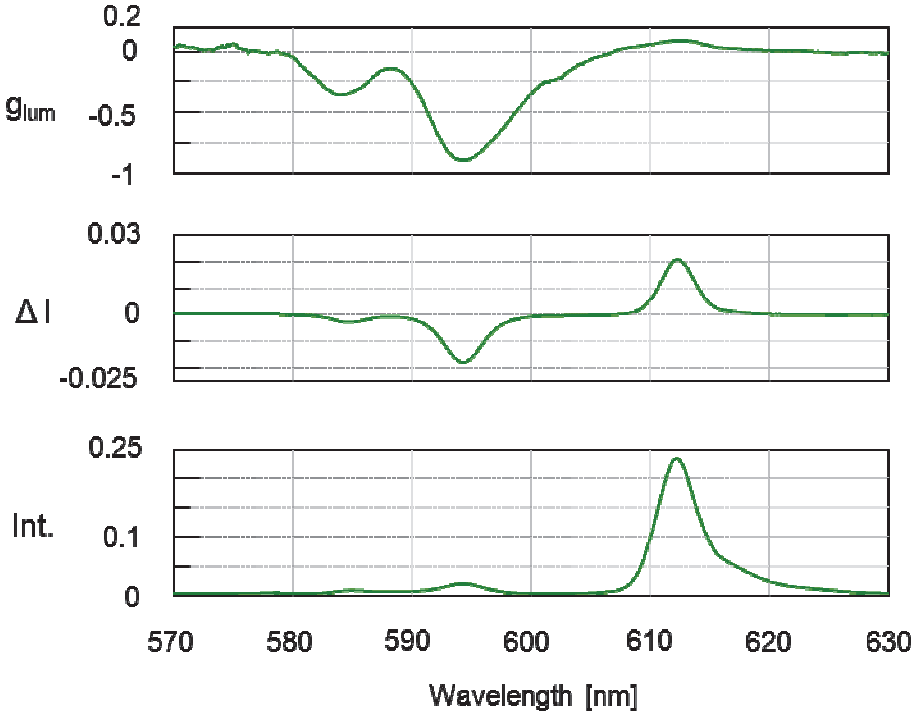

Fig.2 The g_{lum} spectrum (top), CPL spectrum (middle) and the fluorescence spectrum (bottom) of Eu(facam)$_3$/DMSO solution

References

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