

CPL Measurement of Camphorquinone Using CPL-300 Circularly Polarized Luminescence Spectrometer

Introduction

When chiral compounds are excited with unpolarized light, the difference in emission intensities of left- and right-handed circularly polarized light can be measured. This phenomenon is called circularly polarized luminescence (CPL). While circular dichroism provides information about the ground state of chiral molecules, CPL spectroscopy probes the excited states of chiral molecules.



CPL-300
Circularly Polarized Luminescence Spectrophotometer

By combining CPL with ECD, more structural information regarding chiral molecules can be obtained. To measure sharp CPL peaks at a high resolution, the CPL spectrometer uses two prism monochromators. Both the emission and excitation monochromators are equipped with continuously variable slit drives, which allow for an appropriate wavelength and band width selection.

This application note demonstrates the measurement and analysis of camphorquinone using two complimentary techniques: circular dichroism and circularly polarized luminescence.

Keywords

Circularly polarized luminescence, Circular dichroism, CD-0031, Materials

Experimental

18 mM of (1*R*)-(-) - and (1*S*)-(+)-camphorquinone was prepared in ethanol.

Measurement Conditions			
CD		CPL	
Data Pitch	0.1 nm	Excitation Wavelength	440 nm
Scan Speed	50 nm/min	Excitation Bandwidth	16 nm
D.I.T.	2 sec	Data Pitch	0.1 nm
Bandwidth	1 nm	Emission Bandwidth	10 nm
Accumulations	1	Scan Speed	50 nm/min
		D.I.T.	4 sec
		Accumulations	16

Results

The CPL and fluorescence spectra of (1*R*)-(-) and (1*S*)-(+)- camphorquinone were measured using a CPL-300, while CD and absorption were collected using a J-1500. The CD and CPL signals were normalized as $g_{abs} = \Delta \epsilon / \epsilon$ and $g_{lum} = \Delta I / I$, respectively. The spectra are shown in Figure 1.

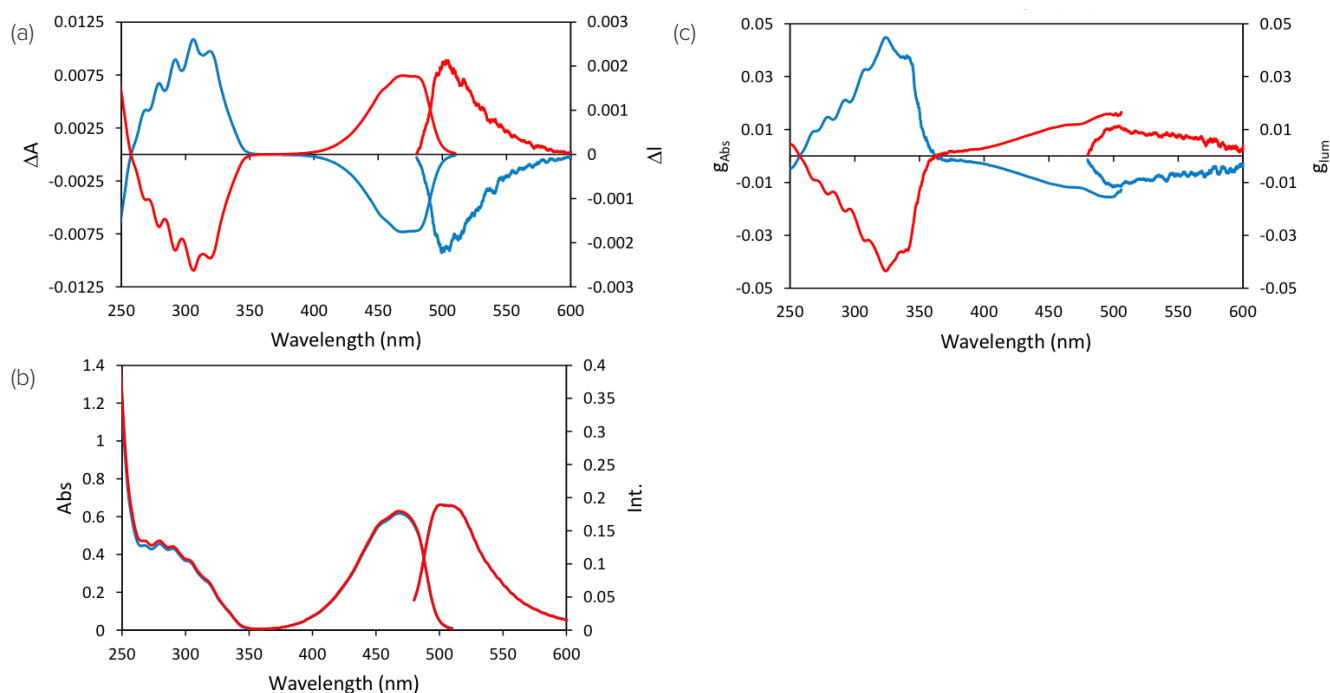


Figure 1. The (a) CD and CPL spectra, (b) absorbance and fluorescence spectra, and (c) g_{obs} and g_{lum} spectra of the (1*R*)-(-) (blue) and (1*S*)-(+) (red) camphorquinone ethanol solution.

Conclusion

The results are in good agreement with the camphorquinone CPL spectrum previously reported.¹

References

1. Chun Ka Luk and F. S. Richardson, JACS. 1974, 96, 2006-2009.