

Circularly Polarized Luminescence Spectrometer

CPL-300



JASCO

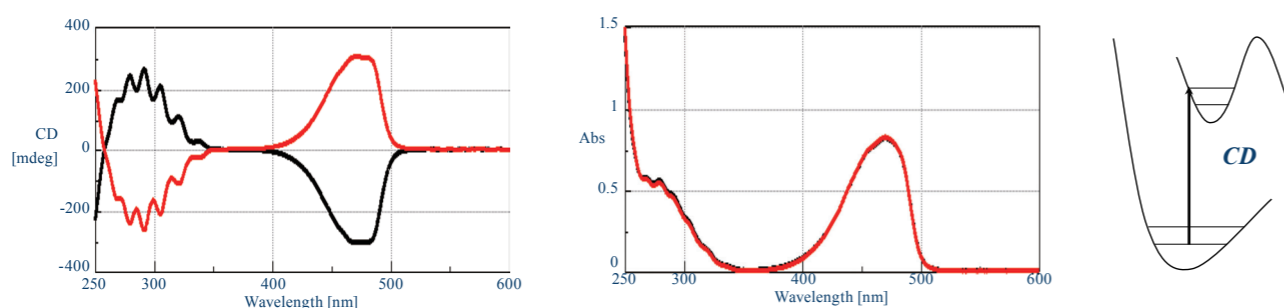
Performance
Innovation
Reliability

CPL-300 System Overview

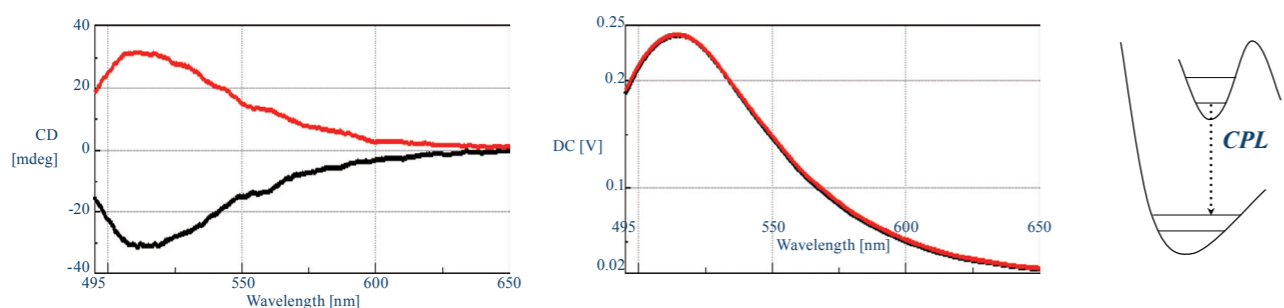
Circularly Polarized Luminescence (CPL) offers different and complementary information to other chiroptical techniques such as ORD, CD, VCD and ROA, since it reflects the structural properties of the excited state.

In addition, the properties of emission may be more interesting than absorption, particularly in the field of new materials research, where emission may have more technological impact. Finally, the use of theoretical calculations probing the excited state of chiral molecules is now possible, due to the increased computational power of modern PCs.

CD and Absorbance Spectra of Camphorquinone (measured by J-1500)



CPL and Fluorescence Spectra of Camphorquinone (measured by CPL-300)



System Features

The CPL-300 uses the original 180° fluorescence collection method proposed originally by Steinberg in the early seventies.

Light Sources

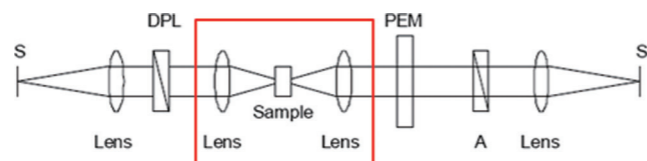
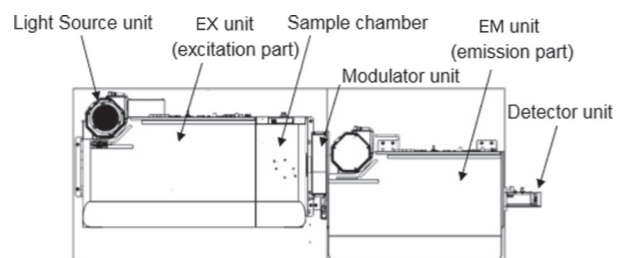
The standard ozone free 150W Xe lamp can be easily user exchanged with an Hg/Xe source, for a stronger excitation flux at the discrete wavelengths where mercury emission lines are present.

Excitation Optics

The CPL-300 features a double prism excitation monochromator, with very low stray light and no linear polarization effects that are typically caused by diffraction gratings.

Emission Optics

The CPL-300 uses a double prism, linearly polarizing monochromator to avoid the spectral range limitations of linear polarizers placed after the photoelastic modulator. Here too the prism approach assures better data, since no second order diffraction or Woods anomalies are present.



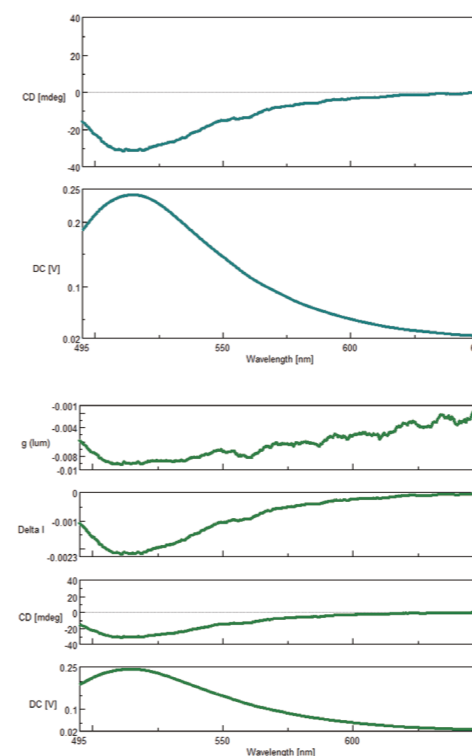
Data Collection and Processing

CPL is evaluated using the difference between left and right circularly polarized radiation intensities emitted by a sample.

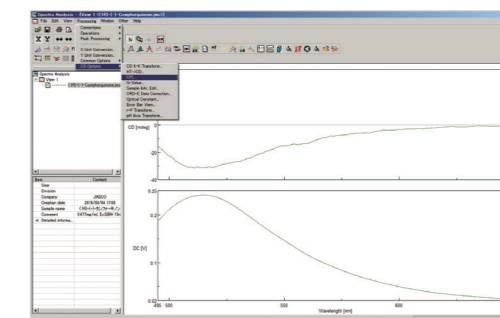
The CPL-300 acquires two data simultaneously while maintaining the photomultiplier tube at a constant gain (fixed high voltage):

- CPL as a demodulated AC component, in millidegrees of ellipticity
- Fluorescence intensity (I) from the DC signal (V)

These data can be converted to the g factor, which provides useful information for analysis. These operations are included in the the Spectra Manager™ operating software.



Data processing of CPL and Fluorescence spectra (Sample: (1R)-(-) Camphorquinone)
 Top: Raw data
 Bottom: Result of calculating g_{lum} as $\Delta I/I$



Sampling Accessories

A sample holder for both rectangular and cylindrical quartz cells is included as standard, with the beam focused at the center of the sample compartment. The CPL-300 allows 90° geometry, using low cost, dedicated monochromatic excitation beams, prepared by the user. These may be CW gas or diode lasers, as well as LEDs. The sample compartment has predrilled holes for this application.

Optional accessories common to J-1500 CD spectrometer (that use the same sample compartment) may also be used.



EXPM-531
NIR extended PMT (wavelength up to 1100 nm)



PTC-517
Peltier thermostatted rectangular cell holder with stirrer



PM-491
Permanent magnet, 1.6 T



CRY5-582
Liquid Nitrogen Cryostat for solid samples

Specifications

Model	CPL-300
Light Source	150W Ozone-free air-cooled Xe lamp (Option:150W air-cooled HgXe lamp)
Detector	Head-on photomultiplier tube PMT
Modulator	Piezoelastic modulator
Electrical System	Lock-in amplifier
Monochromator	Double prism monochromators for both Ex (excitation) and Em (emission) optics
Measurement Wavelength Range	250 to 850 nm 400 to 1100 nm (optional PMT detector)
Wavelength Accuracy	±0.2 nm (250 to 500 nm) ±0.5 nm (500 to 800 nm) ±1.5 nm (800 to 1100 nm)
Wavelength Reproducibility	±0.05 nm (250 to 500 nm) ±0.1 nm (500 to 800 nm) ±0.5 nm (800 to 1100 nm)
Slit Widths	1 - 4000 µm automated by software
Digital Integration Time (D.I.T.)	0.1 msec to 30 sec
Scanning Mode	Continuous scan, Step scan, Auto response (D.I.T) scan
Scanning Speed	up to 10,000 nm/min
Photometric Mode	CD (AC component = CPL), DC (DC component = Fluorescence), HT (PMT High tension voltage), and AC/DC
CPL Resolution	0.00001 mdeg
Wavelength Resolution	0.025 nm
Stray Light	0.001% or less
External Input Terminal	Two channels (input range: -1 to 1 V DC)
Mercury Lamp	Used for instrument calibration
Shutter	Located on both the Ex and Em monochromators
Sample Chamber	150 mm (W) x 310 mm (D) x 165 mm (H)
Dimension	2000 mm (W) x 700 mm (D) x 1000 mm (H)
Weight	180 kg
Full Scale	± 8000 mdeg
Power	100 - 240 V 50/60 Hz, 400 VA
Software	Spectra Manager™

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