Addressing information published by Jasco, Applied Photophysics, and Edinburgh Instruments:

Jasco Statement: "The standard ozone-free 150W Xe arc lamp can be replaced with an Hg/Xe source."

OLIS Response:

We see no justification or explanation for a mercury lamp. Obviously, one could be used, but to what end?

Jasco Statement: "The instrument's unique double-prism excitation and emission monochromators offer very low stray-light and no spurious linear polarization effects caused by instruments that use diffraction gratings. These are both extremely important as CPL signals tend to be very weak."

OLIS Response:

1. *"Linear polarization effects caused by instruments that use diffraction gratings"* is not a concern in the CPL Solo, since it has no optics on the excitation side. Thus, there is no linear polarization being caused. Measuring for LD is easy on the scanning models, allowing you to decide whether the addition of a depolarizer is worthwhile.
2. Stray light is not a parameter of interest in CPL. High sensitivity is always the higher priority.
3. Yes, *"CPL signals tend to be very weak."* The way to address that is the **exact opposite of what Jasco offers.**

Jasco Statement: "Double-prism monochromator"

OLIS Response:

1. As noted previously, our subtractive double grating monochromator on the OLIS DSM 245 does have meaningful advantage of a homogeneous output beam independent of the bandwidth and zero temporal dispersion. And, our Cary prism-grating monochromator used in the OLIS DSM 172 has the meaningful advantage of the vast 185-2600 nm useful range. A double monochromator is required for CD; it is of negative consequence for CPL.
2. The Jasco CPL-300 uses TWO large, expensive, light absorbing double prism monochromators, detrimental to sensitivity, filling a 2 meter length, and costing over $200,000.

The Jasco CPL-300 uses two Jasco CD spectrometers linked to create a CPL system nearly 2 meters long and ironically incapable of CD.

Jasco Statement: "180° sample geometry with unpolarized excitation light"

OLIS Response:

1. There is no advantage to this "feature."
2. Any model can have unpolarized excitation light with the addition of a depolarizer.
3. LEDs – as are used in the CPL Solo and as are recommended for use with the OLIS DSM 172 and 245 – produce unpolarized excitation light.

Jasco Statement: "Excitation (Ex) and emission (Em) monochromators"

OLIS RESPONSE:

All CPL spectrometers have monochromators on both the excitation and emission sides, other than the CPL Solo, which has wavelength specific LEDs on the excitation side for higher sensitivity, smaller footprint, and lower cost.

Jasco Statement: "Low stray light, no second-order radiation and no Wood's anomalies"

OLIS RESPONSE:

Setting	Value
Excitation Wavelength	373 nm
Excitation Bandwidth	33 nm
Emission Range	570-630 nm
Emission Bandwidth	3 nm

1. There is zero value in *"low stray light"* in CPL. As an example of how irrelevant stray light is, refer to this chart produced by another supplier (Applied Photophysics) showing a "33 nm" excitation bandpass:

   If an additive double monochromator is used with a 33 nm bandpass, the sample will receive this light as a spatially distinct rainbow of wavelengths, each wavelength striking a distinct part of the sample. With the subtractive double monochromator, the 33 nm are blended into a homogeneous beam, so that the sample is excited with a single blended color.
2. The concern about *"second-order radiation"* is spurious.
3. The concern about *"Wood's anomalies"* is spurious.

Jasco Statement: "Samples with different transition moments for absorption and fluorescence, that do not become depolarized, can be measured"

OLIS Response:

This is a nonsensical statement.

Jasco Statement: "Selectable Ex wavelength and Em spectral bandwidth"

OLIS RESPONSE:

All commercial CPL models have selectable excitation and emission spectral bandwidth.

Jasco Statement: "High-throughput optical system and highly sensitive PMT "

OLIS RESPONSE:

1. The lengthy optical train of the Jasco CPL-300 produces the opposite of *"high-throughput."* It is highly absorbing and thus has lower light throughput than a smaller and shorter optical train.
2. Also, *"highly sensitive PMT"* is not the exquisitely sensitive gated photon counter that is used in all OLIS CPL spectrometers (and potentially by others).

Jasco Statement: "Increased fluorescence sensitivity"

OLIS RESPONSE:

There is no explanation for or proof of this claim

Jasco Statement: "Data collection and processing"

OLIS RESPONSE:

One hopes!

Jasco Statement:"Simultaneous measurements of CPL and fluorescence intensity"

OLIS RESPONSE:

This will be true for all CPL spectrometers.

Jasco Statement: "One-click data conversion to DI and G_{LUM}"

OLIS RESPONSE:

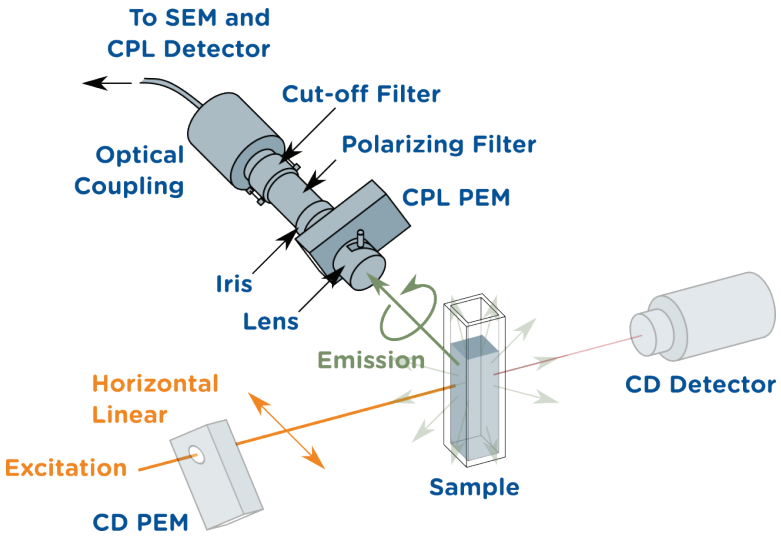
While this statement is made, all data shown by the Jasco CPL is displayed as millidegrees, units which are meaningless for CPL. Can a CD value be converted to G_{LUM}?

Retail List Price for US customers (December 2019):

CPL ONLY:

Jasco CPL-300: over $200,000 **OLIS CPL Solo: under $100,000**

Applied Photophysics' CPL addition to their Chirascan CD:



This graphic from their site shows that two PEMs are used, one for CD and a second for CPL. OLIS can offer the same, but our default recommendation is to move one PEM between measurements to save money and eliminate redundancy.

Applied Photophysics Statement: "In addition to CPL data, CD and absorbance data was [sic] obtained without changing the experimental setup."

OLIS Response:

If one wants to purchase the emission channel PEM for similar hands-free transition between CD and CPL on an OLIS, he can; however, the 2-3 minute tool-free movement of the PEM from the CD channel to the CPL channel is standard.

Applied Photophysics Statement: "The Chirascan CPL accessory enables comprehensive analysis of chiral luminophores and is compatible with CD measurements."

OLIS Response:

Two OLIS models support CD and CPL. The CPL Solo measures CPL only and can be very much smaller and far less expensive than the models which support both.

Applied Photophysics Statement: "CPL and CD measurements with the same instrument setup and sample"

OLIS Response:

While it is entirely possible to do CPL and CD on identical samples, this will be an infrequent situation in most laboratories. Exactly as one produces a sample in a buffer and concentration optimized for absorbance or fluorescence, one should do this for CD or CPL, which are far smaller and thus more challenging signals to acquire than their non-polarized forms.

Applied Photophysics Statement: "Multiple ways for optimizing light throughput"

OLIS Response:

There is no explanation for or proof of this claim.

Applied Photophysics Statement: "Full software integration for easy acquisition of both CD and CPL measurements"

OLIS Response:

One would hope so!

Retail List Price for US customers (December 2019):

CPL and CD:

Applied Photophysics: over $150,000

OLIS DSM 172: under $150,000

OLIS DM 245: under $150,000

Edinburgh Instruments' addition to their FLS1000 (or FLS980)

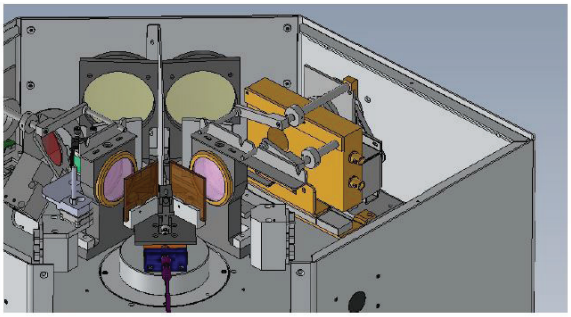


Figure 1: CPL System Sample Chamber (PEM in yellow).

This company offers to add a PEM, lock-in amplifier, and software to a large and expensive spectrofluorimeter. One must purchase or own the fluorimeter to do CPL on an Edinburgh.

Edinburgh Instruments Statement: "Circularly polarized luminescence (CPL) measurements can be made on an FLS980 spectrometer which has been modified to include a photo-elastic modulator (PEM) and lock-in amplifier CB1 box."

OLIS Response:

This makes perfect sense: add the required additional hardware to a high quality spectrofluorimeter. Presumably, homemade CPL instruments have taken this form, too.

Edinburgh Instruments Statement: "The FLS980 comes standard with a 450 W ozone free xenon arc lamp that covers a range of 230 nm to 1000 nm for steady state measurements."

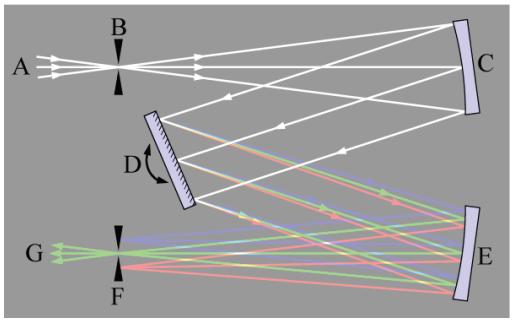
OLIS Response:

A 450 watt xenon arc lamp is exceedingly noisy, so that there will be tremendous variation in excitation intensity among wavelengths and from one measurement to the next. But, there will be a lot of light!

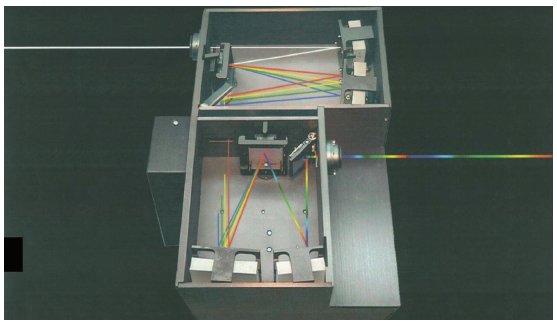
Edinburgh Instruments Statement: "Single and double grating Czerny-Turner monochromators are available in the FLS980"

OLIS Response:

This graphic of a Czery-Turner monochromator (found on Wikipedia) well illustrates the nature of all additive double monochromators: the output beam (the light that reaches the sample) is spatially dispersed, so that different parts of a sample see different wavelengths. Compared this with the light from a subtractive double monochromator – such as on the OLIS DSM 245 – which is homogeneous, so that the sample sees a perfect blend of the wavelengths reaching it.



Czerny-Turner monochromator



Subtractive double monochromator

Edinburgh Instruments Statement: "The instrument comes standard with a R928P PMT detector in a cooled housing which covers a range from 200 nm – 870 nm."

OLIS Response:

One presumes this detector is used in its photon counting mode.

Retail List Price for US customers (December 2019):

CPL ONLY:

Edinburgh Instruments: over $125,000 OLIS CPL Solo: under $100,000