



***Should Circularly Polarized
Luminescence (CPL) systems have an excitation
monochromator?***

Let us look first at the models with scanning excitation, including the OLIS DSM 172, OLIS DSM 245, and Jasco CPL-300.

These three instrument systems offer the user the convenience of selecting any wavelength from say 200-800 nm to excite the sample.

Thus, the advantage is convenience in selecting an excitation wavelength.

The disadvantages are:

1. One must use a very bright light source. The three named CPL models use 150-watt xenon lamps. A 150-watt xenon arc lamp is expensive, large, and relatively unstable. Use of this light source is standard for circular dichroism, which both the OLIS DSM 172 and 245 also support. We will see that it is a poor second choice for CPL.
 - a. Because the lamp assembly is expensive, the price of the CPL must reflect this.
 - b. Because the lamp is large, the size of the CPL must reflect this.
 - c. Because the lamp is relatively unstable, it is ill suited for lengthy acquisition.
2. One must use a monochromator to select a wavelength from the broadband xenon arc lamp. The three named CPL models use a double monochromator, which is ideal and necessary for CD but without merit for CPL.
 - a. Use of a double monochromator reduces the light level by roughly 70%, which lowers the potential sensitivity of the system dramatically from what a “150-watt xenon arc lamp” otherwise suggests.
 - b. The monochromator adds to the size of the CPL
 - c. The monochromator adds to the cost of the CPL

Let us now consider the CPL Solo, the small, affordable & exquisitely sensitive CPL

After many years of producing the combination CD and CPL models, our R&D team was testing an idea that required pulsing a light source at 50 kHz to match the 50 kHz modulation of the PEM. They reached for an LED for this test. Almost immediately, they recognized that the LED's intensity was brighter than the illumination from the combination xenon arc lamp and monochromator.

The next OLIS DSM 172 was delivered with our first "LED Tube." The research group quickly recognized the value: **intensity & stability with economy of size & price.**

This was December 2018.

By fall of 2019, the first CPL-only instrument (hence, "CPL Solo") was purchased, which uses (only) a wavelength specific LED as the excitation source.

The advantages are:

1. Brilliant light throughput
2. Effectively perfect stability over seconds, minutes, hours, days
3. Low cost
4. Ease of handling
5. Availability of LEDs of all required wavelengths
6. Ease of refining bandwidth with filter
7. Ease of optimizing intensity electronically from 0-100%
8. Potential for pulsing for phosphorescence lifetime measurements and other applications

The disadvantage is changing from one LED Tube to another to change wavelengths.

- a. This disadvantage goes away if you choose the LED Carousel, which houses up to 8 LEDs so that one can "scan" from one LED (one wavelength) to another. Each CPL Solo can have two LED Carousels. useful to double the excitation intensity by illuminating from both sides of the sample or double the number of excitation wavelengths from 8 to 16.

Yes, we provide LED Tubes with the OLIS DSM 172 and 245, so that owners of these CD and CPL models can use the 150-watt xenon arc source for CD and choose to use it or the LED for CPL.
