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**THORLABS**

## Part# - HPLS245

Item # HPLS245 was discontinued on December 20, 2016. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

### SOLID STATE PLASMA LIGHT SOURCE WITH LIQUID LIGHT GUIDE

- Broad UV to NIR Output Spectrum with High Color Retaining Index
- Integrated Ø3 mm or Ø5 mm Liquid Light Guide
- Lifetime >10,000 Hours



HPLS245



Control Panel



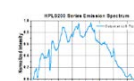
Back View

[Hide Overview](#)

## OVERVIEW

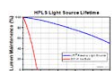
### Features

- Output Spectrum: 400 - 700 nm
- Broadband Light Source Coupled to a Liquid Light Guide (LLG)
  - HPLS243 Includes 3 mm Core Diameter, 1.2 m (4') Long LLG (LLG0338-4)
  - HPLS245 Includes 5 mm Core Diameter, 1.2 m (4') Long LLG (LLG0538-4)
- Color Rendering Index (CRI) of 94 (Measured Before LLG)
- Dimming Range: 30 - 100%
- Five Times Longer Lifetime than Conventional Xenon Lamps (>10,000 Hours\*)
- USB 2.0 Connection and Control Software Included
- Power Supply is Included



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[Click for Raw Data](#)

Thorlabs' high-power, solid-state, plasma light sources (LIFI®) combine the best features of solid-state electronics and full spectrum plasma emitters. These light sources use a dielectric resonant cavity to efficiently couple power from a solid-state power amplifier through a high-intensity discharge vessel and into the included Liquid Light Guide. The results are a long life (>10,000 hours\*, or five times longer than a conventional arc lamp) and a complete color spectrum, making this source ideal for applications such as endoscopy, microscopy, and other medical lighting and inspection applications. This unit also offers many additional features including a USB 2.0 control interface and intensity dimming.



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The compact design of the HPLS200 series incorporates a plasma lamp, lamp assembly, and universal (85 - 264 VAC) power supply in one enclosure. The display, controls, and power switch are located on the front of the unit. Lamp ON and intensity can be controlled from the front panel, as well as with the control software. The USB interface, AC cord, and liquid light guide (LLG) mount are located in the rear of the unit. This long-lived plasma lamp is not replaceable by the user; please contact Tech Support for a replacement quote.

The output port of these solid state plasma light sources is equipped with a mount that accepts the included Ø3 mm or Ø5 mm LLG. The light source design

enables airflow and monitoring of the LLG tip temperature, which prevents overheating. To further protect the LLG, a hot mirror is placed just before the LLG tip. A safety system prevents lamp operation if an LLG is not attached.

The broad spectrum of this light source makes it well suited for hyperspectral imaging, as explained in the *Hyperspectral Imaging* tab. For applications that would benefit from a free-space output, Thorlabs offers LIFI-based plasma lamps with free-space emission.

\* The lifetime of >10,000 hours is rated as the time when intensity reaches 50% of the original output.

[Hide Specs](#)

S P E C S

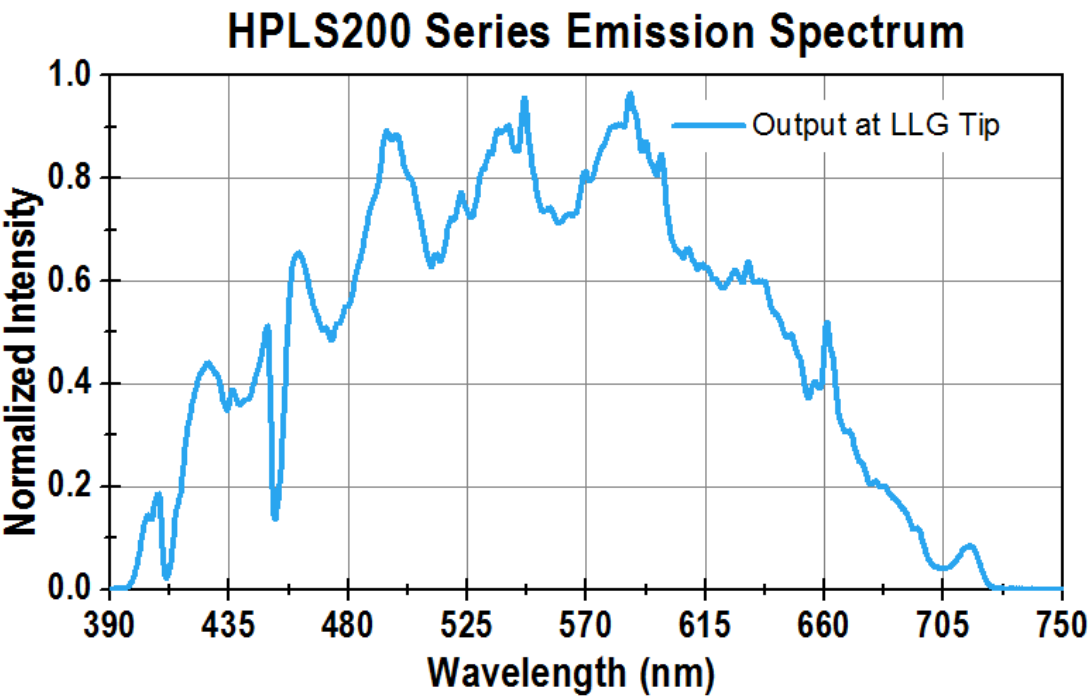
| Item #                                           | HPLS243                                    | HPLS245    |
|--------------------------------------------------|--------------------------------------------|------------|
| Wavelength Range                                 | 400 to 700 nm                              |            |
| Included Liquid Light Guide                      | Ø3 mm Core                                 | Ø5 mm Core |
| Liquid Light Guide (LLG) Mount                   | 3 mm and 5 mm LLG                          |            |
| Color Rendering Index (CRI) <sup>a</sup>         | 94                                         |            |
| Optical Power at LLG Tip Output                  | 2.5 W                                      | 6.0 W      |
| Time to Brightness (Turn on to 90%) <sup>b</sup> | 10 s Typical (30 s Max)                    |            |
| Numerical Aperture (NA)                          | 0.66 <sup>c</sup>                          |            |
| Rated Average Lifetime                           | 10,000 Hours at 50% Intensity <sup>d</sup> |            |
| Dimming Range                                    | 30% to 100%                                |            |
| Correlated Color Temperature                     | 6500 K (Typical)                           |            |
| Electrical                                       |                                            |            |
| AC Line Voltage                                  | 85 VAC to 264 VAC                          |            |
| Nominal Power Use                                | 230 W                                      |            |
| Cooling Fan Control                              | Pulse Width Modulation Controller          |            |
| Physical                                         |                                            |            |
| Dimensions (with Feet Attached)                  | 9.47" x 7.22" x 6.67" (241 x 183 x 169 mm) |            |

- a • Prior to LLG
- b • When powering on an HPLS243 or HPLS245 light source, the beam block shutter closes and reopens once the lamp is fully on and stable. This may take several minutes.
- C • The focusing lens inside the nose cone of the light source has a NA of 0.66. The LLG is placed at the focal point of this lens.
- d • The lifetime of >10,000 hours is rated as the time when intensity reaches 50% of the original output.

[Hide Graphs](#)

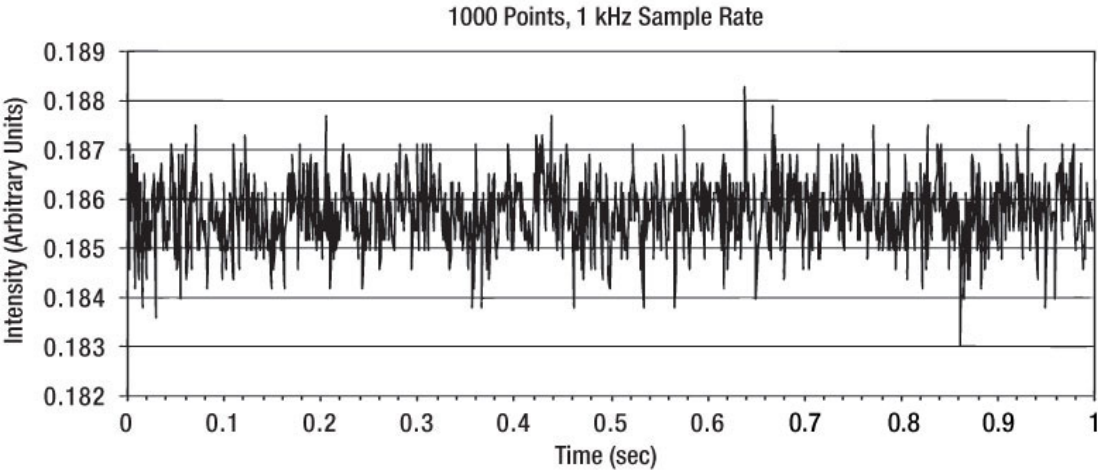
G R A P H S

Emission Spectrum



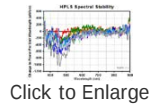
[Click here to download emission spectrum data](#)

### Short-Term Intensity Stability Plot



### Spectral Stability

These curves were obtained by subtracting a starting reference spectrum from the light source spectra measured at various times after startup. To view a stability curve for a specific time, click on the corresponding line in the legend below.



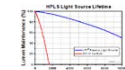
| Line* | Elapsed Time |
|-------|--------------|
|       | 0.25 hr      |
|       | 0.5 hr       |
|       | 0.75 hr      |
|       | 1 hr         |
|       | 2 hrs        |
|       | 3 hrs        |
|       | 4 hrs        |
|       | 5 hrs        |
|       | 24 hrs       |

\* Click Line for Individual Stability Curve

[Hide LIFI® Light Source](#)

LIFI® LIGHT SOURCE

At the heart of LIFI® is the bulb sub-assembly where a sealed bulb is embedded in a dielectric material. This design is more reliable than conventional light sources that insert degradable electrodes into the bulb. The dielectric material serves two purposes: first as a waveguide for the RF energy transmitted by the RF Power Amplifier Circuit and second as an electric field concentrator that focuses energy in the bulb. The energy from the electric field rapidly heats the material in the bulb to a plasma state that emits light of high intensity and full spectrum. The LIFI light source provides a lifetime in excess of 10,000 hours, which is ten times that of a conventional Xenon bulb.



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\*\*The lifetime of >10,000 hours is rated as the time when the intensity reaches 50% of the original output.

[Hide Hyperspectral Imaging](#)

HYPERSPSCTRAL IMAGING

Application Idea: Hyperspectral Imaging

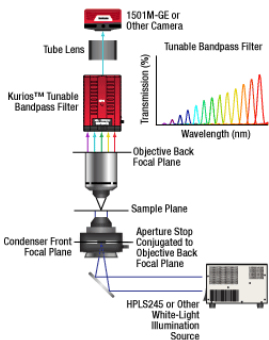
In hyperspectral imaging, a stack of spectrally separated, two-dimensional images is acquired. This technique is frequently used in microscopy, biomedical imaging, and machine vision, as it allows quick sample identification and analysis.

Hyperspectral imaging obtains images with significantly better spectral resolution than that provided by standalone color cameras. Color cameras represent the entire spectral range of an image by using three relatively wide spectral channels—red, green, and blue. In contrast, hyperspectral imaging systems incorporate optical elements such as liquid crystal tunable bandpass filters or diffraction gratings, which create spectral channels with significantly narrower bandwidths.



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A hyperspectral imaging system built using Thorlabs' Cerna Microscopy Platform, KURIOS-VB1 Tunable Bandpass Filter, 1501M-GE Monochrome Scientific Camera, and an illumination source with a spectrum similar to that of the HPLS245. Several components were modified from their stock configuration.



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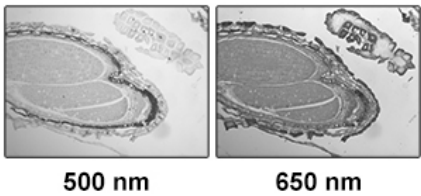
Schematic of Hyperspectral Imaging

Thorlabs' Cerna microscopy platform, Kurios™ tunable filters, and scientific-grade cameras are easily adapted to hyperspectral imaging. The Cerna platform is a modular microscopy system that integrates with Thorlabs' SM lens tube construction systems and supports transmitted light illumination. Kurios tunable filters have SM-threaded interfaces for connections to the Cerna platform and our cameras. In addition, Kurios filters include software and a benchtop controller with external triggers, which enable fast, automated, synchronized wavelength switching and image capture.

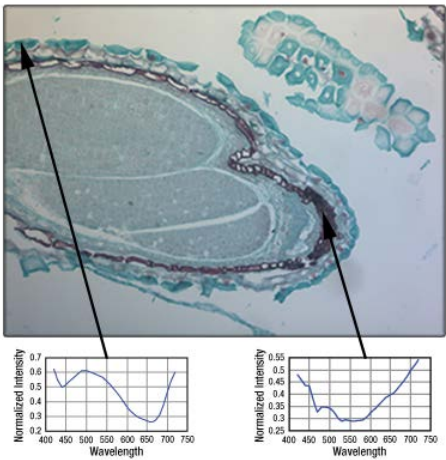
Example Image Stack

The data in the images and video below demonstrate the hyperspectral imaging technique. Figure 1 depicts two images of a mature *capsella bursa-pastoris* embryo (also known as shepherd's-purse) taken with a Kurios filter set to center wavelengths of 500 nm and 650 nm. These two images show that an entire field of view is acquired at each spectral channel. Figure 2 is a video containing 31 images of the same sample, taken at center wavelengths from 420 nm to 730 nm in 10 nm steps. (10 nm is not the spectral resolution; the spectral resolution is set by the FWHM bandwidth at each wavelength.) In Figure 3, images from each spectral channel are used to determine the color of each pixel and assemble a color image. Figure 3 also demonstrates that a broadband spectrum is acquired at each pixel, permitting spectroscopic identification of different sample features within the field of view.

Kurios tunable filters offer a number of advantages for hyperspectral imaging. Unlike approaches that rely upon angle-tunable filters or manual filter swapping, Kurios filters use no moving parts, enabling vibrationless wavelength switching on millisecond timescales. Because the filter is not moved or exchanged during the measurement, the data is not subject to "pixel shift" image registration issues. Our filters also include software and a benchtop controller with external triggers, making them easy to integrate with data acquisition and analysis programs.



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**Figure 1:** Two images of a mature *capsella bursa-pastoris* embryo taken at different center wavelengths. The entire field of view is acquired for each spectral channel.



Click to Enlarge  
**Figure 3:** A color image of the mature *capsella bursa-pastoris* embryo, assembled using the entire field of view acquired in each spectral channel, as shown in Figure 1. By acquiring across multiple channels, a spectrum for each pixel in the image is obtained.

[Hide Software](#)

SOFTWARE

Firmware

Version 2.04

Software

[Hide Solid State Plasma Light Source with Liquid Light Guide](#)

| Solid State Plasma Light Source with Liquid Light Guide |                                                                 |        |              |
|---------------------------------------------------------|-----------------------------------------------------------------|--------|--------------|
| Part Number                                             | Description                                                     | Price  | Availability |
| HPLS243                                                 | Plasma Light Source with Ø3 mm, 4 ft (1.2 m) Liquid Light Guide | \$0.00 | Lead Time    |
| HPLS245                                                 | Plasma Light Source with Ø5 mm, 4 ft (1.2 m) Liquid Light Guide | \$0.00 | Lead Time    |

[Hide Collimating Microscope Adapters](#)

Collimating Microscope Adapters

Thorlabs offers collimation adapters with AR-coated aspheric condenser lenses (EFL = 40 mm) for collimating the output from our High-Power Light Sources. Four different collimator housings are available; each is designed to mate to the illumination port on an Olympus IX/BX, Leica DMI, Zeiss Axioskop, or Nikon Eclipse Ti microscope.

These adapters quickly mount onto the end of either the Ø3 mm or Ø5 mm Liquid Light Guide (LLG). The LLG is secured via a setscrew into the back of the collimator. The addition of these adapters allows the user to incorporate our HPLS200 series lamps into a microscope illumination port.

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| Optic Specifications |                 | Compatible Microscopes           | Olympus BX & IX Microscopes | Leica DMI Microscopes | Zeiss Axioskop Microscopes | Nikon Eclipse Ti Microscopes |
|----------------------|-----------------|----------------------------------|-----------------------------|-----------------------|----------------------------|------------------------------|
| Item #               | ACL5040-A       | Item Photo<br>(Click to Enlarge) |                             |                       |                            |                              |
| AR Coating           | 350 nm - 700 nm |                                  |                             |                       |                            |                              |
| Focal Length         | 40.00 mm ± 5%   |                                  |                             |                       |                            |                              |

|                 |                   |                                                                                  |                                                                                   |                                                                                    |                                                                                    |
|-----------------|-------------------|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                 |                   |  |  |  |  |
| NA              | 0.554             |                                                                                  |                                                                                   |                                                                                    |                                                                                    |
| Magnification   | Infinite          |                                                                                  |                                                                                   |                                                                                    |                                                                                    |
| Surface Quality | 60-40 Scratch-Dig |                                                                                  |                                                                                   |                                                                                    |                                                                                    |
| Centration      | <30 arcmin        |                                                                                  |                                                                                   |                                                                                    |                                                                                    |

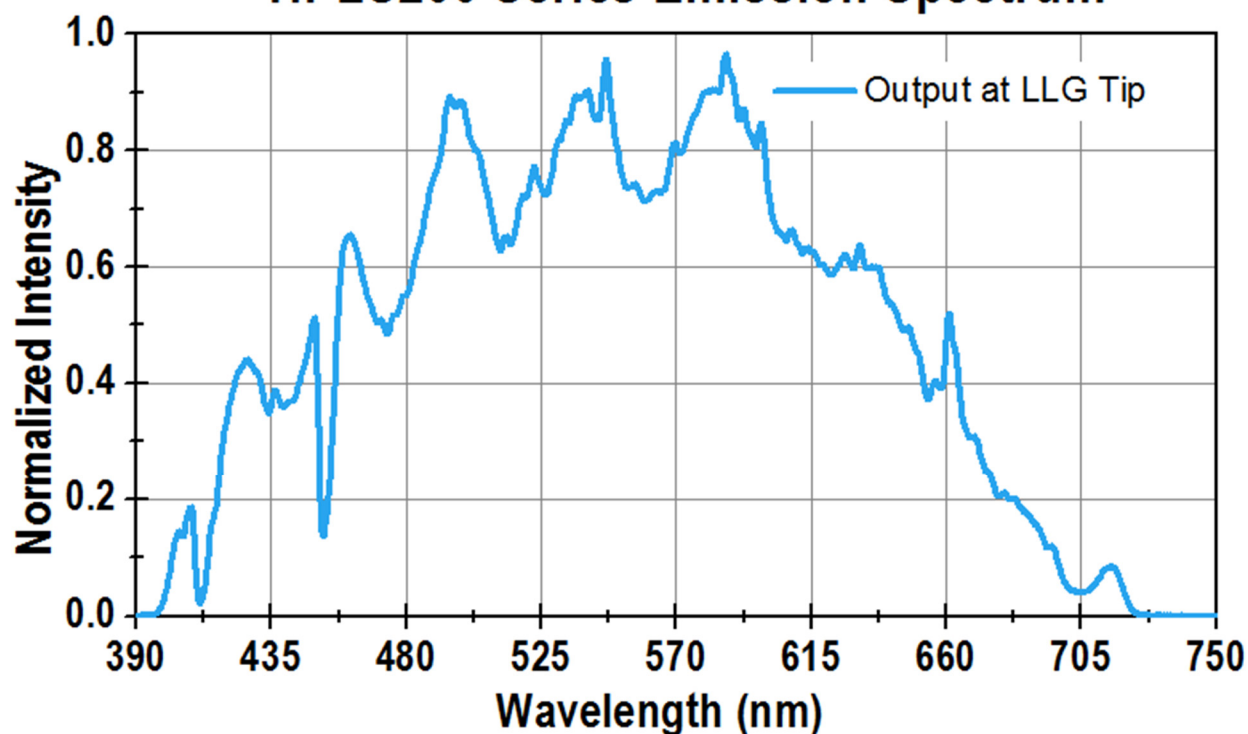
|                     |          |          |          |          |          |          |          |          |
|---------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>Item #</b>       | LLG3A1-A | LLG5A1-A | LLG3A2-A | LLG5A2-A | LLG3A4-A | LLG5A4-A | LLG3A5-A | LLG5A5-A |
| <b>LLG Diameter</b> | 3 mm     | 5 mm     | 3 mm     | 5 mm     | 3 mm     | 5 mm     | 3 mm     | 5 mm     |

| Part Number | Description                                                      | Price  | Availability |
|-------------|------------------------------------------------------------------|--------|--------------|
| LLG3A1-A    | Ø3 mm LLG Collimating Adapter, Olympus BX / IX, ARC: 350-700 nm  | \$0.00 | Today        |
| LLG5A1-A    | Ø5 mm LLG Collimating Adapter, Olympus BX / IX, ARC: 350-700 nm  | \$0.00 | Today        |
| LLG3A2-A    | Ø3 mm LLG Collimating Adapter, Leica DMI, ARC: 350-700 nm        | \$0.00 | Today        |
| LLG5A2-A    | Ø5 mm LLG Collimating Adapter, Leica DMI, ARC: 350-700 nm        | \$0.00 | Today        |
| LLG3A4-A    | Ø3 mm LLG Collimating Adapter, Zeiss Axioskop, ARC: 350-700 nm   | \$0.00 | Today        |
| LLG5A4-A    | Ø5 mm LLG Collimating Adapter, Zeiss Axioskop, ARC: 350-700 nm   | \$0.00 | Today        |
| LLG3A5-A    | Ø3 mm LLG Collimating Adapter, Nikon Eclipse Ti, ARC: 350-700 nm | \$0.00 | Today        |
| LLG5A5-A    | Ø5 mm LLG Collimating Adapter, Nikon Eclipse Ti, ARC: 350-700 nm | \$0.00 | Today        |

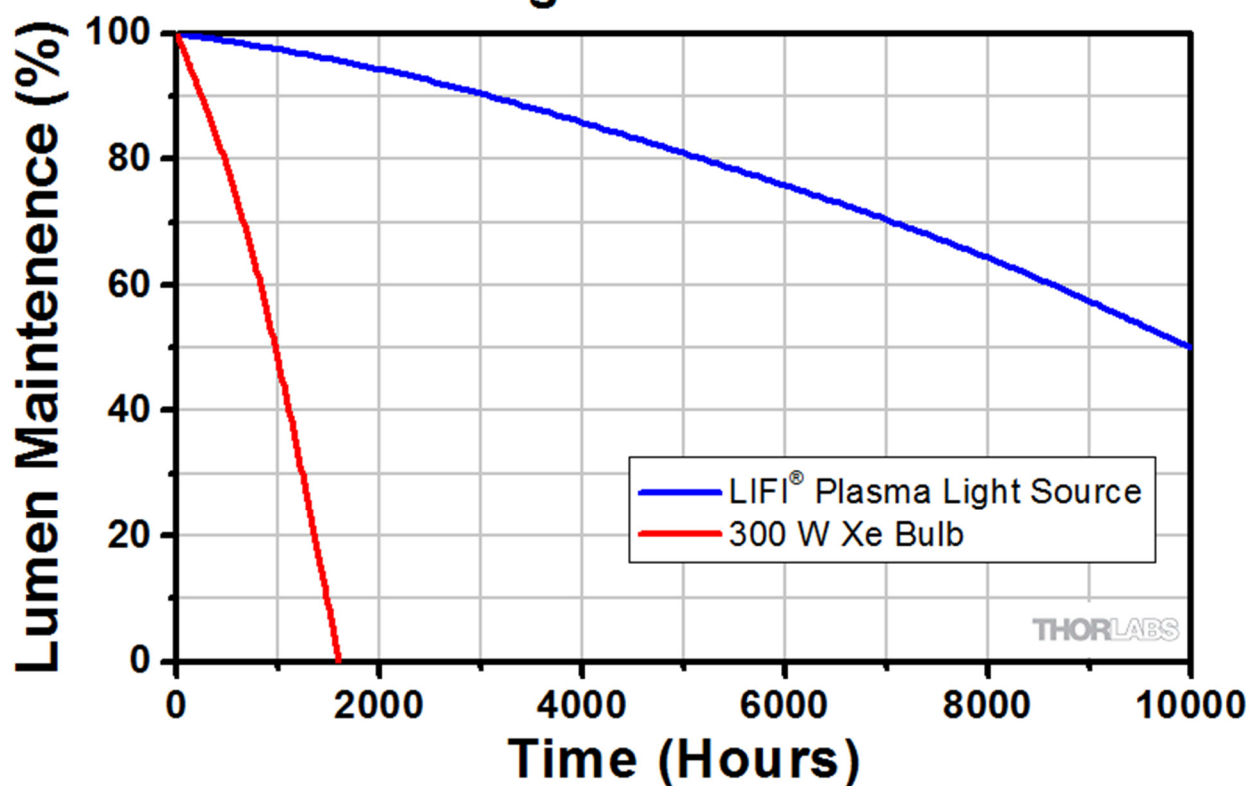
Visit the *Solid State Plasma Light Source with Liquid Light Guide* page for pricing and availability information:  
[https://www.thorlabs.com/newgrouppage9.cfm?objectgroup\\_id=5551](https://www.thorlabs.com/newgrouppage9.cfm?objectgroup_id=5551)



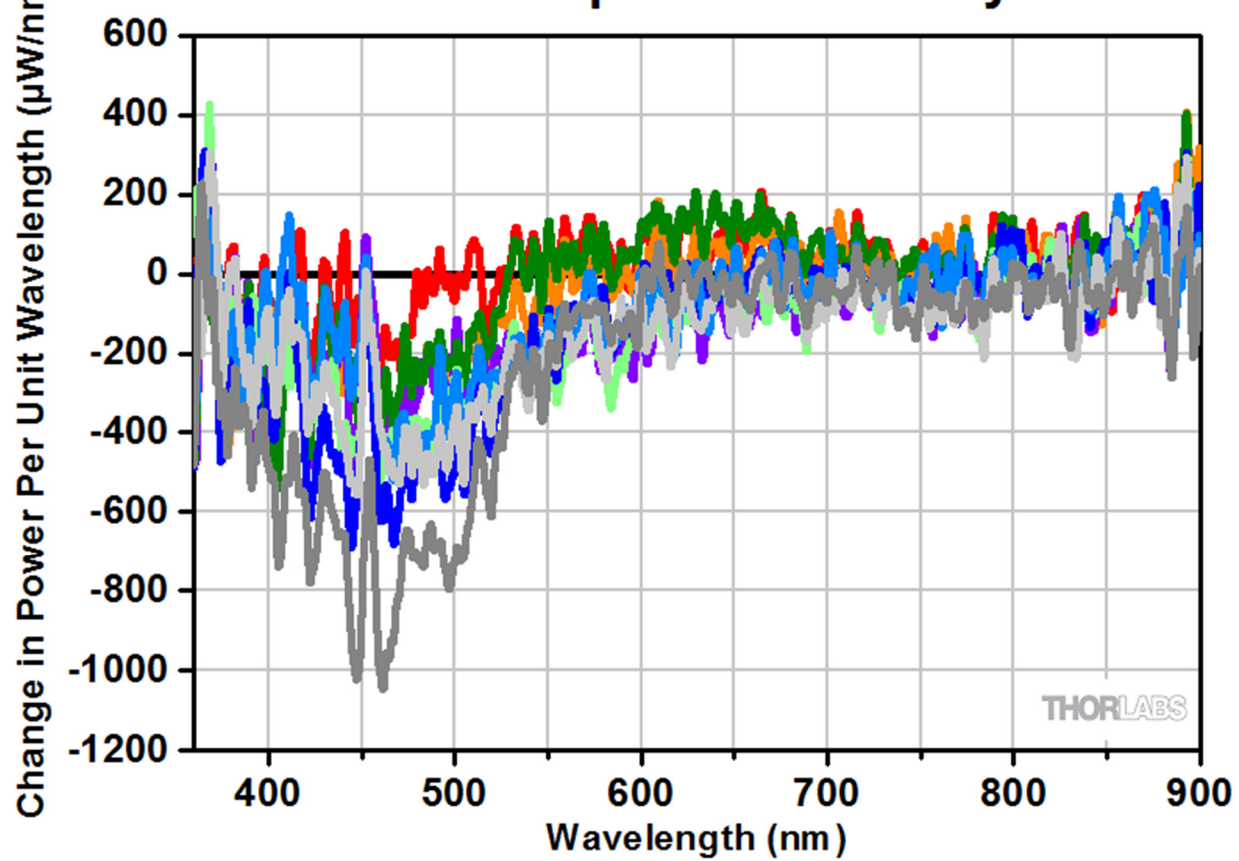
## HPLS200 Series Emission Spectrum

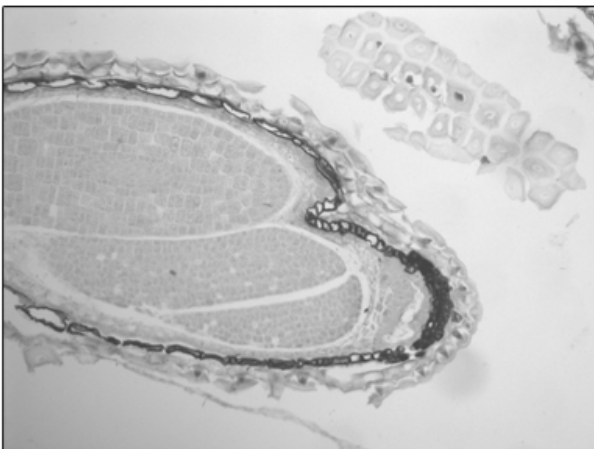


## HPLS Light Source Lifetime

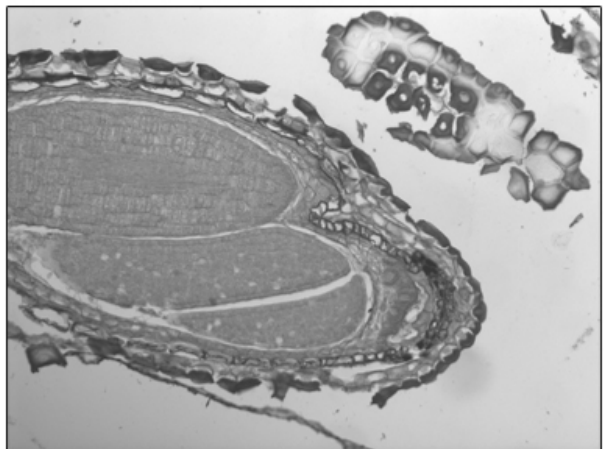


## HPLS Spectral Stability





500 nm



650 nm

