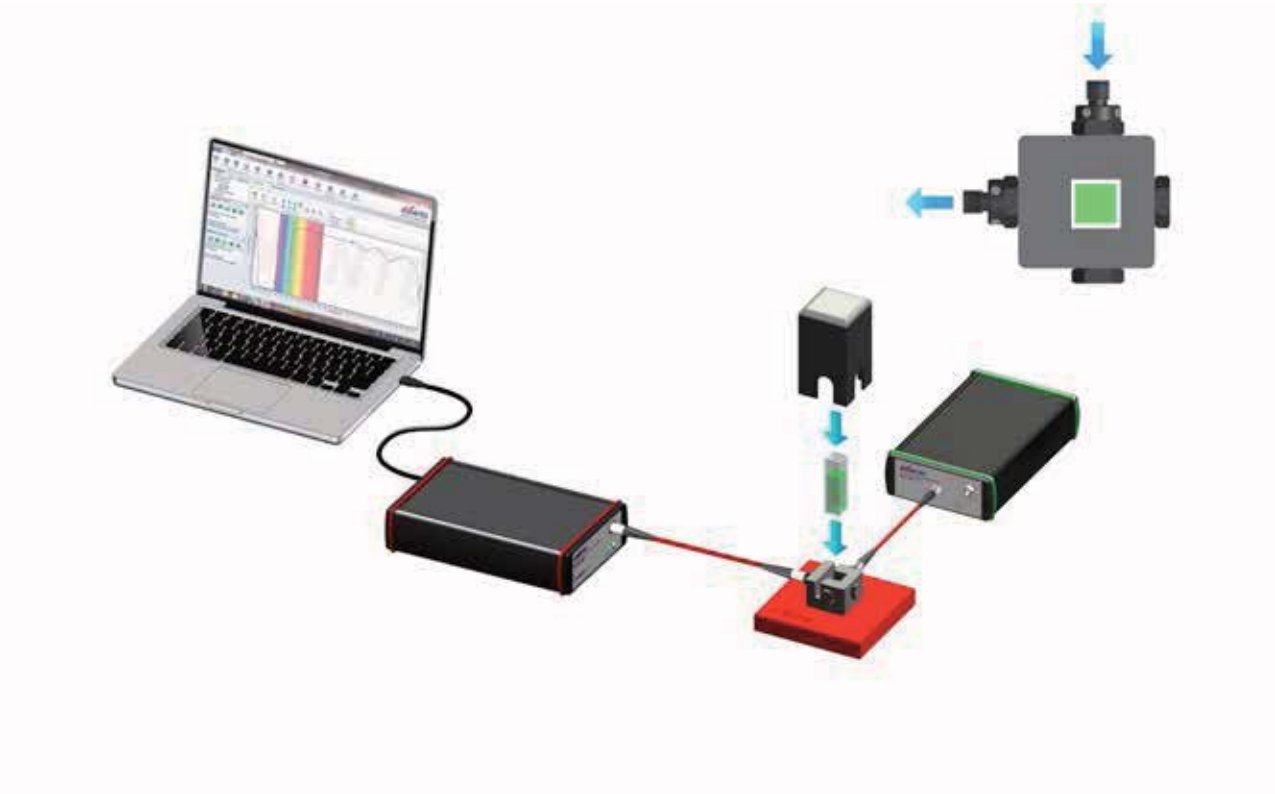
Fluorescence Measurements

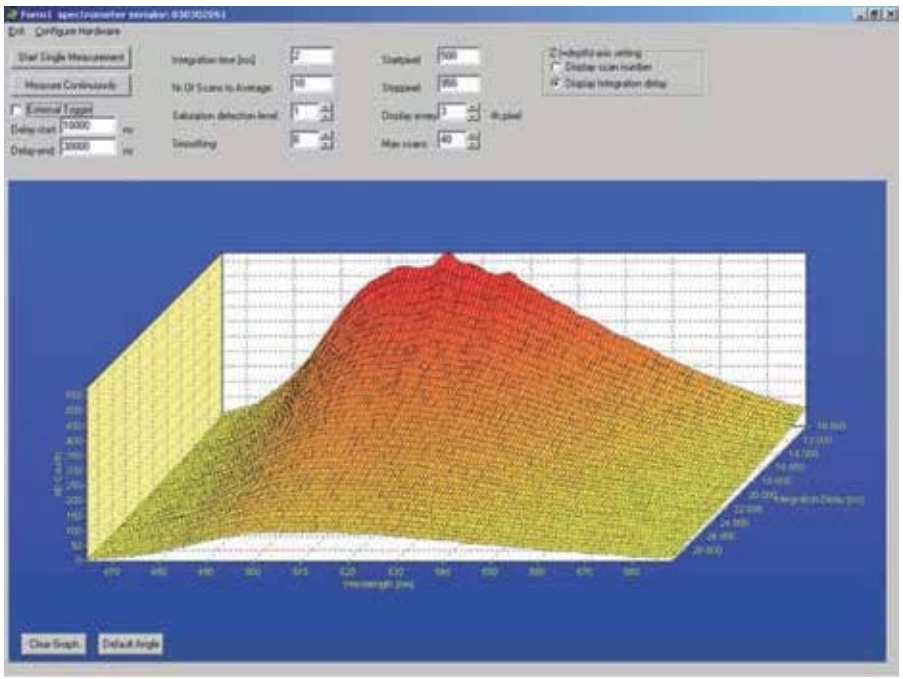
Fluorescence spectroscopy, also known as fluorometry or spectrofluorometry, is a type of electromagnetic spectroscopy, which analyzes fluorescence from a sample. It involves using a beam of light that excites the electrons in molecules of certain compounds and causes them to emit light; typically, but not necessarily, visible light. It is a useful technique in many biological (chlorophyll and carotenoid), biochemical (fluorescence diagnosis of malignancies) and environmental applications. For most fluorescence applications the amount of fluorescence energy emitted is only 3% of the amount of excitation light energy. Fluorescence light has a lower energy (higher wavelength) than the excitation energy and is usually scattered light. This means it emits energy in all directions.

For optimal performance assuming the time acquisition window is not limited, Avantes recommends our AvaSpec-ULS2048LTEC spectrometer for this application, since it can support long integration times often exceeding 5 seconds. When higher-speed acquisition is required, Avantes recommends the AvaSpec-HS2048XL-EVO back-thinned CCD spectrometer. For maximal sensitivity the top model of the SensLine, AvaSpec-HS1024x122-USB2 spectrometer is recommended.
When configuring the measurement setup, preventing excitation light from entering the spectrometer is an important issue.

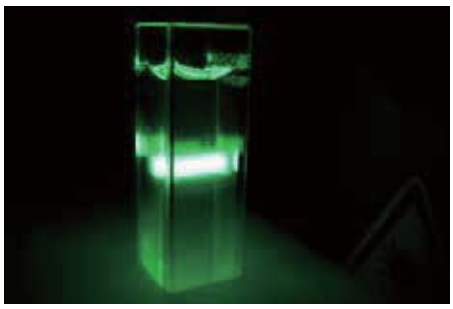
Possible methods to accomplish this, where one does not exclude the other, include:

- Make use of an AvaLight-LED light source which typically has a narrow bandwidth enabling the limitation of excitation to shorter wavelengths that are not part of the emission spectrum
- Use a broadband light source such as the AvaLight-HAL for high output in combination with an (interference) band-pass or low-pass filter.
- Make sure the optical path for excitation light and fluorescence are perpendicular. This means the excitation light will not enter the receiving fiber (use the CUV-UV/VIS-FL or the CUV-DA)
- Use the fluorescence decay time to separate excitation energy from the integration time start pulse. Use a pulsed light source to accomplish this (pulsed laser or AvaLight-XE Xenon flash)





Fluorescence



In spectroscopy fluorescence is one of the more challenging setups, due to the low fluorescent emission (about 3% of the excitation energy). The AvaSpec-ULS2048CL-EVO gives the highest sensitivity and the AvaLight-LED series provides excitation at the requested wavelength.

Typical applications:

- Dyes identification
- Fluorescent lamps
- Diagnosis of malignancies
- Fluorescent labeling

Spectrometer	AvaSpec-HS2048XL-EVO	Grating VA (350-1000nm) 200 µm slit, DCL-UV/VIS-200, OSC AvaSoft-Full
Light source	AvaLight-LEDxxx	PS-12V/1.0A
Fiber optics	FCR-UVIR200/600-2-IND FCR-FLTIP-IND	

Pre-configured spectrometers can be shipped within 24 hours