Characterization of optical filters using GoyaLab devices

Introduction

Band-pass, short-pass, long-pass, edge or Notch, all of them are optical filters. They are essential components for optical systems. Each of them has very specific properties and will allow to keep or remove a part of a spectrum.

Improper selection of your optical components can have a detrimental impact on your optical system. Without the reference transmission spectra of a filter id associated to a manufacturer lot number, it's easy to select the wrong one! Everyone has already been confronted, at least once, to a non-labelled, non-marked filter placed on an optical table.

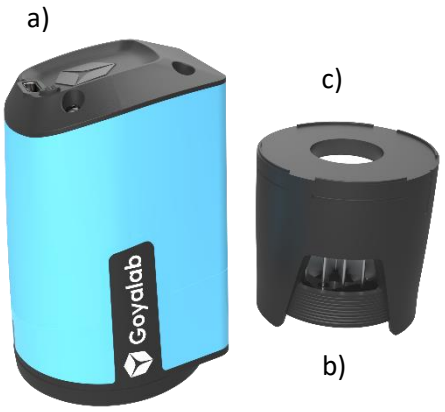
The common method to characterize (or recharacterize) optical filters consists in using expensive laboratory benchtop spectrometers (most of the time non easily available as shared between different labs). This is time-consuming, expensive, and not always easy to use.

GoyaLab offers an easy, fast and affordable solution: GoyaLab has developed a compact device to characterize filters based on its visible spectrometer, the IndiGo and on its visible light source: the GoLight.

Characterization setup

The filter characterization kit is composed of 3 parts as presented in Figure 1:

- The IndiGo: a visible spectrometer (Figure 1- a) with a spectral range going from 380 up to 780nm with a resolution below 1.5nm
- The GoLight (Figure 1-b), a visible external light source powered by USB-C with a spectrum (range 400-900nm)
- A kit of mechanical adapter (Figure 1-c) for round (SM1&SM2) and square filters.



The characterization of a filter consists in measuring the optical transmission percentage. (Ratio between transmitted light vs incident intensity).

Based on this curve, it becomes easy to characterize optical filters (Central Wavelength, FWHM cut-on, cut-off, slope).

The transmission curve is obtained in less than 10s.

Measurement protocol for filter characterization

The first step consists in acquiring the reference spectrum, being the spectrum of the GoLight light source itself, without any filter in the adaptor.

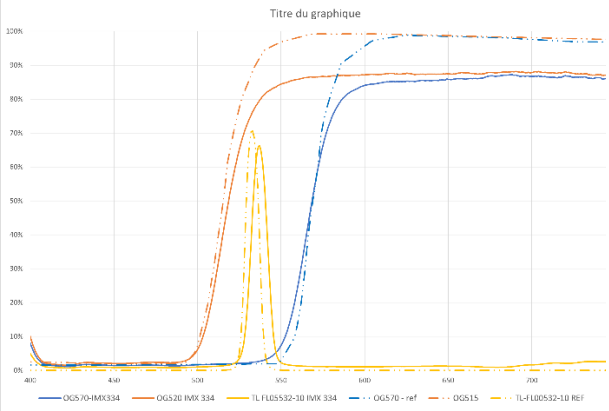
The second step consists in placing the filter in the appropriate filter adapter and measuring its transmission curve.

GoyaLab SAS - contact@goyalab.fr - www.goyalab.com
Institut d'optique d'Aquitaine, rue François Mitterrand - 33400 Talence - France

Finally, based on the shape of the curve, the software provides the optical filter characteristics.

These characteristics can be compared to the reference one from the manufacturer.

Here are some tests performed:



.

Conclusion

GoyaLab solution, combination of a compact spectrometer, the IndiGo and a compact light source, the GoLight is an efficient and precise solution to characterize optical filters

The compact and easy to use design of the IndiGo, combined with the GoLight accessory, offers a great solution for characterizing optical filters quickly and efficiently and at a reasonable cost.