Laser Wavelength Measurement using a Colored Filter Glass

TECH NOTE

ILX Lightwave has developed a wavelength measurement technology based on the transmission verses wavelength characteristics of colored filter glass. (See Graph 1). While some wavelength measurements require the picometer level accuracy and resolution available from complex interferometric techniques, many test requirements can be well supported with the 1 nm accuracy and 0.1 nm resolution available from this simpler technique.

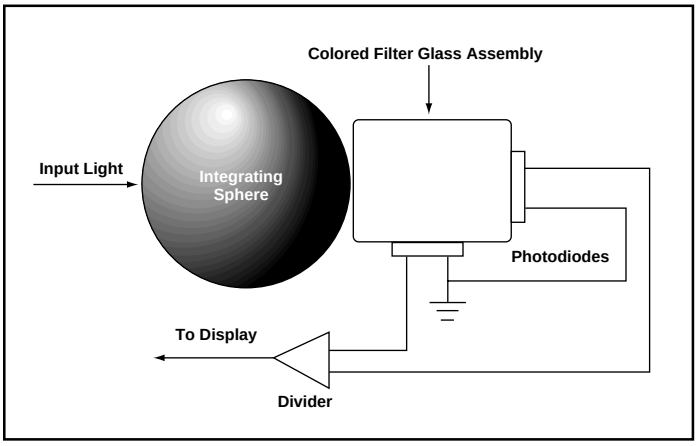


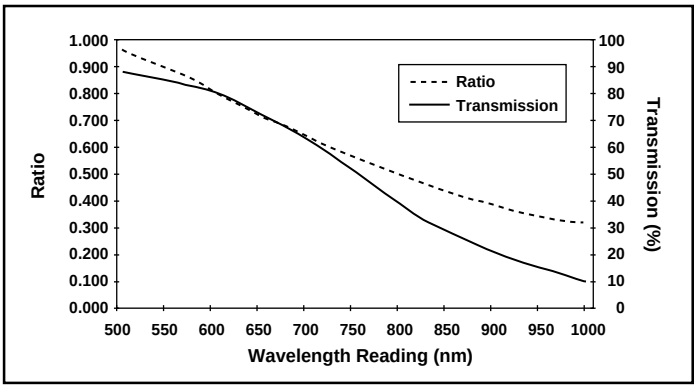
Figure 1. Colored Filter Glass Assembly.

MEASUREMENT SETUP

Light is coupled into the colored filter glass assembly by an integrating sphere, as illustrated in Figure 1. The sphere makes it easy to couple light even from diverging sources. Other wavelength measurement instruments must use a single mode optical fiber since the light input must be mode-matched to the optics.

The light exits the integrating sphere and passes through the precisely characterized colored filter glass assembly. The two photodiodes attached to the assembly generate independent photocurrents. The ratio of these two currents is wavelength dependent, as illustrated in Graph 1.

This ratio is then translated to a wavelength using a calibration lookup table stored with each colored filter glass assembly. This number is then transmitted to the display electronics.



Graph 1. Transmission and Ration Curve for a Typical Colored Glass Filter.