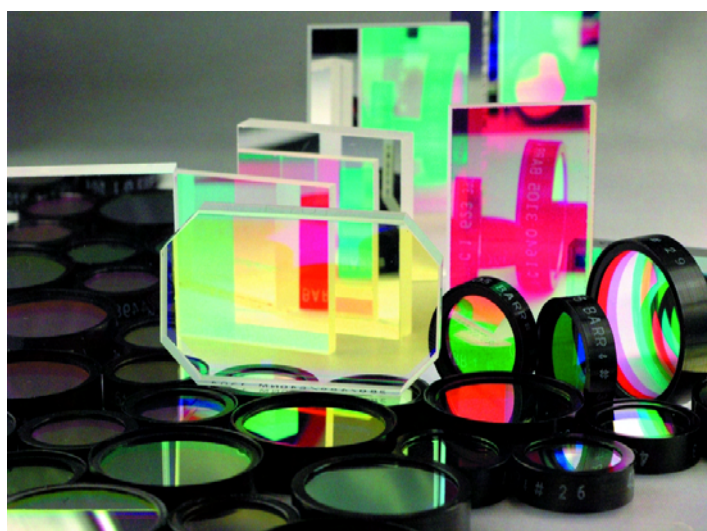


CUSTOM, PRECISION OPTICAL INTERFERENCE FILTERS FOR FLUORESCENCE-BASED SPECTROSCOPY APPLICATIONS

Overview:

Barr is a recognized industry leader in the design and manufacture of precision optical filters for fluorescence-based spectroscopic applications, supplying filters in small, prototype quantity as well as in large OEM quantity. All filters are designed to customer specifications.

With Barr's unique organizational structure you are placed in direct contact with Barr's filter engineering design team during the entire process of specifying, designing, and manufacturing the optical filter. In this way Barr can provide the best optical filter solution for any particular fluorescence-based application.



Barr's advanced coating deposition technologies have been applied to produce optical interference filters well suited for state-of-the-art Fluorescence-based applications. Some related noteworthy filter technology innovations at Barr include:

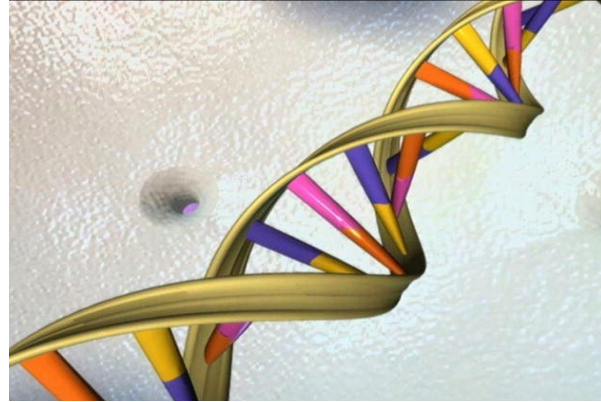
- High performance, custom-designed Excitation (EX) and Emission (EM) filters showing high spectral throughput within passbands and minimal inter-band spectral crosstalk.
- EX and EM filters with steep slopes, typically on the order of 1% or better from OD 5.0 to OD 0.3 and deep out-of-band blocking characteristics over detector responsivity range.
- Customization of passband characteristics to provide best EX and EM transmission characteristics for specific excitation sources and fluorophores.
- Filters showing superior environmental durability characteristics including wavelength temperature stability and humidity resistance.
- Image quality filters for fluorescence applications exhibiting low wavefront distortion and superior surface quality.

Available Filter Types:

- EX and EM filters
- Dichroic Beamsplitters
- Single-Line and Multi-line Rugate Notch Laser Rejection Filters and Edge-type Laser Reflection Filters

Typical Fluorescence-based applications where Barr optical filters are utilized:

- DNA Sequencing
- Flow Cytometry
- Microplate Reader
- Fluorescence Microscopy
- Fluorescence Imaging
- Electrophoresis Scanners



Physical and Environmental Durability Properties:

Filter dimensions

- available in a wide range of sizes and shapes including miniature sizes
- supplied round with or without ring, or rectangular in shape
- conformance to tight dimensional tolerances

Environmental Durability

- filters available with durable oxide-type coatings
- coatings with low thermal shift ($< 4 \times 10^{-6}$ nm/deg C)
- wide operating temperature range

Wavefront Control

- filters can be constructed to specified transmitted or reflected wavefront properties for imaging applications

Surface Quality

- Conformance to visual inspection standards routinely achieved for MIL-O-13830, MIL-F-48616
- 60/40 Scratch/Dig routinely supplied

Key Spectral Properties of Barr Optical Filters for Fluorescence-based Applications:

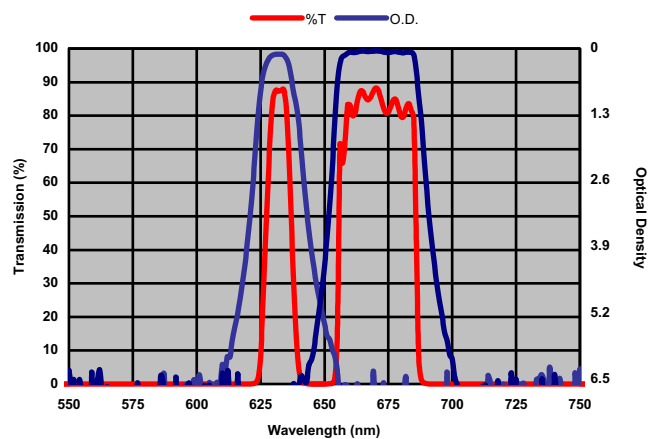
Wavelength range

Barr routinely produces custom optical interference filters for Fluorescence-based applications over a wide spectral range; from the ultraviolet through the near infrared.

EX and EM filters

- high throughput
- deep blocking ($> OD\ 6$) over detector responsivity range
- low crosstalk between EX and EM passbands
- image quality available
- low-to-no autofluorescence

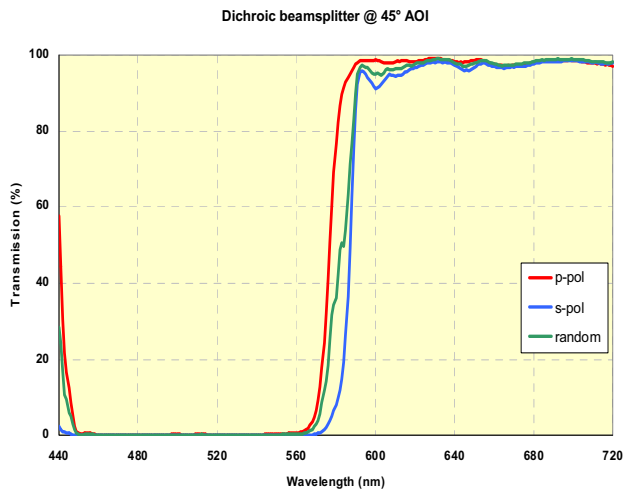
Typical Excitation/Emission Cy5 Filter Set



Key Spectral Properties of Barr Optical Filters for Fluorescence-based Applications: (continued)

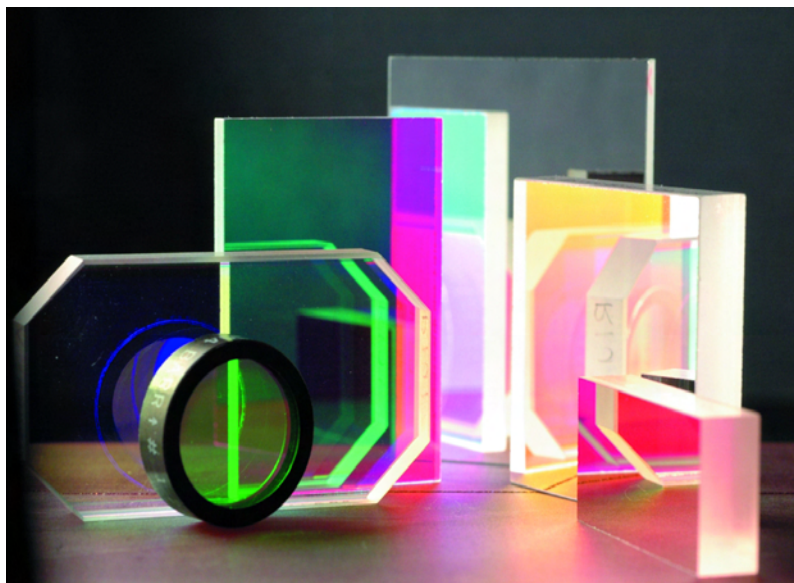
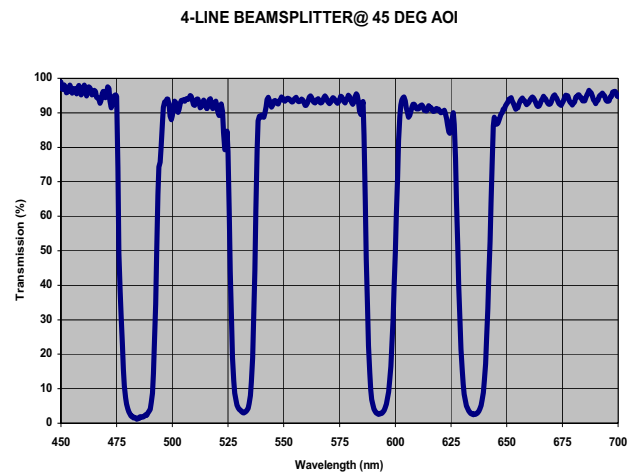
Dichroic Beamsplitters

- low polarization splitting
- steep slope
- optimized for high R%, high T%
- designed for use at 45 deg AOI or at other angle
- low-to-no autofluorescence



Rugate Notch Polychroic Beamsplitters

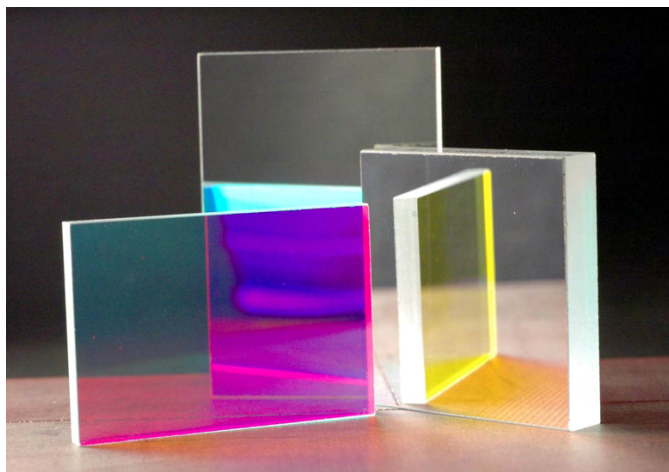
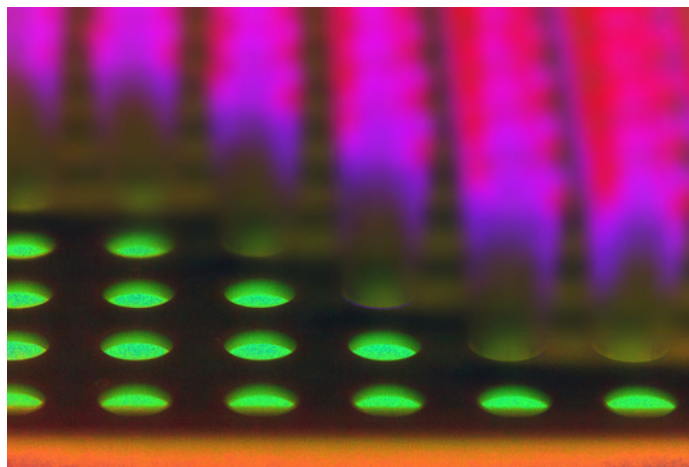
- high reflectance at multiple laser lines
- high transmission over broad spectral range
- designed for use at 45 deg AOI or at other angle
- low-to-no autofluorescence



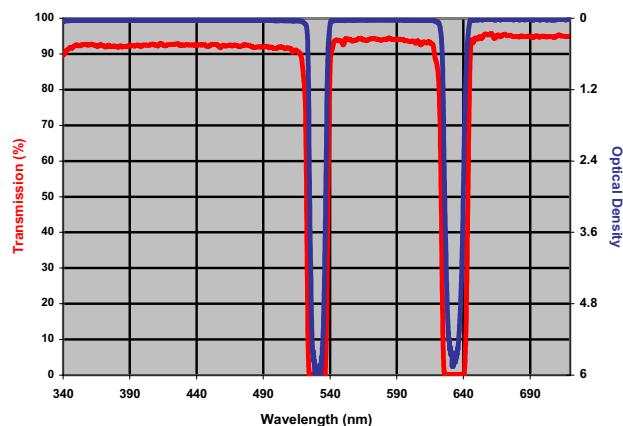
Key Spectral Properties of Barr Optical Filters for Fluorescence-based Applications: (continued)

Rugate Notch Laser Rejection Filter (Single- and Multi-line)

- deep blocking at laser lines (Measured OD6 +)
- steep slopes
- high transmission from near 300nm to 2500nm and beyond
- typical FWHM Bandwidth 3 to 5% of center wavelength
- low ripple in transmission band
- designed for use at normal or non-normal incidence
- low-to-no autofluorescence



2-Line Rugate Notch Filter



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