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FILTERS FOR LASER APPLICATIONS

STEEP EDGE FILTERS

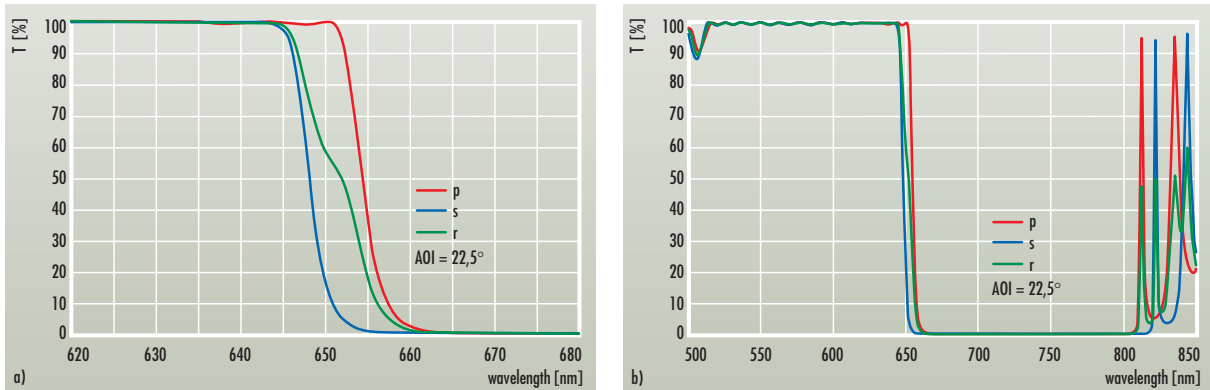


Figure 1: Transmittance spectra (detail (a) and spectral overview (b)) of a steep edge short wavelength pass filter for use as combiner for laser diodes at 635nm and 670nm (HRr(22.5°, 670nm) > 99.9% + HTr(22.5°, 635nm) > 98%, rear side AR coated)

For more information on combiners for diode lasers see pages 12–13.

For steep edge filters used as pump mirrors for solid state lasers on the basis of Yb-doped materials (e.g. Yb:YAG, Yb:KGW, Yb-doped fibers) see pages 16–17.

VARIABLE FILTERS FOR LASER APPLICATIONS

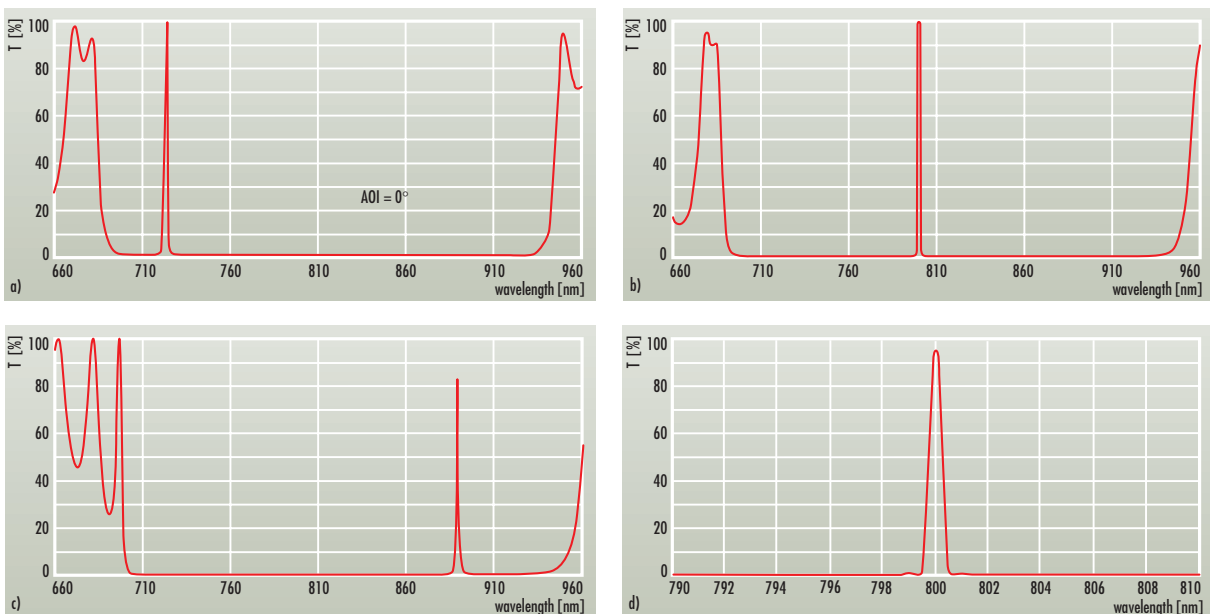


Figure 2: Transmittance spectra of a laterally variable filter for the wavelength range of the Ti:Sapphire laser taken on the short wavelength side (a), in the center (b, d) and on the long wavelength side (c) of the filter

Special features:

- Linear variation of the filter wavelength with the position on the filter
- Similar designs for the VIS range (400–700nm) and for the NIR range (up to 1800nm)
- Blocking: $T < 10^{-3}$, block band: ~200nm in the Ti-Sapphire range
- Maximum transmittance: 90%, FWHM: 1nm
- Shape: rectangular, size: 10 ... 20mm long, 5 ... 10mm broad

NARROWBAND REFLECTANCE FILTERS

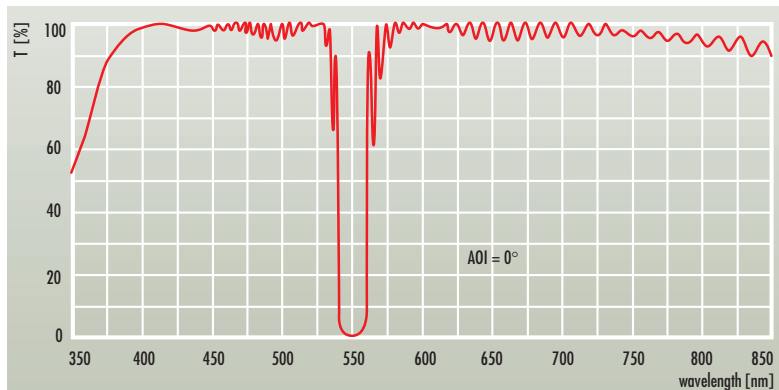


Figure 3: Transmittance spectrum of a narrowband reflectance filter for 550nm

Filters of this type are ideal for the blocking of a single laser line while preserving a high and relatively constant transmission over the whole visible range.

Special features:

- Spectral width of the reflectance band: 3% (e.g. $T < 1\%$ from 543–559nm)
- $T < 0.1\%$ at the center wavelength
- $T > 90\%$ throughout the visible spectral range

OEM PRODUCTION OF SPECIAL FILTERS FOR LASER APPLICATIONS

- Filters for laser applications require excellent spectral quality and high damage thresholds.
- Spectral position of cut on / cut off wavelengths or reflectance and transmittance bands according to customer specifications
- Steep edge filters on laser crystals
- Spectral tolerance 1% of centre wavelength
The spectral position of the edge may vary by 1% between the coating runs while the steepness of the edge remains unchanged. The spectral performance of the filter can be optimized by tilting the filter. Tilting results in a shift of the edge towards shorter wavelengths. Thus, the edge position of a filter with the edge at longer wavelengths than required can be adjusted for its best performance by angle tuning.
- Sizes and shapes:
Edge filters can be produced on round or rectangular substrates up to diameters of 38.1 mm (1.5 inch). Also the production of miniature size filters (e.g. $3 \times 3 \text{ mm}^2$) is possible. Narrow band reflectance filters are limited to diameters of 25.4 mm (1 inch).
- High thermal and climatical stability