

Polarization-independent Beam Splitters

SPECIAL COATINGS MAKE THE IMPOSSIBLE POSSIBLE

Dielectrically coated beam splitters separate a laser (usually at an angle of incidence of 45°) into two beams. The user can choose the amount of power split into each beam. Until recently, however, for an angle of incidence of 45° the user could only specify performance for one polarization state. For traditional high power coatings the degree of reflection depends on the polarization. If, for example, 50% of the p-polarized light is to be reflected, then a beam splitter $R_p=50\%$ will be used. With s-polarized light, the same coating achieves a reflection of $R_s=82\%$ (or a transmission of $T_s=18\%$). Unpolarized light results in a reflection of $R_u=(50\%+82\%)/2=66\%$ (see Figure 1).

This peculiarity of dielectric coatings significantly limits the use of beam splitters. The user must determine, in advance, which polarization should be managed inside the setup. Subsequent changes to the polarization result in a replacement of the beam splitter. Furthermore, certain applications require 50% beam splitters that perform equally for both polarization states.

Thanks to novel IAD (ion assisted deposition) coatings LASER COMPONENTS can offer designs engineered to reflect p-polarized and s-polarized light with identical performance. These beam splitters are also optimally suited for circularly polarized light. Figure 2 shows the coating for the most common case of $R_p=R_s=50\%$. Other degrees of reflection are available upon request. These coatings are suitable for high power lasers and available for all common laser wavelengths. LASER COMPONENTS will gladly recommend techniques to optimize your experimental setup.

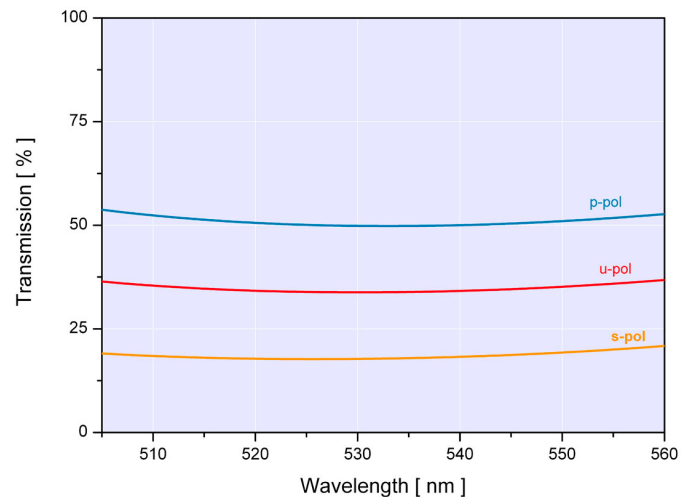


Figure 1: Beam splitter coating with $R=50\%$ for 532 nm, optimized for only p-polarized light.

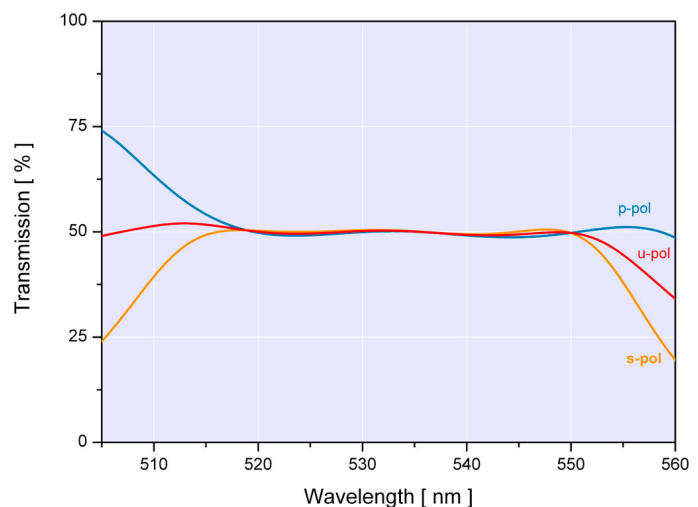


Figure 2: Polarization-independent beam splitter coating with $R_p=R_s=50\%$ for 532 nm.

