

# High Performance Thin Film Optical Coatings

## Technical Reference Document

09/13

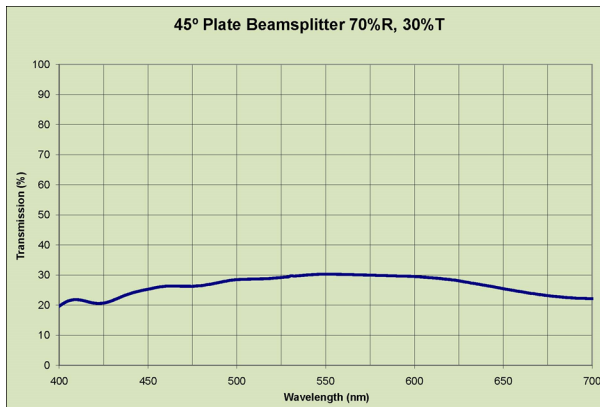
## Coatings Capabilities

### Beam Splitters - Plate and Cube; Standard and Polarizing

Beam Splitter (BS) is a term used to describe various coatings which divide a beam of light into separate beams. Dichroic filters are often called beam splitters. In this section, we will be describing beam splitters that divide light at each wavelength of interest into two separate beams. These beam splitters are typically designed for an incident angle around 45 degrees from normal.

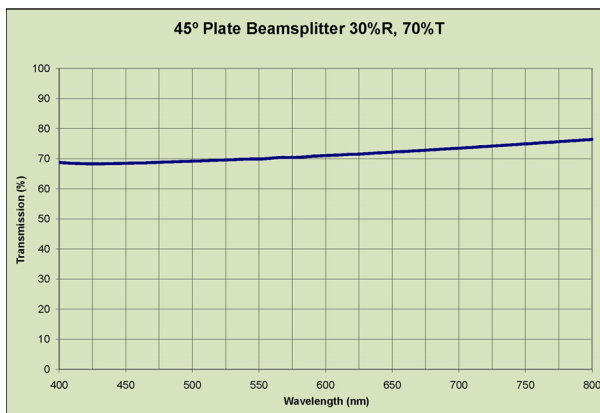
Partially transmitting metals also make very useful beam splitter coatings. Two common metals used for this purpose are Inconel and chrome. Metal beam splitters are often very broad and can cover a much wider spectrum of wavelengths than their dielectric counterparts.

Dielectric coatings as described here have the advantage of being non-absorbing and so allow for greater throughput of energy. These dichroic filters for example, have a dielectric coating that can be used for a 50/50 beam splitter. In contrast, Inconel is limited to 30% transmission and 30% reflection due to the absorption inherent in the metal film. Standard dielectric beam splitter coatings include 30/70, 50/50, and 70/30. We welcome inquiries regarding any custom requirements you may have.



#### **\*45-Degree Plate Beam Splitter 70%R, 30%T**

This coating reflects 70% and transmits 30% ( $\pm 10\%$ ) from 450-650nm at 45 degrees angle of incidence.



#### **\*45-Degree Plate Beam Splitter 30%R, 70%T**

This coating transmits 70% and reflects 30% ( $\pm 10\%$ ) from 450-650nm at 45 degrees angle of incidence.

\*Average transmittance and reflectance.

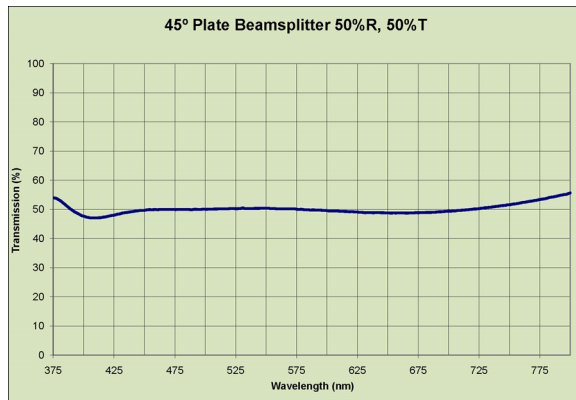
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## Coatings Capabilities

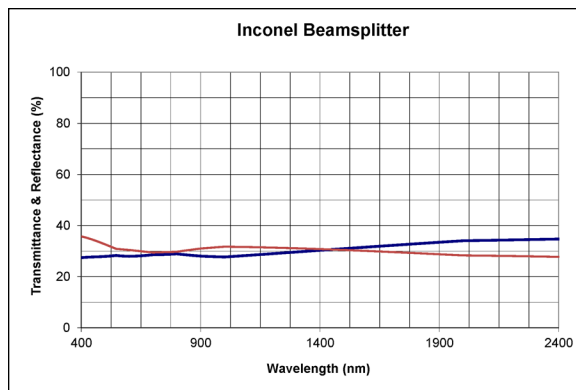
### Beam Splitters - Plate and Cube; Standard and Polarizing - *continued*



#### \*45-Degree Plate Beam Splitter 50%R, 50%T

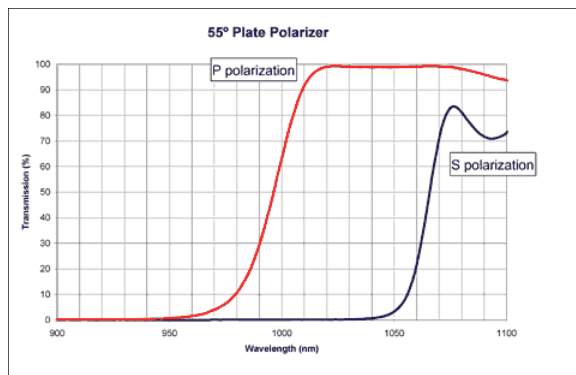
This coating is designed to transmit 50% and reflect 50%  $\pm 10\%$  from 425-650nm at 45 degrees angle of incidence.

\*Average transmittance and reflectance.



#### Inconel Beam Splitter

Partially transmitting metals make very useful beam splitter coatings. Two common metals used for this purpose are Inconel and chrome. Metal beam splitters are often very broad and can cover a much wider spectrum of wavelengths than their dielectric counterparts. In this example, a single layer of Inconel with approximately equal reflectance and transmittance is shown.



#### 55-Degree Plate Polarizer

This coating provides greater than 97% transmission of "P" polarized light and greater than 97% reflectance of "S" polarized light at single specified wavelength. Generally the angle of incidence is specified between 45 and 65 degrees.

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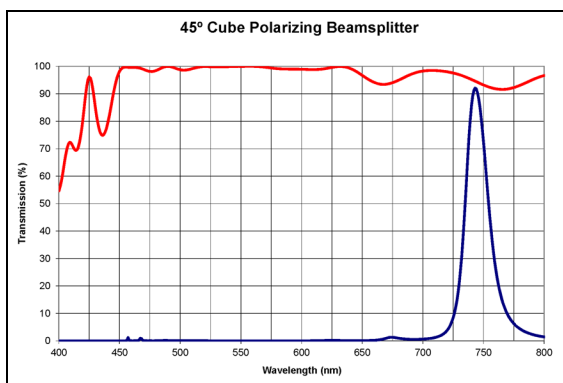
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## Coatings Capabilities

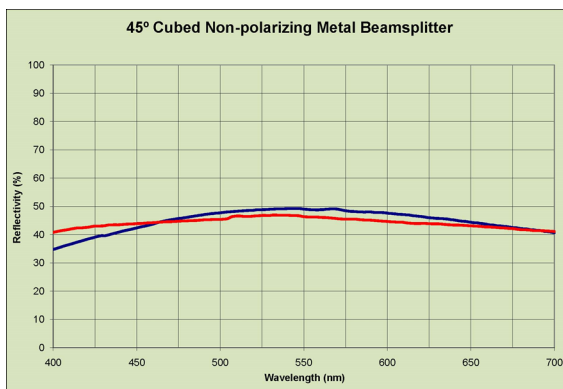
### Beam Splitters - Plate and Cube; Standard and Polarizing (cont.)

**Cube Beam Splitters** - Cube Beam Splitters are especially useful in separating light into component polarizations over a broadband spectra.



### 45-Degree Cube Polarizing Beam Splitter

Typically higher index glass to maximize polarization separation. This example is designed for a substrate refractive index of approximately 1.80.



### 45-Degree Non-Polarizing Hybrid Cubed Beam Splitter

This coating has an average transmission of 45% and 45% reflectance from 475-625nm for both "S" and "P" polarizations.