

# COATING

## APPLICATION-SPECIFIC SOLUTIONS



# COATING

SwissOptic AG, a company of the Jenoptik Group, produces sophisticated coatings for various applications. The spectral range extends from UV (190 nm) to the infrared range (6  $\mu\text{m}$ , metal mirror up to 12  $\mu\text{m}$ ). In addition, we also develop customized solutions and advise you. Environmental- and stress tests of the coatings for the qualification are carried out in-house.

## SUBSTRATE

Typical substrates are:

- ▶ Wide variety of optical and colored glasses
- ▶ Flat glass, lenses and prisms
- ▶ Sapphire, quartz as well as glass ceramic and ceramic
- ▶ Infrared materials such as silicon, germanium and zinc sulfide (ZnS)
- ▶ Plastic limited to Zeonex
- ▶ Substrate size up to 400 x 1,000 mm,  $\varnothing$  400 mm
- ▶ Contract coating on customer substrates on request

## SPECIFICATIONS\*

### General

- ▶ Wavelength ranges for:
  - ▶ Metallic mirror 120 nm–12  $\mu\text{m}$
  - ▶ Dielectric mirror 190 nm–3  $\mu\text{m}$
  - ▶ Filter, beam splitter, black chrome 250 nm–3  $\mu\text{m}$
- ▶ Anti reflection coatings 190 nm–5  $\mu\text{m}$
- ▶ Conductive layers 400 nm–1.6  $\mu\text{m}$
- ▶ Angle of incidence ranges 0–45° typical  
0–85° possible
- ▶ All polarization types are specifiable (p, s and average value)
- ▶ Reflection, transmission and optical density
- ▶ Phase specification
- ▶ Very high LIDT for Pulse and CW laser applications

### Mirrors

- ▶ Metallic, dielectric and hybrid mirrors
- ▶ Narrowband and broadband mirrors
- ▶ Front and back surface mirror
- ▶ Reflection to 99.9 % possible
- ▶ Laser mirrors for one or more wavelengths

### Antireflection coatings

- ▶ Narrow, multi- and wide-band spectral ranges
- ▶ Residual reflection to < 0.1 % possible

### Filters

- ▶ Edge Filters: Long- (LWP) and short pass (SWP)
- ▶ Edge position tolerance from 0.5 % of the nominal wavelength
- ▶ Narrowband filter (T-band) and Notch filters (R-band)
  - ▶ Center position tolerance from 0.2 % of the nominal wavelength
  - ▶ High peak transmittance and high blocking possible
  - ▶ Half width from 2 % of the nominal wavelength
- ▶ Laser protection filter
- ▶ Single and multi-band filters with freely definable widths and positions
- ▶ Graduated variable filters

### Beam splitters

- ▶ Available on a plane-parallel plate or embedded in a cube:
  - ▶ Cemented
  - ▶ Optically contacted
  - ▶ With defined airspace
- ▶ Polarizing beam splitter (PBS)
- ▶ Non-polarizing beamsplitter (NPBS)
- ▶ Neutral beam splitter
- ▶ Narrow, wide or multiple spectral regions with freely definable splitting ratios

### Transparent and electrically conductive layers (ITO)

- ▶ Defined electrical resistance, tolerance  $\pm 20$  %
- ▶ Lowest specification < 17  $\Omega/\text{cm}^2$  for EMI protection
- ▶ Transmission > 80 % in the visible range and > 40 % at 1,550 nm
- ▶ Low reflection < 20 % possible
- ▶ Structuring with mechanical masks
- ▶ Metal contact electrodes

### Absorbing layers

- ▶ Typically made with black chrome layers
- ▶ Chrome-free absorber layers available
- ▶ High blocking, low reflection
- ▶ Narrow- and broadband
- ▶ Efficient from air and/or glass sides
- ▶ Structurable (etch and lift-off processes)

### Layers for non-optical applications

- ▶ Barrier layers, e. g. etch stop
- ▶ Layers to connect components
- ▶ Conductive layers

### Development of customized coatings

### Surface imperfections

- ▶ Assessment according to ISO 10110/MIL-O-13830A/DIN3140
- ▶ Specifications depending on the layer system e.g.:
  - ▶ AR: 5/C3 x 0.025 over  $\varnothing$  25 mm (MIL 20/10)
  - ▶ Filter: 5/C3 x 0.040 over  $\varnothing$  25 mm (MIL 40/20)

\* The following error and tolerance data indicate possible limit values.