

Metallic Mirrors

Surface coatings with high reflection are generally produced with metals or with dielectric thin-film interference systems and also by a combination of metal/dielectric. Metallic and dielectric mirrors differ in their reflectivity and spectral width, but also in hardness, abrasion resistance, laser damage threshold, etc. Metallic mirrors have a relatively large spectral width of about 0.2 to 12 μm and vary greatly in their reflectivity with values between 96% and 60%. With reflection-enhancing dielectric protective coatings, values $> 98\%$ can be achieved with silver, for example.

Materials / Technology

Al, Ag, Au, Cu, Rh, Cr and Ni are used as coating materials for metal mirrors. The reflection-increasing mechanical protective coatings consist of metal oxides or fluorides. Suitable substrates are glass, ceramics, plastics and metal. The coatings are applied by vapor deposition using the electron beam technique. The dense and hard protective layers are applied ion-assisted with a special ion plating technique (Reactive Low-Voltage Ion Plating RLVIP). The RLVIP technique produces a firm bond to the substrate and extremely dense, scratch-resistant layers with almost atomically smooth surfaces.

Aluminum Mirrors

- Environmentally stable, dielectric protective or reflection-increasing layers
- Can be produced on temperature-sensitive substrates
- Not very sensitive to polarization
- Colour-neutral reflection
- Use e.g. in lighting systems in the visible and UV range and in optical instrument engineering



Concave Mirror, coated with aluminum and protective layer

Gold Mirrors

- High reflectivity $> 98\%$ in longer wave range $> 800\text{ nm}$
- Chemically stable
- Not scratch-resistant without protective layer
- With protective layer permanently hard
- Use e.g. as IR mirror

Silver Mirrors

- Highest reflection from the visible to the IR; $R \geq 97\%$ (420 nm) \rightarrow 99% (NIR)
- Environmentally very stable, gastight protective layer
- No polarization effects
- Low angle dependence
- Colour-neutral reflection
- Use e.g. as laser scanner mirror, in sensors, in optical instrument engineering

Chrome Mirrors

- Gray-brown stinging mean reflection $\approx 60\%$
- Hard, scratch-resistant, durable
- Use e.g. as low-glare Car rear view mirror, reticles

Rhodium Mirrors

- Chemically and mechanically very stable
- High resolution with reflection of $\geq 75\%$
- Sterilizable
- Use e.g. as medical mirror like mirrors for dental photography

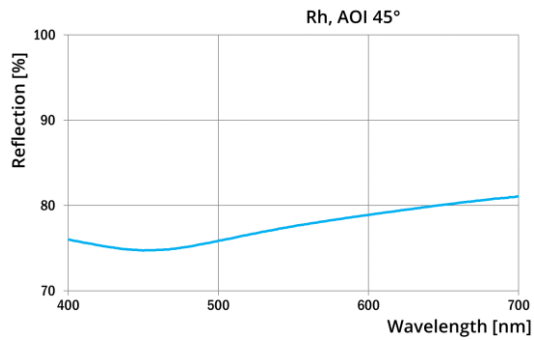
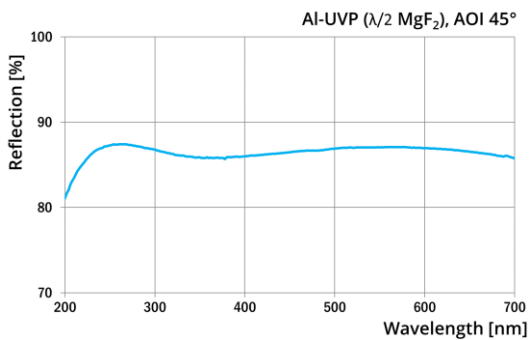
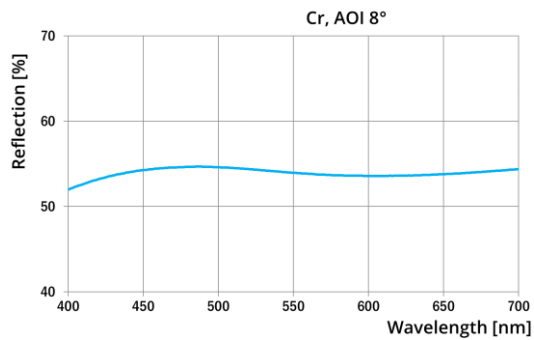
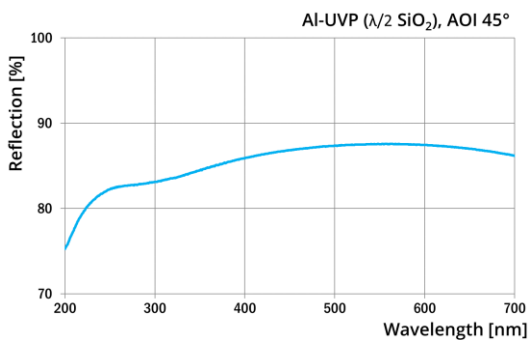
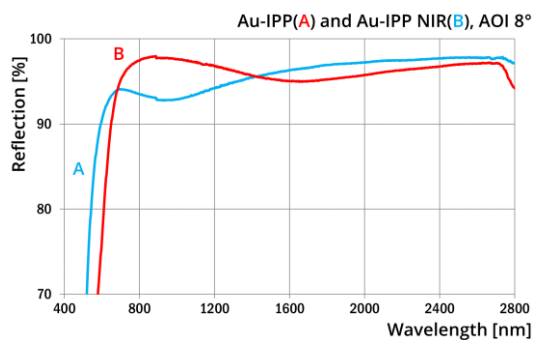
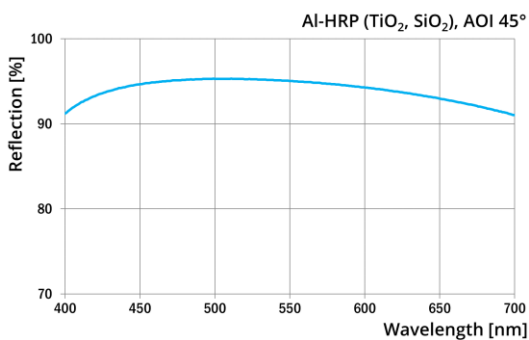
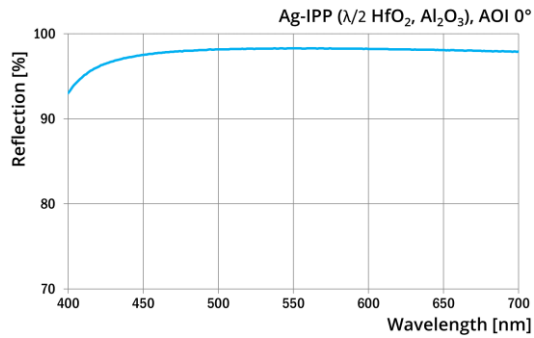
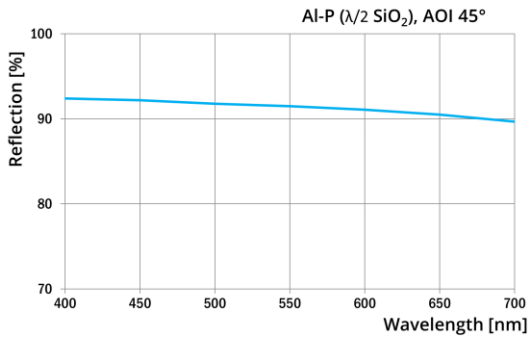
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Al-P = Aluminum with protective layer
 Al-HRP = Aluminum with HR protective layer
 Al-UVP = Aluminum with UV protective layer
 Ag-IPP = Silver with Ion Plating protective layer
 Au-IPP = Gold with Ion Plating protective layer
 Cr = Chrome
 Rh = Rhodium

Typical curves:



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