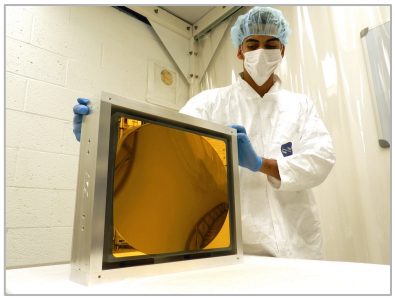
INTRODUCTION

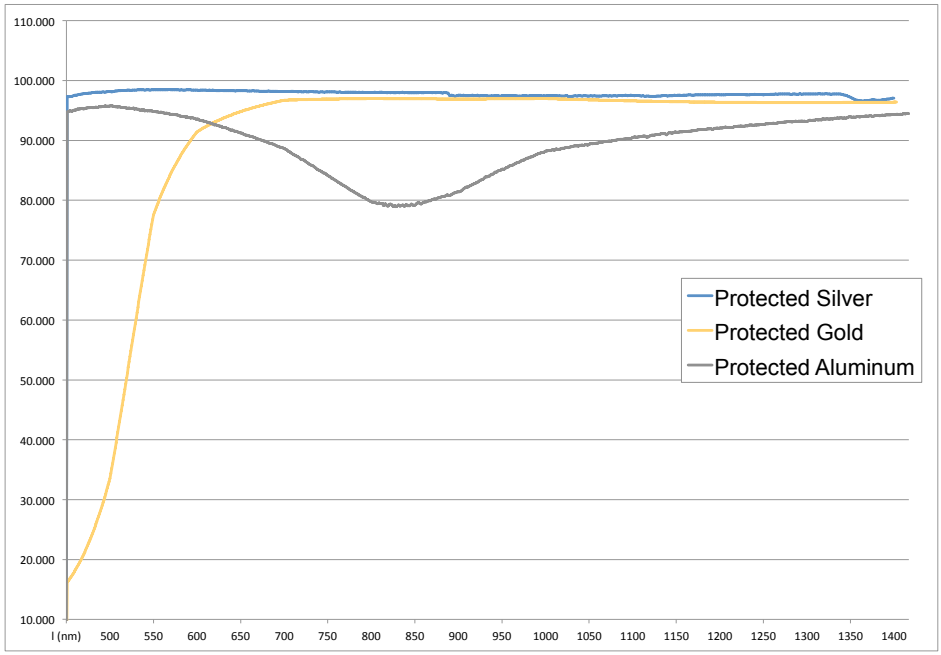


When specifying the coating for an OAP, Customers may choose from Protected Gold, Aluminum, Silver, or a family of Multi-layer Dielectric coatings tuned for specific requirements including high laser damage threshold.

First order items to consider when deciding on coatings include:

The WAVELENGTHS over which the OAP will be used, the REFLECTIVITY needed, and ENVIRONMENT the OAP will be used in.

Metallic Coatings: Metals provide the most efficient means to enhancing the reflectivity of an optical mirror. Metallic coatings, are readily manufacturable, provide broadband performance and are less sensitive to incident angle, group velocity dispersion (GVD) and polarization than dielectric coatings. Due to high absorption, metallics, in general, often have lower laser damage threshold than dielectrics. Because metallic coatings are relatively soft, protective dielectric overcoat(s) are applied to enhance the metal's durability, cleanability, and resistance to environmental damage. With proper care, protected metallic coatings can be cleaned with lens tissue and standard solvents.



Typical Reflectivity vs. Wavelength Results for AOS Metallic coatings for OAPs

- **Protected Silver**: Of the three metallic coating choices available, Protected Silver provides the highest reflectivity over the broadest range of wavelengths. Protected silver is often the most expensive option because silver is highly sensitive to environmental degradation. In particular, Silver tarnishes in the presence of minute levels of hydrogen sulfide – which will reduce its reflectivity and increase scatter. To protect the coating, a rather complex – but

effective coating process is required. The silver coating layer is protected from the outside environment using a hard dielectric overcoat.

- **Protected Gold**: Gold is the most environmentally stable material for reflective coatings and provides higher reflectivity than Aluminum for near-infrared wavelengths. When control of the operating environment is limited, Gold can often provide the most reliable long-term solution. The gold coating layer is protected from the outside environment using a hard dielectric overcoat.
- **Protected Aluminum**: Aluminum is the most common metallic coating produced today, and provides the most affordable solution for most applications. Average reflectivity in the visible spectrum is higher than gold. The reflectivity of aluminum coatings may be enhanced by adding supplemental dielectric coating layers, called an enhancement stack. While enhanced coatings are effective for boosting reflectivity, the additional layers increase sensitivity to polarization, incident angle, and add stress to the composite structure.

Multi-layer Dielectric Coatings (MLD): MLD coatings provide lower absorption reflectors than metallics, which can often result in higher laser damage resistance. MLD coatings can be tuned for very specific performance requirements for reflectors, partial reflectors, leaky mirrors, beamsplitters, polarization control coatings, and anti-reflective coatings. AOS, through our partner Okamoto Optics, provides standardized coatings for high-energy laser applications – but most MLD coatings are user specific. Please contact us for more details.

Standard Specifications for Coatings when requesting a quote:

Coating Type:	Metallic / MLD
Reflectivity:	$\%R_{average}$, $\%R_{min}$ as a function of wavelength λ
Angle of incidence:	All OAPS operate over a range of incident angles, the central incident angle is identified at geometric center of the parabola surface, and varies as a function of zonal radius.
Center wavelength:	The center wavelength of the total operating range.
Bandwidth:	The range over which the coating must reflect wavelengths of interest
Polarization:	S, P, or random
LIDT:	Laser Induced Damage Threshold
Witness samples:	Witness samples are used for measurements of reflectivity and environmental durability. Please specify if you wish to receive samples
Durability:	Environmental durability includes specifications for adhesion, solubility, resistance to humidity, abrasion resistance, and other special environments. Typically tested as defined by MIL-C-48497A, or MIL-PRF-13830B