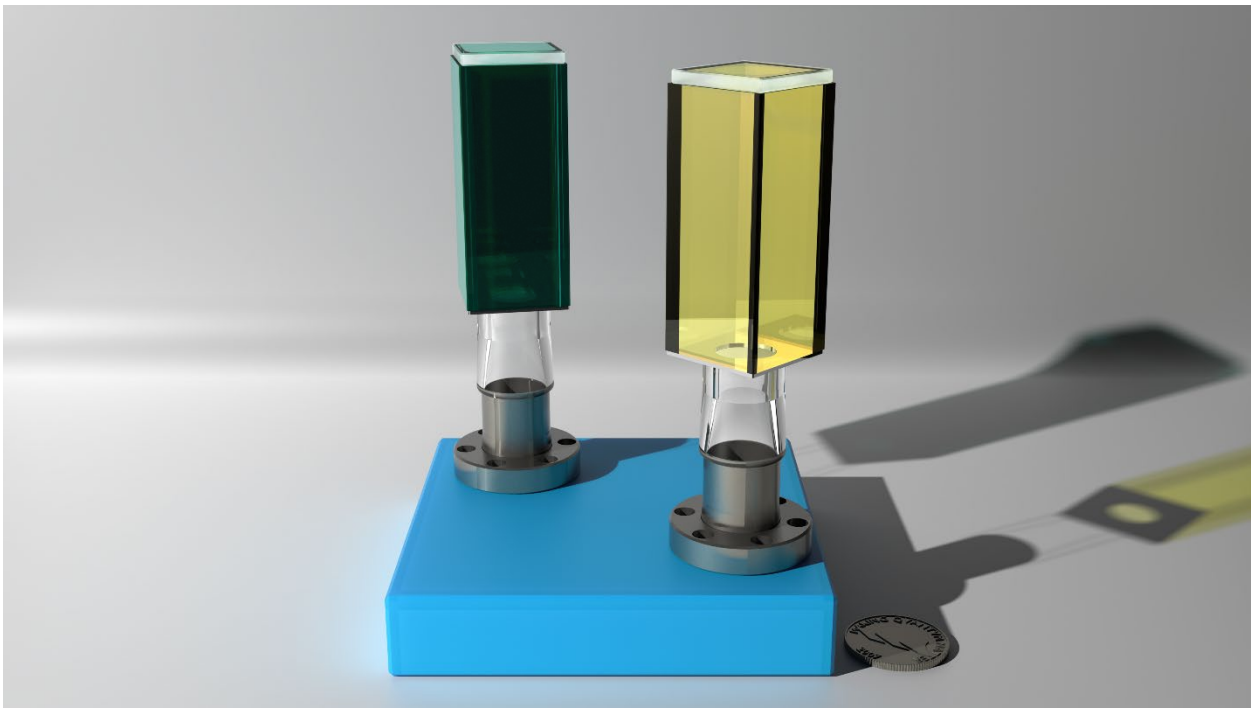
Standard Glass Cell Anti-Reflection Coatings



Infleqtion offers Ion Beam Sputtering (IBS) coatings as the standard on our cells. IBS is ideal for vacuum applications as they are very dense yet deposited in layers resulting in minimal pores or voids, resulting in low outgassing. This creates a more homogenous film that is smooth and minimizes distortion and scattering of light through the cell. IBS coatings are very stable and durable and can withstand intense laser light. The sputtering of the ions creates a strong bond between the film and the substrate, reducing the risk of delamination.

Infleqtion offers two standard IBS AR-coatings, Targeted (H) and Broadband (K). The targeted coating has been optimized for the lowest reflectivity at the resonant wavelengths for potassium, rubidium and cesium, as well as 1064 nm, ideal for optical dipole traps and evaporative cooling. The broadband (K) coating has very low reflectivity across a wider range, from 450 nm to 1100 nm. This allows for increased flexibility with experiments while still covering most resonant wavelengths for alkali metals.

Infleqtion recommends cleaning any cell with standard optic cleaning techniques.

- Appropriate cleaners include IPA, methanol, acetone, or deionized water.
- For polished surfaces of the cells, always drag from inside the aperture to edge, not the other way around. This avoids dragging contaminants across the specular surface.
- Use a fresh section of wipe each time to avoid glass chips or contaminants dragging across the coated surface.

Laser induced damage threshold is typically around 40 J/cm^2 @ 10 ns pulsed and 0.5 MW CW. See individual cell datasheets for coated apertures and clear apertures.

Targeted (H) Coating

R < 0.2% per surface @ 780 nm @ +/- 10° AOI Inclusive.

R < 0.5% per surface @ 780 nm @ +/- 10-45° AOI inclusive S and P polarization balanced to less than 0.1% difference in reflectivity @780 +/-45° AOI

R < 0.25% per surface @ 852 nm @ +/- 10° AOI Inclusive.

R < 0.8% per surface @ 852 nm @ +/- 45° AOI Inclusive. S and P polarization balanced to less than 0.1% difference in reflectivity @852 +/-10° AOI

R < 0.25% per surface @ 1064 nm @ +/- 10° AOI Inclusive S and P polarization balanced to less than 0.1% difference in reflectivity @1064, 795 +/-10° AOI

R < 0.25% per surface @ 767 nm @ +/- 10° AOI Inclusive.

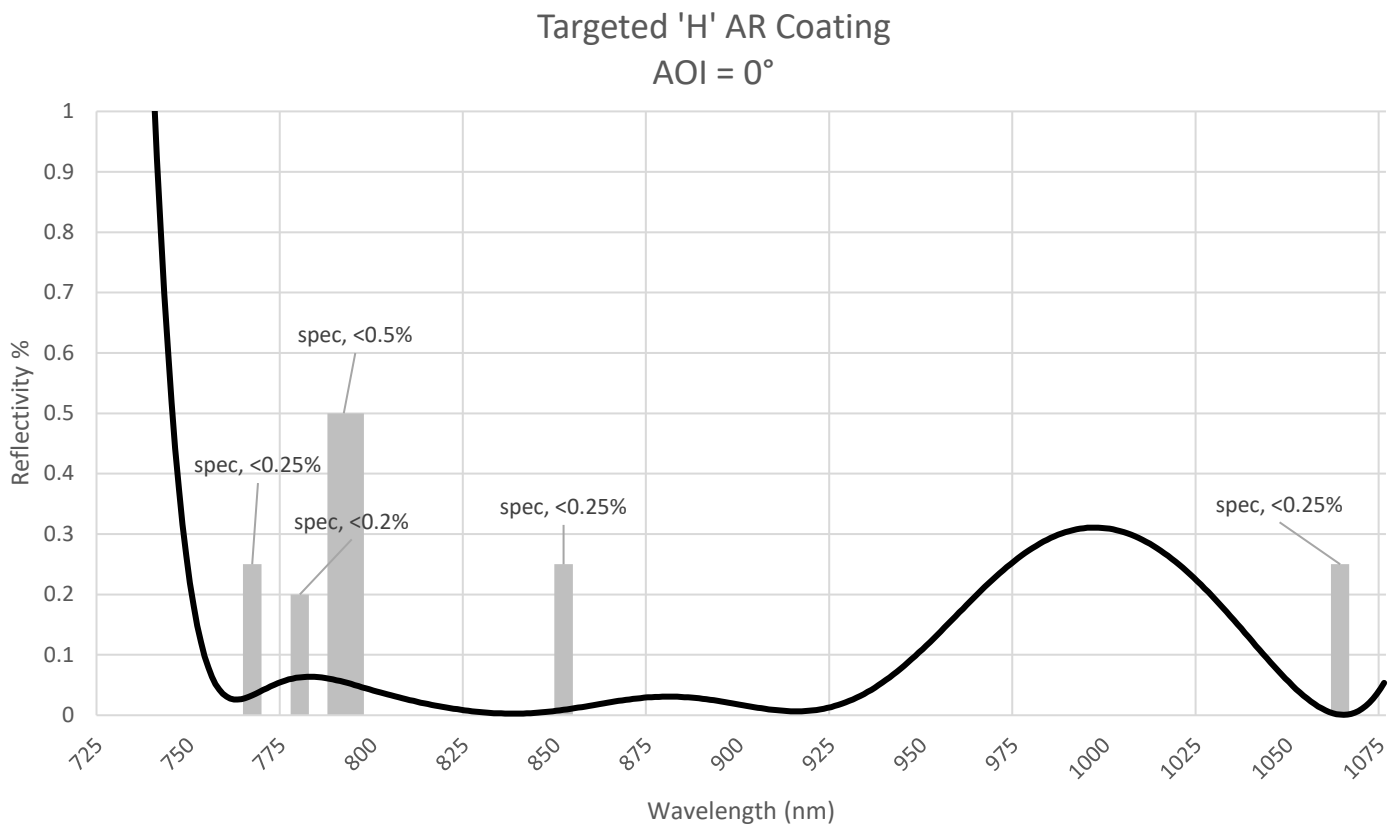
R < 0.8% per surface @ 767 nm @ +/- 45° AOI Inclusive. S and P polarization balanced to less than 0.2% difference in reflectivity @767 +/-45° AOI

R < 0.5% per surface @ 790 nm @ +/- 10° AOI Inclusive.

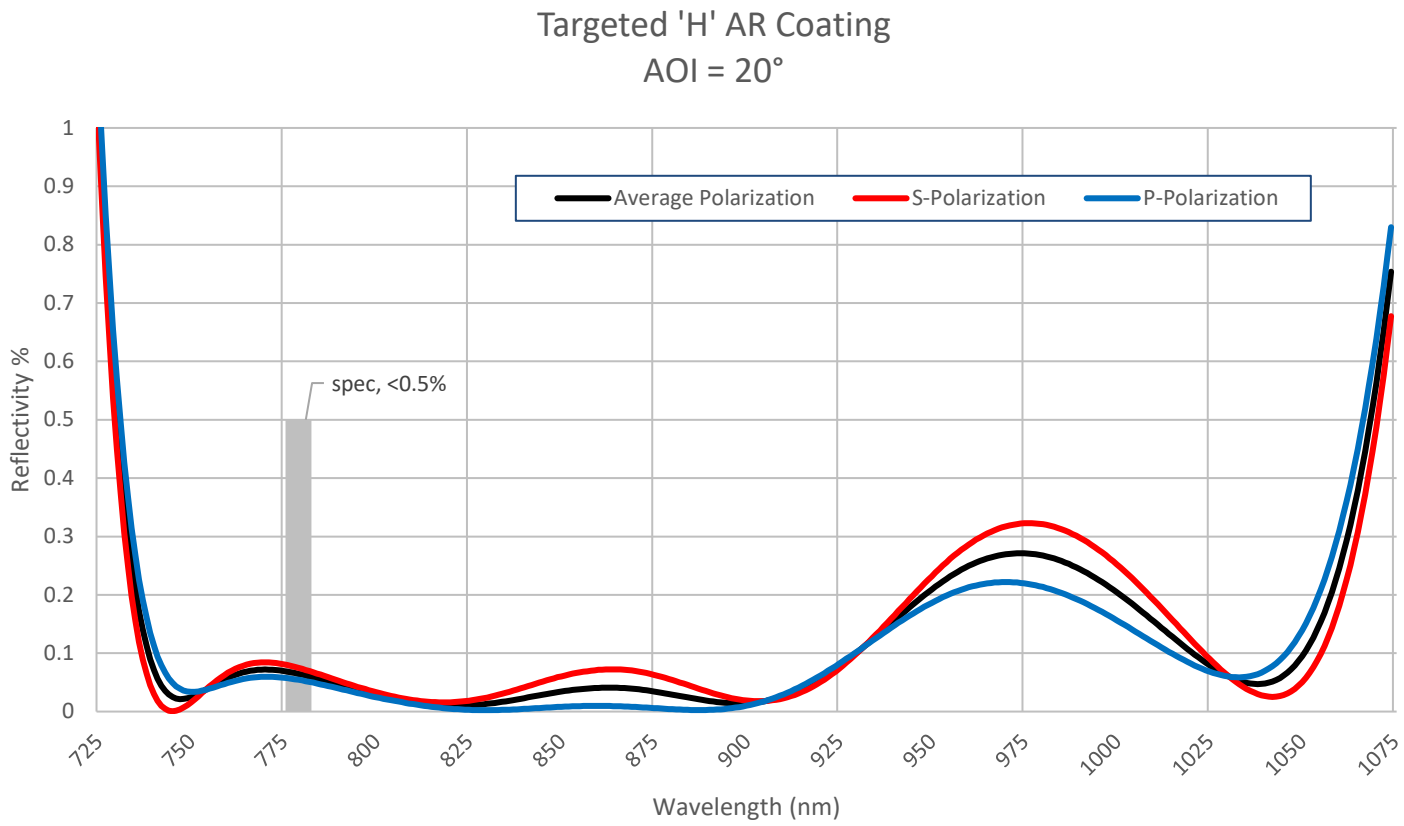
R < 0.5% per surface @ 795 nm @ +/- 10° AOI Inclusive. S and P polarization balanced to less than 0.1% difference in reflectivity @790, 795 +/-10° AOI

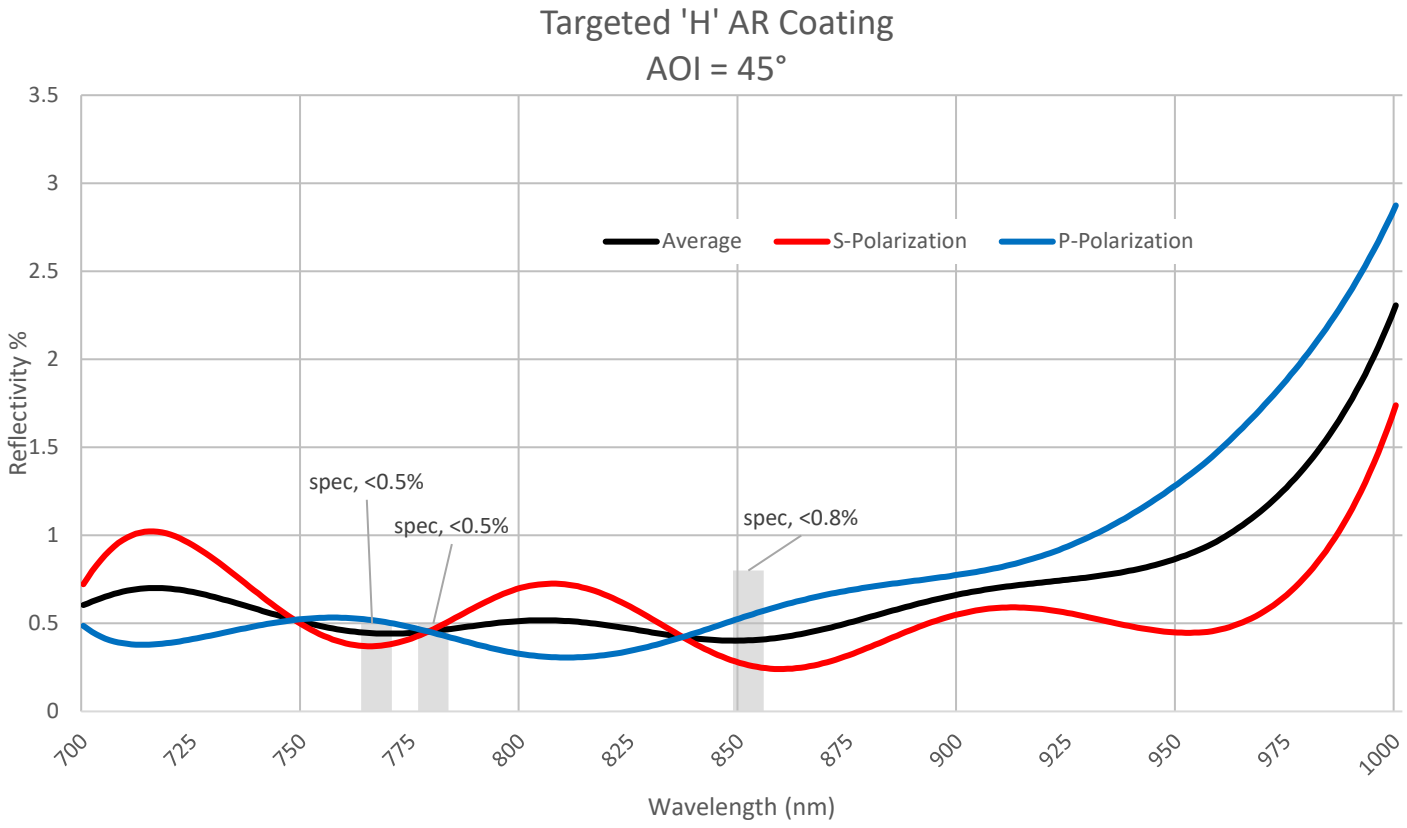
*Typical coating performance is +/- 0.1% of coating detail.

Characteristic performance of the AR coatings *per surface* is shown in the following figures.



*Note: Spec show above is for +/- 10° AOI Inclusive. The conformance at 10° is approximated by measurement at 0° and 20° data.


Targeted 'H' AR Coating
AOI = 20°
Average Polarization
S-Polarization
P-Polarization
spec, <0.5%
Reflectivity %
Wavelength (nm)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
725
750
775
800
825
850
875
900
925
950
975
1000
1025
1050
1075


Targeted 'H' AR Coating
AOI = 45°
Average
S-Polarization
P-Polarization
spec, <0.5%
spec, <0.5%
spec, <0.8%
Reflectivity %
Wavelength (nm)
0
0.5
1
1.5
2
2.5
3
3.5
700
725
750
775
800
825
850
875
900
925
950
975
1000

Broadband AR Coating (K)

R < 10% @ 410nm-450nm @ 0°-10° AOI

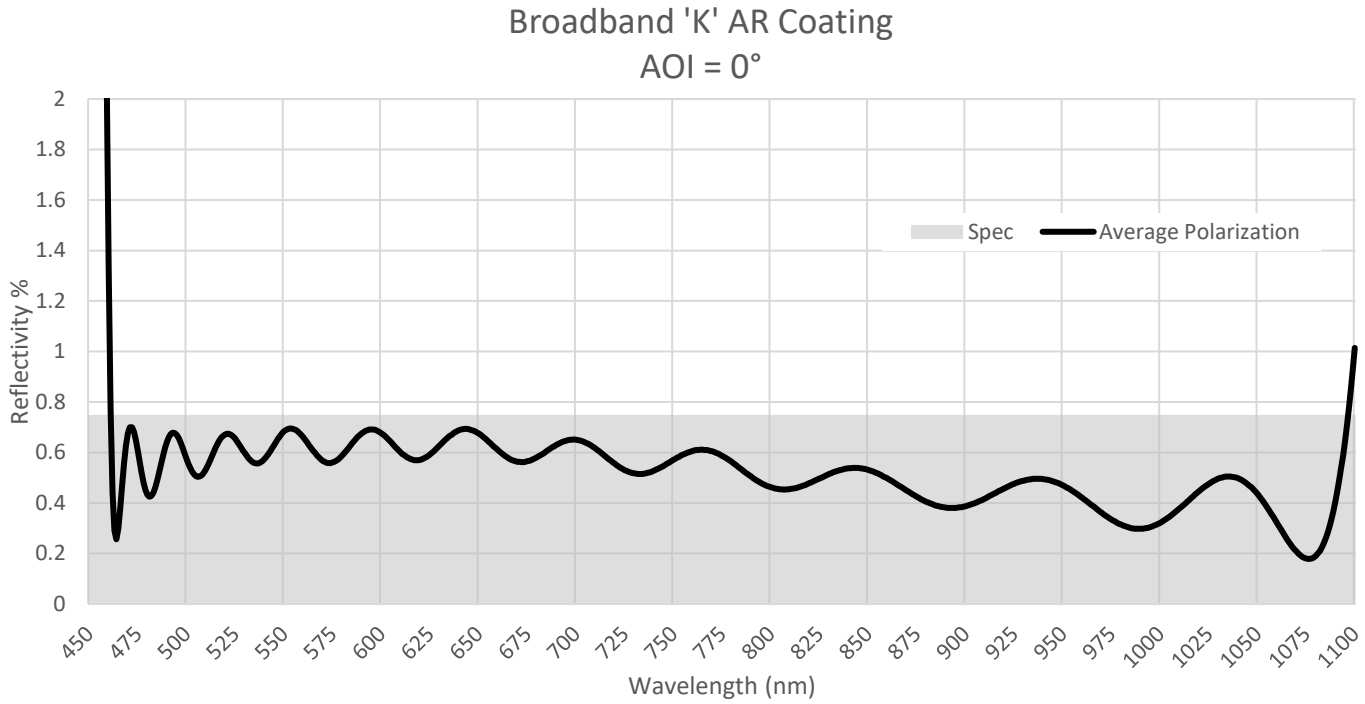
R < .75% @ 450nm-1070nm @ 0°-10° AOI

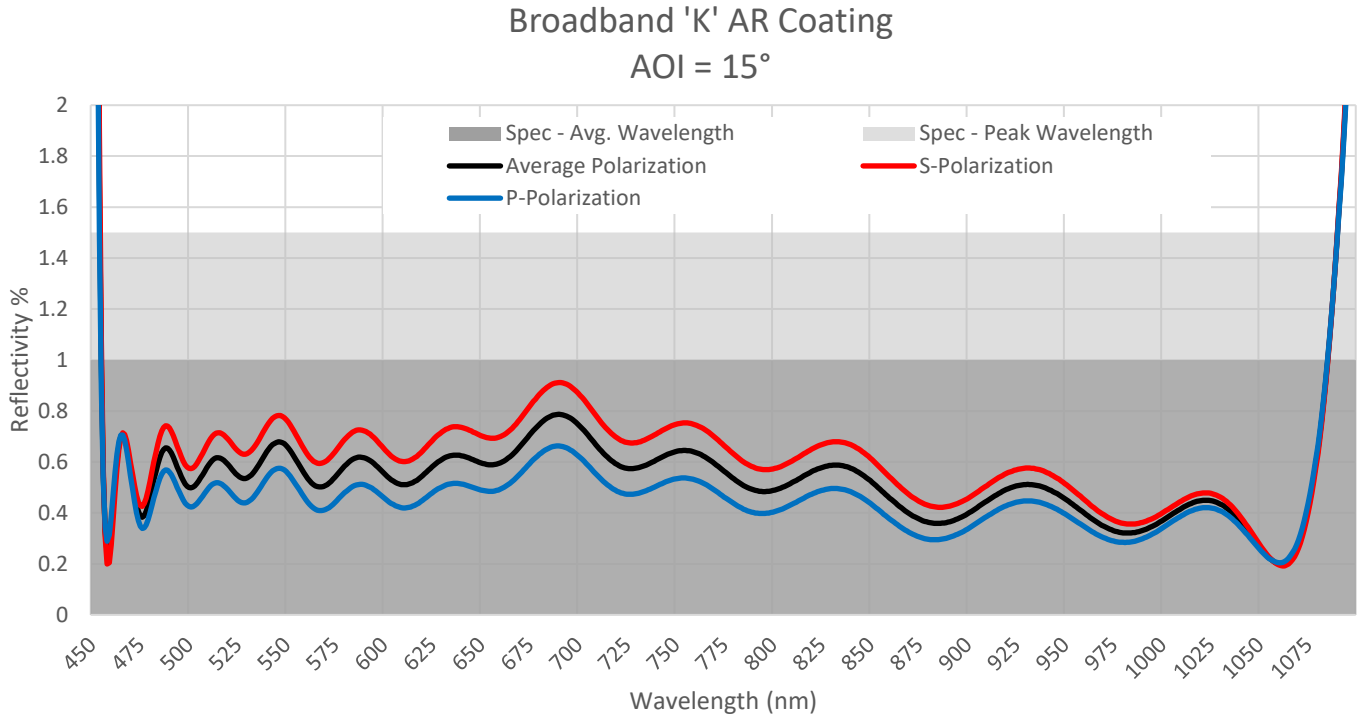
Average R < 1% @ 450nm-1070nm @ 0°-30° AOI

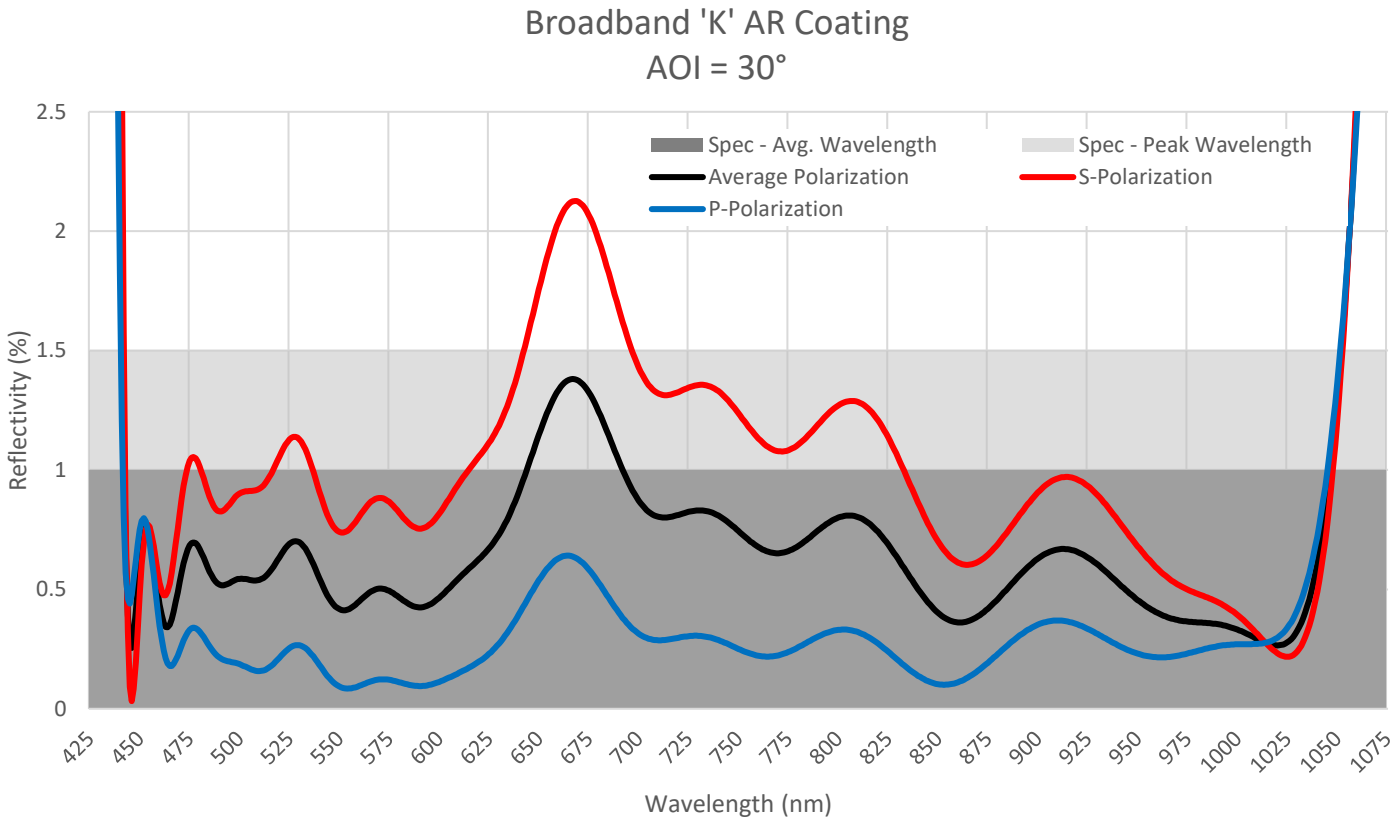
Peak R < 1.5% @ 450nm-1070nm @ 0°-30° AOI

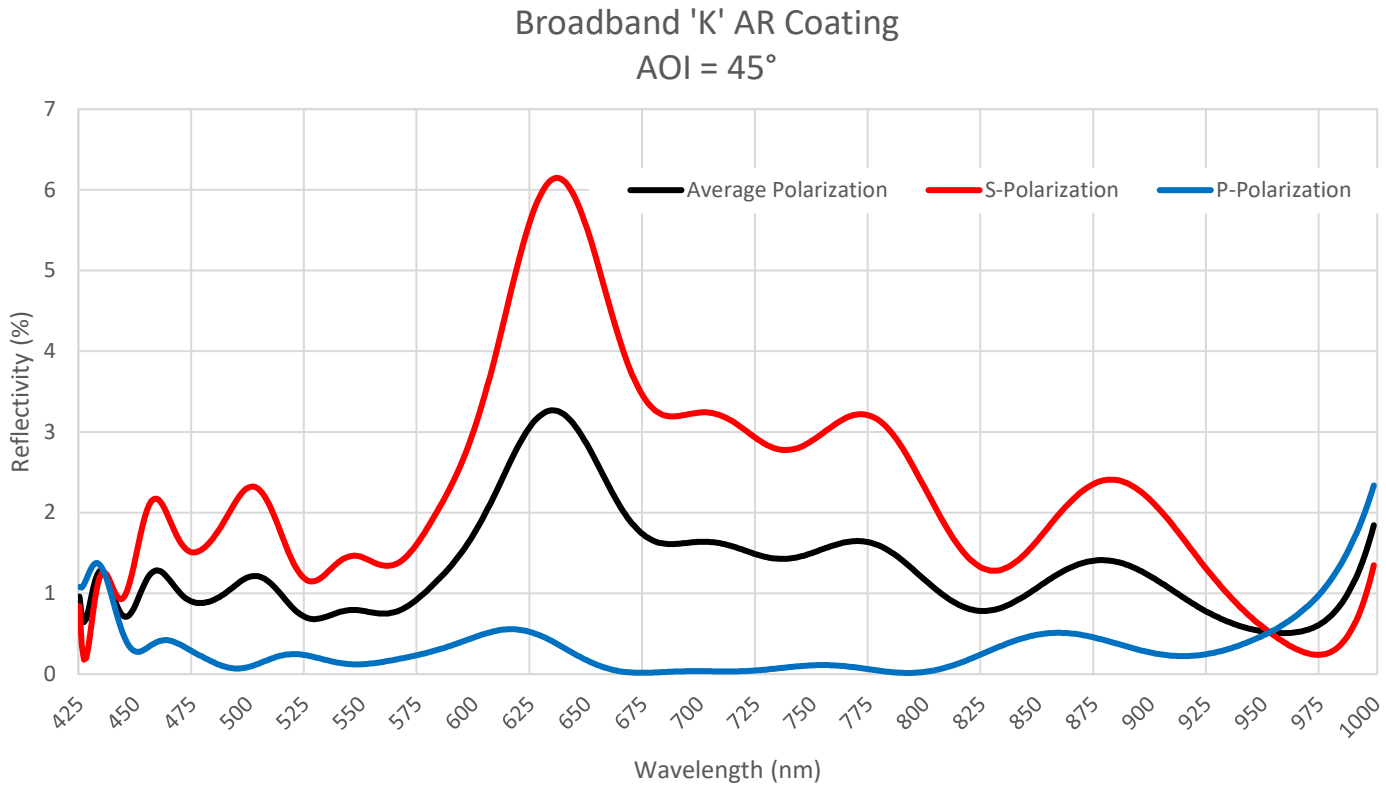
*Typical coating performance is +/- 0.1% of coating detail.

Characteristic performance of the AR coatings *per surface* is shown in the following figures.






Broadband 'K' AR Coating
AOI = 30°
Spec - Avg. Wavelength
Spec - Peak Wavelength
Average Polarization
S-Polarization
P-Polarization
Reflectivity (%)
Wavelength (nm)


Broadband 'K' AR Coating
AOI = 45°
Average Polarization
S-Polarization
P-Polarization
Reflectivity (%)
Wavelength (nm)