

High-refractive index wafers enabling high-performance waveguides with nanostructures created by reactive ion etching



SCHOTT RealView® with ultra-precise TiO₂ coatings

Among the different waveguide technologies, incoupling and outcoupling light via surface relief gratings (SRGs) has been established as the workhorse of the industry. In order to manufacture SRGs, there are two methods:

Additive:

via nanoimprint lithography into a resin



Resin with nanostructures on SCHOTT RealView®

Subtractive:

via etching into the waveguide material



Nanostructures etched into SCHOTT RealView®

or an additional (inorganic) layer



TiO₂ nanostructures on SCHOTT RealView®

SCHOTT RealView® with a broad variety of refractive indices (typically 1.7 to > 2.0) has been proven as the leading substrate for the additive method with index-matching resins as well as for the subtractive approach with direct etching into the glass. To complement SCHOTT's portfolio for the SRG industry, SCHOTT RealView® substrates are now available with dedicated coatings for reactive ion etching (RIE) applications. In combination with high-index RealView® substrates, this opens the door for the development of highly immersive large-field-of-view devices. By using just one high-performance waveguide layer, miniaturization and weight reduction are taken to the next level.

Typical specifications of a SCHOTT RealView® 2.0 wafer with TiO₂ coating

Wafer diameter	150/200/300 mm
Wafer thickness	> 0.3 mm
Exclusion zone	3 mm
Roughness	1 nm (rms)
Coating thickness	> 30 nm
Thickness variation	± 2 nm
Reproducibility	± 1 nm
Refractive index (n)	N(460 nm) = 2.50 ± 3 %
	N(520 nm) = 2.435 ± 3 %
	N(620 nm) = 2.38 ± 3 %
Extinction coefficient (k)	k(600 nm) < 10 ⁻³
Scratch/dig	20/10
Compatible with typical solvents	

What are advantages of coatings for RIE?

- Tight thickness control of TiO₂ layer (in the range of nanometers)
- High homogeneity in pinhole-free TiO₂ layer
- "RealView® ultra" quality as foundation for great performance
- Tight roughness control
- High adhesion between coating and wafer

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