

Undoped YAG

Undoped YAG is a substrate material that can be used for both UV and IR optics. It is particularly useful for applications in the 2 - 3 μm region where glasses tend to be highly absorbent due to the strong OH band. YAG shows no trace absorption in this region. Sapphire has traditionally been the substrate of choice for such applications; however, it is difficult to polish Sapphire to a 10 - 5 scratch-dig laser grade finish. Sapphire is also slightly birefringent. YAG is non-birefringent, almost as durable, and can readily be polished to a 10 - 5 surface quality.

Due to the high strength of YAG, very thin windows can be fabricated allowing for use at wavelengths that approach both the IR and UV cutoffs.

Finally, its high index of refraction will reduce spherical aberrations in lenses by 25% over typical glass lenses.

Advantages Of Undoped YAG Include:

Wide Transmission Range

- Useful from 250 - 5000 nm
- No absorption in the 2 μm - 3 μm region

Excellent Thermal and Opto-Mechanical Properties

- High thermal conductivity, 10 times better than most glasses
- Extremely hard and durable allowing for thin highly polished substrates to be fabricated
- High index of refraction, facilitating low aberration lens design
- High bulk damage threshold
- Non-birefringent

Standard Rod Specifications

Material Parameters

Crystal	Yttrium Aluminum Garnet (Y ₃ Al ₅ O ₁₂)
Orientation	[111] within 5 degrees
Wavefront Distortion	less than $\lambda / 2$ per inch of length (at 1064 nm)

Dimensional Tolerances

Diameter	+0.000" / -0.002"
Thickness	+0.040 / -0.000"

End Configuration

Flatness	$\lambda / 10$ wave at 633 nm wavelength
Surface Quality	10 - 5 scratch-dig per MIL-0-13830A

Anti-Reflection Coatings

*Reflectivity	< 0.25% at specified wavelength
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*Partial and High Reflector Coating Available Upon Request

Properties of Undoped YAG

Spectral Properties

Transmission Range	250 – 5000 nm
Index of Refraction	1.82 (@1064 nm)
Damage Threshold	> 15 J n cm ²

Mechanical Properties

Mohs Hardness	8 - 8.5
Thermal Expansion	$6.9 \times 10^{-6} \text{ C}^{-1}$
Thermal Conductivity	$13 \text{ W m}^{-1} \text{ K}^{-1}$
dn / dt	$7.4 \times 10^{-6} \text{ C}^{-1}$

Specifications and information are subject to change without prior notice.
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