

# Undoped YAG

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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  $\mu\text{m}$  region where glasses tend to be highly absorbent due to the strong H<sub>2</sub>O 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  $\mu\text{m}$  - 3  $\mu\text{m}$  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 Mirror And Window Specifications

## Material Parameters

Crystal Formula: Yttrium Aluminum Garnet ( $Y_3Al_5O_{12}$ )  
Orientation: [111] within 5 degrees  
Wavefront Distortion: less than 1/2 wave per inch of length  
(measured at 1064 nm)

## Dimensional Tolerances

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

## End Configuration

Flatness: within  $\lambda$  / 10 wave at 633 nm wavelength  
Scratch-Dig: 10 - 5 per MIL-0-13830A

## Anti-Reflection Coatings

Reflectivity: less than 0.25% at Specified Wavelength  
Partial and High Reflector Coatings Available Upon Request

## Properties Of Undoped YAG

### Spectral Properties

Transmission Range: 250 - 500 nm  
Index of Refraction: 1.82 (@ 1064 nm)  
Damage Threshold: > 15 J / cm<sup>2</sup>

### Mechanical Properties

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

Specifications and information are subject to change without prior notice.  
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*Space Technology*

**SYNOPTICS**

704-588-2340 • FAX 704-588-2516  
1201 Continental Blvd., Charlotte, NC 28273  
email: st.synoptics.sales@ngc.com