Crystal

$Nd:YVO_4$ *Neodymium Doped Yttrium Vanadate*

$Nd:YVO_4$ crystal is one of the most efficient laser host crystal currently existing for diode laser pumped solid state lasers. Its large stimulated emission cross-section at lasing wavelength, high absorption coefficient and wide absorption bandwidth at pump wavelength, high laser induced damage threshold as well as good physical, optical and mechanical properties make $Nd:YVO_4$ an excellent crystal for high power, stable and cost effective diode pumped solid-state lasers.

Specifications

Dimension Tolerance	±0.1mm
Orientation	±0.5deg
Nd Doped Level	0.1 - 5.0 atm%
Scattering	Invisible, probed with He-Ne laser
Intrinsic Loss	< 0.1%cm^{-1}
Wavefront Distortion	< λ /8 at 633nm
Surface Flatness	< λ /10 at 633 nm
Parallelism	< 10 arc seconds
Surface Quality	10/5 Scratch and Dig
Clear Aperture	> Central 90%
End-faces Configuration	Plano/Plano

Nd:YAG *Neodymium Doped Yttrium Aluminum Garnet*

Invented in the sixties of the last century, Nd:YAG has been and continue to be the most widely used laser crystal for solid-state crystal material. Its laser parameters are a good compromise between the strengths and weaknesses of its competition. Nd:YAG crystals are used in all types of solid-state lasers. Compared with others laser crystals, its fluorescence lifetime is twice more than $Nd:YVO_4$, and thermal conductivity is also better.

Specifications

Dimension	Diameter	Up to 10mm
	Length	Up to 120mm
Nd Doped Level	0.5-1.1atm%	
Orientation	<111> crystalline direction (±5deg)	
Surface Flatness	< λ /10 at 633 nm	
Wavefront Distortion	< λ /8 at 633nm	
Parallelism	< 10 arc seconds	
Perpendicularity	< 5 arc minutes	
Surface Quality	10/5 Scratch and Dig	
Clear Aperture	> Central 90%	
Extinction Ratio		

Rods with diameter from 3 mm to 6.35 mm and with length to 100 mm: >30dB

Rods with diameter from 7 mm to 10 mm and with length to 100 mm: >28dB

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BBO Beta Barium Borate

BBO (beta-BaB_2O_4) is a nonlinear optical crystal which combines a number of unique features. These features include wide transparency and phase matching ranges, large nonlinear coefficient, high damage threshold and excellent optical homogeneity. Therefore, BBO provides an attractive solution for various nonlinear optical applications.

BBO crystal is also an excellent electro-optic crystal for high power applications at the wavelength range from 200nm to 2500nm. It can be used for Q-Switching in a CW diode pumped Nd:YAG laser with average power>50W.

Specifications

Dimension Tolerance	±0.1mm
Angle Tolerance	Δ θ < 0.5° , Δ Φ< 0.5°
Wavefront Distortion	< λ /4 at 633nm
Surface Flatness	< λ /8 at 633 nm
Surface Quality	20/10 Scratch and Dig
Parallelism	< 20 arc seconds
Perpendicularity	< 5 arc minutes
Clear Aperture	> Central 90%

KDP & KD*P

KDP and KD*P are nonlinear optical materials, characterized by high damage threshold, good nonlinear optical coefficients and electro-optic coefficients. It can used for doubling, tripling and quadrupling of Nd:YAG laser at room temperature, and electro-optical modulators.

Specifications

Dimension Tolerance	±0.1mm
Angle Tolerance	Δ θ <0.5° , Δ Φ<0.5°
Surface Flatness	< λ /8@633 nm
Wavefront Distortion	< λ /4@633 nm
Parallelism	< 20 arc seconds
Perpendicularity	< 15 arc minutes
Surface Quality	Better than 20/10 Scratch and Dig
Clear Aperture	> 90% Central

Crystal

YVO_4 *Yttrium Orthovanadate*

The yttrium orthovanadate (YVO_4) is a positive uniaxial crystal grown with Czochralski method. It has good mechanical and physical properties and is ideal for optical polarizing components due to its wide transparency range and large birefringence. It is an excellent synthetic substitute for Calcite ($CaCO_3$) and Rutile (TiO_2) crystals in fiber optical applications such as isolators, circulators, beam displacers, Glan polarizers and other polarizing optics, etc.

Specifications

Dimension Tolerance	±0.1mm
Angle Tolerance	±0.5°
Surface Flatness	< λ /8@633 nm
Wavefront Distortion	< λ /4@633 nm
Parallelism	< 15 arc seconds
Perpendicularity	< 15 arc minutes
Surface Quality	Better than 20/10 Scratch and Dig
Clear Aperture	> 90% Central
AR Coating	R<0.25% @ central wavelength

Calcite

Calcite is a negative uniaxial crystal that has high birefringence, wide spectral transmission and availability in reasonably sized rhombs. Although it is a fairly soft crystal and is easily scratched, it is an ideal material used as visible and near IR polarizers, such as Glan Thompson, Glan Taylor and Glan laser polarizer.

Specifications

Dimension Tolerance	±0.1mm
Angle Tolerance	±0.5°
Surface Flatness	< λ /4@633 nm
Wavefront Distortion	< λ /2@633 nm
Parallelism	< 15 arc seconds
Perpendicularity	< 15 arc minutes
Surface Quality	Better than 20/10 Scratch and Dig
Clear Aperture	> 90% Central
AR Coating	R<0.25% @ central wavelength

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Chromium Doped Yttrium Aluminum Garnet

$Cr^{4+}:Y_3Al_5O_{12}$ crystal is one of the most promising passive Q-switching materials for passively Q-Switching diode pumped or lamped Nd or Yb doped lasers at wavelength from 0.8 to 1.2um. Because of its chemical stability, durability, UV resistance, good thermal conductivity, high damage threshold (> 500MW/cm^2) and easy operation, it will replace some traditional switching materials, such as LiF and organic Dye.

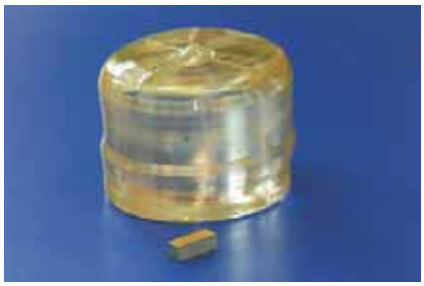
The preliminary experiments of Cr^{4+}:YAG showed that the pulse width of passively Q-switched lasers could be as short as 9 ns for diode pumped Nd:YAG lasers and repetition rate as high as 10kHz for diode pumped Nd:YVO_4 lasers.

Specifications

Dimension Tolerance	±0.1mm
Initial Transmission	10% ~ 99%
Surface Flatness	< λ /10@633 nm
Wavefront Distortion	< λ /4@633 nm
Parallelism	< 20 arc seconds
Perpendicularity	< 15 arc minutes
Surface Quality	Better than 20/10 Scratch and Dig
Clear Aperture	> 90% Central
AR Coating	R<0.25% @ 1064nm

Lithium Niobate Crystal

Lithium Niobate ($LiNbO_3$) is widely used as electro-optic modulator and Q-switch for Nd:YAG, Nd:YLF and Ti:Sapphire lasers as well as modulator for fiber optics, etc. The transverse modulation is mostly employed for $LiNbO_3$ crystal. Also $LiNbO_3$ Crystal is widely used as frequency doublers for wavelength > 1μm and optical parametric oscillators (OPO) pumped at 1064 nm as well as quasi-phase-matched (QPM) devices.



Specifications

Dimension Tolerance	±0.1mm
Angle Tolerance	±0.5deg
Surface Flatness	< λ /8@633 nm
Wavefront Distortion	< λ /4@633 nm
Parallelism	< 20 arc seconds
Perpendicularity	< 5 arc minutes
Surface Quality	Better than 20/10 Scratch and Dig
Clear Aperture	> 90% Central
AR Coating	R<0.25% @ 1064nm

Crystal

Standard Products Series

Union Optic can provide $LiNbO_3$ products used for many applications, such as E-O modulator, waveguide substrate, frequency doubling, SAW wafer application and etc.

1. E-O modulator

Part No.	Dimension	Cut	Coating	Electrode	Unit Price
LNO001	3x3x15mm	Z-cut	AR/AR@1064nm	Au on X face	$178
LNO002	4x4x15mm	Z-cut	AR/AR@1064nm	Au on X face	$238
LNO003	6x6x25mm	Z-cut	AR/AR@1064nm	Au on X face	$328
LNO004	9x9x25mm	Z-cut	AR/AR@1064nm	Au on X face	$408

2. Waveguide substrate

Part No.	Dimension	End faces	Unit Price
LNO101	50x50x1mm	One surface polished, reverse fine ground	$118

3. SAW Wafer

Part No.	Dimension	Thickness	End faces	Unit Price
LNO201	76.2mm	0.5mm	One surface polished, reverse fine ground	$18

Iron Doped Lithium Niobate Crystal

Fe:$LiNbO_3$ crystal is widely used photo refractive material with large electro-optic coefficients, high photo refractive sensitivity and high diffraction efficiency. Due to these features,Fe:$LiNbO_3$ crystals are mostly used for memory, optical storage, information processing and holography applications. The iron level we can offer is from 0.005mol% to 0.1mol%.

Magnesium Oxide Doped Lithium Niobate Crystal

Compared with $LiNbO_3$ crystal, MgO:$LiNbO_3$ crystal exhibits its particular advantages for NCPM frequency doubling (SHG) of Nd:Lasers, mixing (SFG) and optical parametric oscillators(OPOs). MgO:$LiNbO_3$ is also a good crystal for optical parametric oscillators (OPOs) and amplifiers (OPAs), quasi-phase-matched doublers and integrated waveguide.

MgO:$LiNbO_3$ has similar effective nonlinear coefficients as pure $LiNbO_3$. Its Sellmeier equations (for MgO dopant 7 mol%) are:

$n_o^2=4.8762+0.11554/(\lambda^2 - 0.04674) - 0.033119\lambda^2$

$n_e^2=4.5469+0.094779/(\lambda^2 - 0.04439) - 0.026721\lambda^2$

Lithium Tantalate Crystal

$LiTaO_3$ crystal is also widely used as electro-optic modulator, with NLO and E-O properties similar to those of $LiNbO_3$ but higher damage threshold (>500 MW/cm^2 for ns pulsed).

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