

Nd:YVO4 Crystals and Components

Nd:YVO4 is the most efficient laser host crystal for diode pumping among the current commercial laser crystals, especially, for low to middle power density. This is mainly for Nd:YVO4's absorption and emission features surpassing Nd:YAG. Pumped by laser diodes, Nd:YVO4 crystal has been incorporated with high NLO coefficient crystals (LBO, BBO, or KTP) to frequency-shift the output from the near infrared to green, blue, or even UV.

This incorporation to construct all solid state lasers is an ideal laser tool that can cover the most widespread applications of lasers, including machining, material processing, spectroscopy, wafer inspection, light displays, medical diagnostics, laser printing, and data storage, etc. It has been shown that Nd:YVO4 based diode pumped solid state lasers are rapidly occupying the markets traditionally dominated by water-cooled ion lasers and lamp-pumped lasers, especially when compact design and single-longitudinal-mode outputs are required.

The Physical and Optical Properties of Nd:YVO4 Crystals

Properties	Values
Crystal Structure	Zircon Tetragonal, space group D_{4h} , $a=b=7.21$, $c=6.35$
Melting Point	1780°C
Density	5.47g/cm ³
Mohs Hardness	Glass-like, ~ 5
Thermal Expansion Coefficient	$\alpha_a=1.5 \times 10^{-6}/K$, $\alpha_c=7.3 \times 10^{-6}/K$
Thermal Conductivity Coefficient	11.7 W/m/K <110>
Peak Absorption Wavelength	808.5 nm
Lasing Wavelength	912.6 nm, 1063.1 nm, 1341.3 nm
Crystal Class	Positive uniaxial, $n_o=n_a=n_b$, $n_e=n_{cno}=1.9854$, $n_e=2.1981$, @ 1064nm $n_o=2.0382$, $n_e=2.2929$, @ 532nm $n_o=1.9977$, $n_e=2.2198$, @ 808nm
Thermal Optical Coefficient	$dn/dT=4.7 \times 10^{-6}/K$
Stimulated Emission Cross-Section	$7.60 \times 10^{-19} \text{cm}^2$, @ 1064 nm
Fluorescent Lifetime Nd=1.2 atm%	95 ms @ 808 nm
Loss Coefficient	0.003 cm ⁻¹ @ 1064 nm
Absorption Coefficient Nd=1.2 atm%	74 cm ⁻¹ @ 808 nm
Absorption Length Nd=1.2 atm%	0.18 mm @ 808 nm
Intrinsic Loss Nd=1.2 atm%	Less 0.1% cm ⁻¹ , @ 1064 nm
Line width	0.6 nm
Polarized Laser Emission	p parallel to optic axis (c-axis)
Diode Pumped Optical to Optical Efficiency	> 60%
Sellmeier Equation	$n_e^2=4.734369 + 0.1216149/(12 - 0.0523664) - 0.01392712$ $n_o^2=3.8987165+0.05990622/(12 - 0.0514395) - 0.01131912$

Standard Processing Specifications of Nd:YVO4 Crystals

Specifications	Capability
Nd Doping Level	0.1~3 atm% Tolerance within 10% of concentration



Orientation	<i>a-cut crystalline direction(+/-0.20)</i>
Surface Flatness	<i>up to $\lambda/10$ at 633 nm</i>
Parallelism	<i>< 10 arcsec</i>
Surface quality	<i>10/5 scratch/dig as per MIL-O-13830A</i>
Perpendicularity	<i>< 5 arcmin</i>
Angle tolerance	<i>< 30 arcmin</i>
Aperture tolerance	<i>± 0.1 mm</i>
Clear aperture	<i>90% of full aperture</i>
Chamfers	<i>0.1 mm at 45 deg</i>
Coating	<i>AR@1063nm, R< 0.1% & HT@808nm, T>95% HR@1063nm, R>99.8% & HT@808nm, T>95% HR@1063nm, R>99.8%, HR@532 nm, R>99% & HT@808 nm, T>95% AR@1063 nm, R<0.1%</i>
Damage threshold:	<i>over 15J/cm² (rods without coating) over 700 MW/cm² (coating)</i>

Notes

- »| Our inspection standard is comply with MIL standard and ISO9001 standard
- »| OEM Specifications are available upon requested

Standard Product List

Code	Size,mm	Nd dopeing,%	Coating	Price
NDYV-101	3x3x4	0.5	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-102	3x3x6	0.5	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-103	3x3x10	0.5	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-104	3x3x4	0.5	AR/AR@1064&808nm	Contact us
NDYV-105	3x3x6	0.5	AR/AR@1064&808nm	Contact us
NDYV-106	3x3x10	0.5	AR/AR@1064&808nm	Contact us
NDYV-107	3x3x1	1.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-108	3x3x2	1.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-109	3x3x3	1.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-110	3x3x4	1.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-111	3x3x1	1.0	AR/AR@1064&808nm	Contact us
NDYV-112	3x3x2	1.0	AR/AR@1064&808nm	Contact us
NDYV-113	3x3x3	1.0	AR/AR@1064&808nm	Contact us
NDYV-114	3x3x4	1.0	AR/AR@1064&808nm	Contact us
NDYV-115	3x3x1	2.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-116	3x3x2	2.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us



NDYV-117	3x3x3	2.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-118	3x3x1	2.0	AR/AR@1064&808nm	Contact us
NDYV-119	3x3x2	2.0	AR/AR@1064&808nm	Contact us
NDYV-120	3x3x3	2.0	AR/AR@1064&808nm	Contact us
NDYV-121	3x3x0.5	3.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-122	3x3x1	3.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-123	3x3x2	3.0	HR@1064&532+HT@808/AR@1064&532nm	Contact us
NDYV-124	3x3x0.5	3.0	AR/AR@1064&808nm	Contact us
NDYV-125	3x3x1	3.0	AR/AR@1064&808nm	Contact us
NDYV-126	3x3x2	3.0	AR/AR@1064&808nm	Contact us



Notes

»| We develop a new diffusion bonding series(Nd:YVO 4 +KTP) for very compact design of diode pumped green lasers. Please refer to [Diffusion Bonding Crystals Modules Section](#) for more information.

»| Custom size is available upon requested.

