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Subject: Nd:YVO4

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ND:YVO4

Nd:YVO4 is one of the most promising commercially available diode pumped solid state laser materials.

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:YVO4 an excellent crystal for high power, stable and cost effective diode pumped solid-state lasers.

Nd: YVO4 can produce IR green and blue laser by using minor different set-up. A broad absorption band centered at 808nm and favorable mechanical properties make Nd:YVO4 well suited for compact, efficient, high power diode-pumped lasers. Natural birefringence gives rise to a highly polarized output at 1064.3 and 1342nm.

Featured

Low lasing threshold and high slope efficiency

Low dependency on pump wavelength

Large stimulated emission cross-section at lasing wavelength

High absorption over a wide pumping wavelength bandwidth

Optically uniaxial and large birefringence emits polarized laser

Laser Properties of Nd:YVO4 VS Nd:YAG

Laser crystal	Nd doped	σ	a	τ	La	Pth	Effi.
	(atm%)	($\times 10^{-19} \text{cm}^2$)	(cm^{-1})	(μs)	(mm)	(mW)	(%)
Nd:YVO4(a-cut)	1.0	25	31.2	90	0.32	30	52
	2		72.4	50	0.14	78	48.6
Nd:YVO4(c-cut)	1.1	7	9.2	90		231	45.5
Nd:YAG	0.85	6	7.1	230	1.41	115	38.6

Stimulated emission cross-sections (σ)

Absorption Coefficient (α)

Fluorescent Lifetime (τ)

Absorption Length (La)

Threshold Power (Pth)

Pump Quantum Efficiency

Basic Properties

Atomic Density (Nd1.0%)	$1.26 \times 10^{20} \text{ atoms/cm}^3$
Crystal Structure	Zircon Tetragonal, space group D4h
	a=b=7.12, c=6.29
Density	4.22 g/cm^3
Mohs Hardness	4-5(Glass-like)
Thermal Expansion Coefficient	a= $4.43 \times 10^{-6}/\text{K}$, c= $11.37 \times 10^{-6}/\text{K}$

Optical Properties

Lasing Wavelengths	914nm, 1064 nm, 1342 nm
Thermal Optical Coefficient	$dn_a/dT=8.5 \times 10^{-6}/K$, $dn_c/dT=3.0 \times 10^{-6}/K$
Stimulated Emission Cross-Section	$25.0 \times 10^{-19} \text{cm}^2$ @1064 nm
Fluorescent Lifetime	90us @808 nm, (50us @808 nm for 2atm% Nd doped)
Absorption Coefficient	31.4 cm^{-1} @808 nm
Absorption Length	0.32 mm @808 nm
Intrinsic Loss	Less than 0.1% cm^{-1} @1064 nm
Gain Bandwidth	0.96 nm (257 GHz) @1064 nm
Polarized Laser Emission	p polarization, Parallel to optic axis (c-axis)
Diode Pumped Optical to Optical Efficiency	> 60%
Sellmeier Equation (for pure YVO4 crystals, λ in um)	$n_o^2=3.77834+0.069736/(\lambda^2-0.04724) - 0.0108133\lambda^2$ $n_e^2=4.59905+0.110534/(\lambda^2-0.04813) - 0.0122676\lambda^2$

Specifications

Nd Dopant Level	0.1 - 3.0 atm%
Orientation Tolerance	A-cut/C-cut +/-0.5deg.
Dimensional Tolerance	$\pm 0.1\text{mm}$
Surface Flatness	$\lambda/10$ @633nm
Wavefront Distortion	$\lambda/8$ @633nm
Surface Quality	10/5 Scratch and Dig
Parallelism	<10 arc seconds
Clear Aperture	>95%
Bevel/Chamfer	<0.1mm@45deg.
Coating	AR/HR/PR coating upon customer's request

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WARRANTY

All products are guaranteed to be in specifications in material and workmanship for a period of 12 months after shipment.

We do not assume liability for installation, labor or consequential damages.

This warranty is not suitable for failure of the products due to misuse, abuse, accident, or neglect.

CONTACTS

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