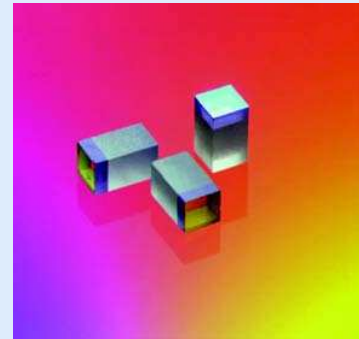


DPM Crystals

Diode-Pumped Solid State (DPSS) lasers are the ideal laser tools for applications such as pointing light shows, machining, material processing, spectroscopy, wafer inspection and medical diagnostics. CASIX's Diode-Pumped Microchip (DPM) crystal assemblies combine Nd:YVO₄ and KTP and act as the laser core for green DPSS lasers. Applications for DPMs include green laser pointers, laser displays, DPSS green lasers and surveying laser systems.



The suggested pump power for the low power DPM crystals is less than 300mW and the generated green output power can reach 10mW. The suggested pump power for the middle power DPM crystals is less than 500mW and the generated green output power can be as high as 60mW. For the high power DPM crystals the suggested pump power is 600mW and the generated green output power can reach 100mW. Heat deposit mechanics are needed.

Specifications:

Parallelism Less than 5 arc seconds

Output Wavelength 532nm

Mode TEM00

Pump Power 200mW (Low power DPM)

..... 400mW (Middle power DPM)

..... 600mW (High power DPM)

Output Power >2.5mW

..... >35mW

..... >60mW

Coating Type

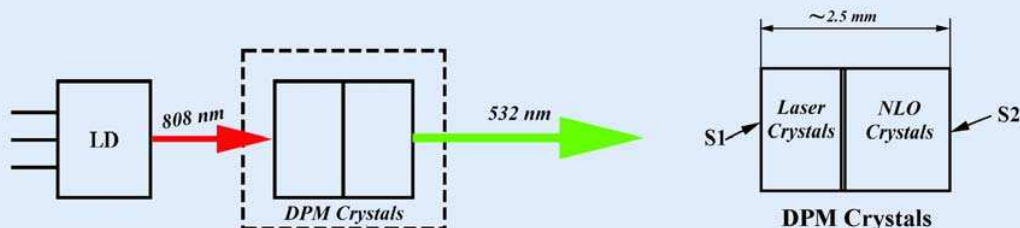
Incident Surface HR R>99.8% @1064nm

..... HT R<5% @808nm

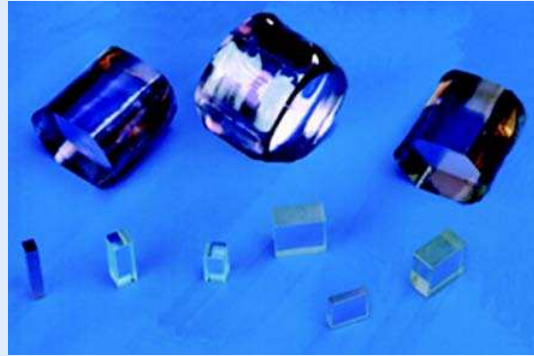
..... HR R>99% @532nm

Output Surface HR R>99.8% @1064nm

..... HT R<5% @532nm



Neodymium Doped Yttrium Vanadate (Nd:YVO₄) Crystals



CASIX applies Czochralski (CZ) crystal growth technology to grow high grade Nd:YVO₄ crystals. With strict control of materials and the growth process, our Nd:YVO₄ crystals feature low lasing wavelength absorption and high conversion efficiency. CASIX offers Nd:YVO₄ with Nd doping from 0.1 atm% to 4.0 atm%. Crystal boules and crystals are available in various sizes and coatings.

Main Features:

- Low lasing threshold and high slope efficiency
- Large stimulated emission cross-section at lasing wavelength
- High absorption over a wide pumping wavelength bandwidth
- Optically uniaxial and large birefringence emits polarized laser light

Specifications:

Nd:Dopant Level	0.1-3.0 atm%
Standard Dimensions	3x3x3mm ³ , 3x3x1mm ³ , 3x3x0.5mm ³
Wavefront Distortion	<λ/8 at 633nm
Scattering Sites	Invisible, probed with a He-Ne laser
Orientation	±0.5 degree
Dimensional Tolerance	+0.1/-0.1mm
End-faces Configuration	Plano/Plano
Surface Quality	10-5 scratch and dig per MIL-O-13830B
Flatness	λ/10 at 633nm
Clear Aperture	>Central 90%
Parallelism	<10 arc seconds
Intrinsic Loss	<0.1% cm ⁻¹

Additional Nd:YVO₄ crystal and coating specifications are available upon request.

Neodymium Doped Yttrium Aluminum Garnet (Nd:YAG) Crystals

Nd:YAG crystals are the most widely used solid state laser materials today. CASIX offers Nd:YAG rods with high optical homogeneity, consistent performance, high processing accuracy and on time delivery. A variety of specifications and sizes from $\phi 3 \times 0.5\text{mm}$ to $\phi 12 \times 150\text{mm}$ are available.

Specifications:

Dopant Concentration (atomic %): 0.5% ~ 1.1%
Orientation: <111> crystalline direction ($\pm 5^\circ$)
Wavefront Distortion: $\lambda/8$ per inch, measured by a double-pass interferometer @633nm
Extinction Ratio: Rods with diameter from 3mm to 6.35mm and with lengths to 100mm: >30dB Rods with diameters from 7mm to 10mm and with lengths to 100mm: >28dB
Dimension Tolerances: Diameter: $\pm 0.025\text{mm}$ ($\pm 0.001''$), Length: $\pm 0.2\text{mm}$ ($\pm 0.01''$) Barrel Finish: 50-80 micro-inch (RMS), grooved rod barrels are also available
Ends Finish: Surface Figure $< \lambda/10$ @633nm Parallelism <10 arc seconds Perpendicularity <5 arc minutes Surface Quality >10-5 scratch and dig per MIL-O-1380A Chamfer <0.1mm @45° Clear Aperture Extend over the entire face to the chamfered edges
Anti-Reflective Coating: Single layer MgF_2 coating with high damage threshold for high power laser operations. Reflectivity $R < 0.1\%$ @1064nm per surface. Damage threshold over $750\text{mW}/\text{cm}^2$ @1064nm, 10ns and 10Hz.
High-Reflective Coating: CASIX offers standard HR coatings with $R > 99.8\%$ @1064nm and $R < 5\%$ @808nm, as well as HR coatings such as HR @1064/532nm, HR @946nm, HR 1319nm and other wavelengths.
Standard Products in Stock: Standard Nd:YAG laser rods with dimensions of $\phi 3 \times 5\text{mm}$ and $\phi 4 \times 50\text{mm}$ with AR or HR coating for Diode Pumped Solid State Lasers are ready for immediate delivery.

Neodymium Doped Gadolinium Vanadate (Nd:GdVO₄) Crystals



Nd:GdVO₄ crystals are excellent laser crystals. They are ideal laser host materials for diode pumped solid state (DPSS) micro/mini lasers because of their good physical, optical and mechanical properties. They have a higher slope efficiency than Nd:YAG crystals and better thermal conductivity and higher power output than Nd:YVO₄ crystals, so they are a good choice for high power output DPSS lasers. Using advanced growth technology, CASIX provides high grade Nd:GdVO₄ crystals with Nd doping from 0.1 atm% to 4.0 atm%. In addition, crystal components of various sizes and coatings are available.

Main Features:

- Large stimulated emission cross section at laser wavelength
- High absorption coefficient and wide bandwidth at pump wavelength
- Low dependency on pump wavelength
- Good thermal conductivity
- Low lasing threshold and high slope efficiency
- High laser induced damage threshold
- Strongly polarized laser output

Specifications:

Nd:Doping Level	0.1-3.0 atm%
Dimensions	3×3×1mm ³ 3×3×3mm ³
Wavefront Distortion	<λ/8@633nm
Scattering Sites	Invisible, probed with a He-Ne laser
Orientation	a-cut ±0.5°
End-faces Configuration	Plano/Plano
Dimensional Tolerance	±0.1mm
Surface Quality	10-5 scratch and dig per MIL-PRF-13830B
Flatness	λ/10
Parallelism	20 arc seconds
Perpendicularity	15 arc minutes
Clear Aperture	>90%

Additional specifications for Nd:GdVO₄ crystals and coatings are available upon request.

Chromium Doped Yttrium Aluminum Garnet (Cr⁴⁺:YAG) Crystals

Passive Q-Switching is preferred for simplicity of manufacturing and operation, low cost, and reduced system size and weight. Cr⁴⁺:YAG (Y₃Al₅O₁₂) crystals are excellent for passively Q-switching diode pumped or lamp-pumped Nd:YAG, Nd:YLF, Yb:YAG or other Nd and Yb doped lasers at wavelengths from 1.0 to 1.2μm. Because they are chemically stable, durable, UV resistant, have good thermal conductivity, have a high damage threshold (>500mW/cm²) and ease of operation, they will replace traditional materials such as LiF, organic dye and color centers.

Basic Properties of Cr⁴⁺:YAG

Formula	Cr ⁴⁺ :Y ₃ Al ₅ O ₁₂
Crystal Structure	Cubic Garnet
Dopant Level	0.03 mol% – 0.05 mol%
Hardness	8.5 (Mohs)
Damage Threshold	>500mW/cm ²
Refractive Index	1.82 @1064nm

Specifications:

Flatness	<λ/8
Wave Distortion	<λ/4
Parallelism	<30"
Surface Quality	20-10 scratch and dig
AR Coating	R<0.2%@1064nm
Standard Aperture	3x3 ~ 10x10mm

AR coatings and HR coatings are also available. The initial transmission (T₀) can be controlled from 10% to 95% according to customer requirements. Standard size Cr⁴⁺:YAG crystals of 3x3mm² with T₀=80% or 90% are in stock and available for immediate delivery.

Preliminary experiments done on CASIX's Cr:YAG crystals show that the pulse width of passively Q-switched lasers can be as short as 9ns for diode pumped Nd:YAG lasers with repetition as high as 10kHz for diode pumped Nd:YVO₄ lasers. Furthermore, an efficient green output @532nm and UV output @355nm and 266nm were generated after a subsequent intra-cavity SHG in KTP for diode pumped and passive Q-switched Nd:YAG and Nd:YVO₄ lasers.

Cr:YAG is also a laser crystal with tunable output from 1.35 μm to 1.6 μm. It can generate ultrashort pulse lasers (to fs pulsed) when pumped by Nd:YAG lasers at 1.064 μm.

Note: When ordering Cr⁴⁺:YAG crystals, please specify the aperture, initial transmission (T₀) and coatings.