

Cr⁴⁺:YAG

Cr⁴⁺:YAG is an excellent crystal for passively Q-switching diode-pumped or lamp-pumped Nd:YAG, Nd:YVO₄, Nd:YLF, Yb:YAG or other Nd and Yb doped lasers at wavelength range from 800 to 1200 nm). Passive Q-switches or saturable absorbers provide high power laser pulses without electro-optic Q-switches, thereby reducing the package size and eliminating a high voltage power supply.

It is easy to be operated and therefore outstandingly suited to replace LiF and Dye which are commonly used for passive Q-switching, because of its superior properties: large absorption cross section in the near IR, high damage threshold (>500 MW/cm²), broad absorption band, good thermal stability and heat dissipation (especially at high repetition rates).

Cr⁴⁺:YAG is more robust than dyes or color centers and is the material of choice for Nd:YAG, Nd:YVO₄, Nd:YLF, Yb:YAG or other Nd and Yb doped lasers in wavelength range from 800 to 1200 nm).

A pulse width of 8.3ns and a Q-switching efficiency of 56.9% were obtained by using passive Q-switched of Nd:YAG laser. Cr⁴⁺:YAG showed that the pulse width of passively Q-switched lasers could be as short as 5ns for diode pumped Nd:YAG lasers and repetition as high as 10kHz for diode pumped Nd:YVO₄ lasers. Furthermore, an efficient green output at 532 nm, and UV output at 355 nm and 266 nm were generated, after a subsequent intracavity SHG in KTP or LBO, THG and 4HG in LBO and BBO for diode pumped and passive Q-switched Nd:YVO₄ and Nd:YAG lasers.

**Basic Properties**

Chemical Formula	Cr ⁴⁺ :Y ₃ Al ₅ O ₁₂
Crystal Structure	Cubic
Dopant Concentration	0.5-3.0 mol%
Mohs Hardness	8.5
Density	4.55 g/cm ³
Melting Point	1950 °C
Thermal Conductivity	0.14 W cm ⁻¹ K ⁻¹
Thermal Expansion	6.9 x 10 ⁻⁶ °C ⁻¹
Thermal Shock Resistance	790 Wm ⁻¹
Refractive Index	1.82 @1064 nm
Damage Threshold	> 500 MW/cm ²

Standard Specifications

Standard Aperture	Ø3~10 mm, 2x2~12x12 mm ²
Initial Transmission	5.0% ~ 98.0%
Transmission Tolerance	± 2%
Flatness	λ/8 @633 nm
Parallelism	< 20 arc seconds
Perpendicularity	< 5 arc minutes
Surface Quality	10/5 Scratch/Dig per MIL-O-13830A
Barrel Finish	50 - 80 micro-inch (RMS)
Clear Aperture	> Central 90%

Cr⁴⁺:YAG Standard Products

Part No.	Initial Transmission	Section Dimension	Coatings
CYAG3350	T ₀ = 50%	3x3mm	AR/AR @ 1064 nm
CYAG3360	T ₀ = 60%	3x3mm	AR/AR @ 1064 nm
CYAG3370	T ₀ = 70%	3x3mm	AR/AR @ 1064 nm
CYAG3375	T ₀ = 75%	3x3mm	AR/AR @ 1064 nm
CYAG3380	T ₀ = 80%	3x3mm	AR/AR @ 1064 nm
CYAG3390	T ₀ = 90%	3x3mm	AR/AR @ 1064 nm
CYAG0630	T ₀ = 30%	∅6mm	AR/AR @ 1064 nm
CYAG0650	T ₀ = 50%	∅6mm	AR/AR @ 1064 nm
CYAG0660	T ₀ = 60%	∅6mm	AR/AR @ 1064 nm
CYAG0670	T ₀ = 70%	∅6mm	AR/AR @ 1064 nm
CYAG0680	T ₀ = 80%	∅6mm	AR/AR @ 1064 nm
CYAG0690	T ₀ = 90%	∅6mm	AR/AR @ 1064 nm
CYAG0820	T ₀ = 20%	∅8mm	AR/AR @ 1064 nm
CYAG0830	T ₀ = 30%	∅8mm	AR/AR @ 1064 nm
CYAG0850	T ₀ = 50%	∅8mm	AR/AR @ 1064 nm
CYAG0860	T ₀ = 60%	∅8mm	AR/AR @ 1064 nm
CYAG0870	T ₀ = 70%	∅8mm	AR/AR @ 1064 nm
CYAG0880	T ₀ = 80%	∅8mm	AR/AR @ 1064 nm
CYAG0890	T ₀ = 90%	∅8mm	AR/AR @ 1064 nm
CYAG1010	T ₀ = 10%	∅10mm	AR/AR @ 1064 nm
CYAG1020	T ₀ = 20%	∅10mm	AR/AR @ 1064 nm
CYAG1030	T ₀ = 30%	∅10mm	AR/AR @ 1064 nm
CYAG1050	T ₀ = 50%	∅10mm	AR/AR @ 1064 nm
CYAG1060	T ₀ = 60%	∅10mm	AR/AR @ 1064 nm
CYAG1070	T ₀ = 70%	∅10mm	AR/AR @ 1064 nm
CYAG1080	T ₀ = 80%	∅10mm	AR/AR @ 1064 nm
CYAG1090	T ₀ = 90%	∅10mm	AR/AR @ 1064 nm

Note

- Other specifications of Cr⁴⁺:YAG crystals and coatings are available upon request.
- Please specify the section dimension, initial transmission (or optical density) and coatings while ordering Cr⁴⁺:YAG as passive Q-switch components.
- The relationship of initial transmission and optical density (O.D.) value is: $T = 10^{-O.D.}$.

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