

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

A High Power Solid State and Compact Passive Q-Switch

Passive Q-Switching is preferred for simplicity of manufacturing and operation, low cost and reduced system size and weight. Cr⁴⁺:YAG (Y₃Al₅O₁₂) is an excellent crystal for passively Q-switching diode pumped or lamp-pumped Nd:YAG, Nd:YLF, Yb:YAG or other Nd and Yb doped lasers at wavelength from 1.0 to 1.2 μm. Because of its chemically stable, durable, UV resistant, good thermal conductivity and high damage threshold (>500 MW/cm²) and being easy to be operated, it 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	0.5 mol% ~ 3 mol%
Hardness	8.5 (Mohs)
Damage threshold	>500 MW/cm ²
Refractive index	1.82 @ 1064 nm

Main Specifications

Flatness	<λ/8
Wavefront Distortion	<λ/4
Parallelism	< 30"
Surface quality	20/10 scratch/dig
AR-coating	R<0.2% @ 1064 nm
Standard Aperture	3x3 ~ 10 x 10 mm

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AR-coatings and HR-coatings are also available. We can control the initial transmission (T_0) from 10% to 95% according to customers' requirements. Standard size of 3 x 3 mm² with $T_0 = 80\%$ or 90% in inventory for immediate delivery.

The preliminary experiments of Cr: 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 as high as 10 kHz for diode pumped Nd:YVO₄ lasers. Furthermore, an efficient green output @ 532 nm, and UV output @ 355 nm and 266 nm were generated, after a subsequent intracavity 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 ultra short pulse laser (to fs pulsed) when pumped by Nd: YAG laser at 1.064 μm .

Note: When ordering Cr⁴⁺:YAG crystal, please specify the aperture, initial transmission (T_0) and coatings.