



Co: Spinel

Cobalt spinel is a comprehensive Q-switching crystal product with excellent properties. It demonstrates a wide absorption band in the 1200~1600nm wavelength range, making it a passive Q-switch for solid-state lasers operating at the eye-safe wavelength of 1.5μm.

Classification: [Laser Crystals](#)

Detailed introduction

Cobalt Spinel (Co: Spinel), with the chemical formula $\text{Co}_{0.05}\text{-Mg}_{0.95}\text{Al}_2\text{O}_4$, is a comprehensive Q-switching crystal product with excellent properties. $\text{Co}_{0.05}\text{-Mg}_{0.95}\text{Al}_2\text{O}_4$ demonstrates a wide absorption band in the 1200~1600nm wavelength range, making it a passive Q-switch for solid-state lasers operating at the eye-safe wavelength of 1.5μm. Cobalt-doped magnesium aluminate spinel (Co: MgAl_2O_4) can produce short nanosecond pulses, with high peak power around the eye-safe wavelength of 1.5μm. Additionally, this wavelength is within the peak response band of InGaAs detectors, making 1.5μm lasers highly suitable for applications in range finders, environmental sensing, telecommunications, and more.

PRODUCT FEATURE

Wide Absorption Bandwidth from 1.2 to 1.6 micrometers.

High Damage Threshold

Good Thermal Stability

High Optical Quality

Mechanical and Chemical Stability

APPLICATIONS

Fiber Lasers that wavelength from 1.2 to 1.6 micrometers

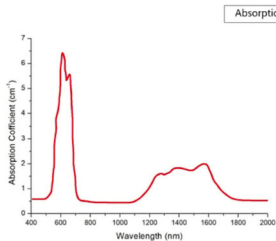
Passive Q-switch in solid-state lasers

Medical and Cosmetic

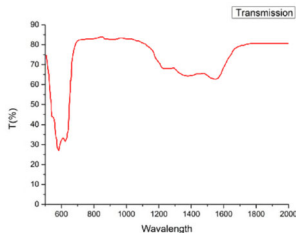
Ultrafast lasers and nonlinear optical experiments

Laser radars, laser guidance, and electro-optical countermeasure systems

Absorption Spectrum



Emission Spectrum



Material properties

Concentration	0.05wt%~0.35wt%
Absorption coefficient	$0 \sim 7 \text{ cm}^{-1}$
Ground-state absorption cross-section $\text{GSA}(E^{10}\text{cm}^2)$	2.8 (± 0.4) @1340nm
Excited state absorption cross-section $\text{ESA}(E^{10}\text{cm}^2)$	2.0 (± 0.6) @1340nm
Ground-state absorption cross-section $\text{GSA}(E^{10}\text{cm}^2)$	3.5 (± 0.4) @1540nm
Excited state absorption cross-section $\text{ESA}(E^{10}\text{cm}^2)$	1.0 (± 0.6) @1540nm
Working wavelength	1200~1600 nm
End Configuration	Flat/Flat
Figure of Merit(FOM)	100~300
Coatings	AR/AR@1540, R<0.2%; AR/AR@1340, R<0.2%

Physical and Chemical Properties

Chemical formula	$\text{Co}_{0.05}\text{-Mg}_{0.95}\text{Al}_2\text{O}_4$
Crystal structure	Cubic
Lattice parameters	8.07Å
Density	3.62 g/cm ³
Melting Point	2105°C
Refractive Index	$n=1.6948$ @1.54 μm
Thermal Conductivity/(W cm ⁻¹ K ⁻¹)(@25°C)	0.033W
Thermal Expansion / (10 ⁻⁶ /°C@25°C)	1.046
Specific Heat/ (J g ⁻¹ K ⁻¹)	5.9
Hardness (Mohs)	8.2
Extinction Ratio	25dB
Orientation	<100> or <111> < ±0.5°
Optical density	0.1~0.9
Damage Threshold	>500 MW/cm ²
Doping concentration of Co ₂₊	0.01~0.3 at%

Keywords: YAG

Previous: [Er:Yb:Glass](#)

Next: [GTH:YAG](#)