

# **Co:Spinel** Cobalt-doped MgAl<sub>2</sub>O<sub>4</sub>



### DESCRIPTION

Co spinel-saturable absorbers for the passive Q-switching of solid-state lasers operating at eye-safe wavelength of 1.5 µm

Cobalt-doped magnesium aluminate spinel (Co:MgAl<sub>2</sub>O<sub>4</sub>) allow the generation of short nanosecond pulse with high peak power around the eye-safe wavelength of 1.5um, perfect for telemetry applications. The absorption spectrum of Co<sup>2+</sup>-doped MgAl<sub>2</sub>O<sub>4</sub> exhibited a broad absorption band in the wavelength range of 1200–1600 nm, which indicated that Co<sup>2+</sup> ions substituted for the tetrahedrally coordinated Mg<sup>2+</sup> ions in the MgAl<sub>2</sub>O<sub>4</sub> lattice. Passive Q-switching of solid-state lasers with solid-state saturable absorbers is a very attractive Q-switching technique because it allows to develop compact and low cost laser sources of nano and sub nanosecond pulses far various applications

Lasers emitting at 1.5µm are of great interest for several industrial applications. This interest is, first of all, due to eye-safety of 1.5-µm radiation. Other advantages of this wavelength are high transparency in atmosphere and fused-silica wave guides and availability of sensitive room temperature light detectors(Ge and InGaAs photo diodes).All this makes 1.5µm lasers very attractive for applications in range-finder, environmental sensing, telecommunications, surgery, etc. Co: Spinel absorption peak is close to 1520nm, which is most used in eye-safe laser. The absorption cross-section at 1520nm is 3.5×10<sup>-19</sup>cm<sup>2</sup> and at 1331 is 2.8×10<sup>-19</sup>cm<sup>2</sup>, it has reported as Q-switch crystal for Er,Yb:glass and Nd:GYSGG,Nd:YALO,.

## **FEATURES**

- Rare excited absorption
- High constant of Q-switch
- High absorption section
- Long excited lifetime
- Evenly distributed cobalt
- · Wide absorption band

### **APPLICATIONS**

- Ultra compact pulsed diode pumped laser
- 1535nm(100uj) pulse laser used in range
- 1535nm(1KHZ))pulse laser used in range and lidar



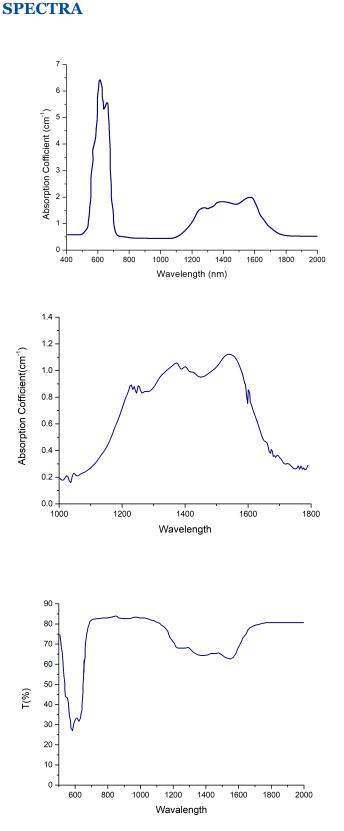
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### PARAMETERS

### PHYSICAL AND CHEMICAL PROPERTIES

Value
Co <sup>2+</sup> :MgAl <sub>2</sub> O <sub>4</sub>
Cubic
8.07Å
3.62 g/cm <sup>3</sup>
2105°C
n=1.6948 @1.54 µm
0.033W
1.046
5.9
8.2
25dB
[100] or [111] < ±0.5°
0.1-0.9
>500 MW/cm <sup>2</sup>



#### METARIAL AND SPECIFICATIONS

Property	Value
Concentrations	(0.05~0.35) wt%
Absorption coefficient	$0 \sim 7 \ \text{cm}^{-1}$
Ground-state absorption cross-section	2.8 (±0.4) @1340nm
Excited state absorption cross-section	2.0 (±0.6) @1340nm
Ground-state absorption cross-section	3.5 (±0.4) @1540nm
Excited state absorption cross-section	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@1540, R<0.2%