

Co:Spinel

Cobalt-doped MgAl_2O_4



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 ($\text{Co:MgAl}_2\text{O}_4$) allow the generation of short nanosecond pulse with high peak power around the eye-safe wavelength of 1.5 μm , perfect for telemetry applications. The absorption spectrum of Co^{2+} -doped MgAl_2O_4 exhibited a broad absorption band in the wavelength range of 1200–1600 nm, which indicated that Co^{2+} ions substituted for the tetrahedrally coordinated Mg^{2+} ions in the MgAl_2O_4 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 for various applications

Lasers emitting at 1.5 μm 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 1.5 μm 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 $3.5 \times 10^{-19} \text{cm}^2$ and at 1331 is $2.8 \times 10^{-19} \text{cm}^2$, it has reported as Q-switch crystal for Er, Yb:glass and Nd:GYSGG, Nd:YAL O_3 .

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

Property	Value
Chemical formula	$\text{Co}^{2+}:\text{MgAl}_2\text{O}_4$
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

METARIAL AND SPECIFICATIONS

Property	Value
Concentrations	(0.05~0.35) wt%
Absorption coefficient	0 ~ 7 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%

SPECTRA

