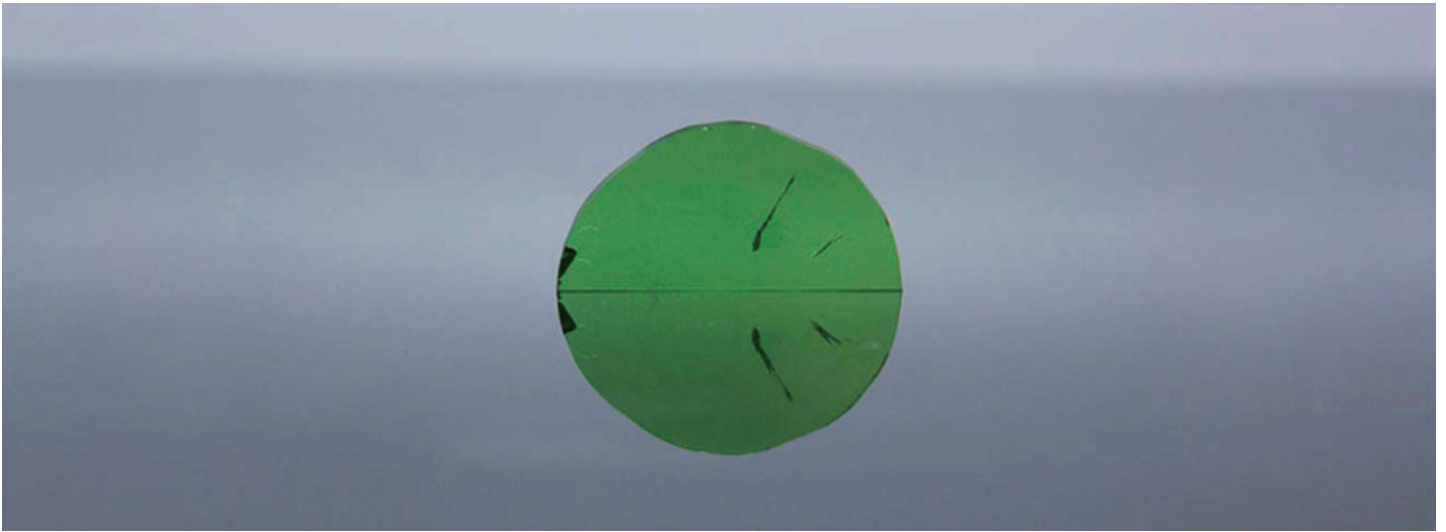


Cr:GSGG



DESCRIPTION

Cr:GSGG crystal (Cr doped Gadolinium scandium gallium garnet) is a laser material with high efficiency. An electro-optic shutter element was first utilized to provide Q-switched operation of the ruby laser. Passive Q-switched ruby lasers were achieved with saturable dye absorbers and colored glass (compounds of selenium and cadmium sulfide). Recently the operational characteristics of a dye Q-switch for a pulsed ruby laser was still studied for application in underwater holography. However, the dye Q-switch was limited in durability because of degradation (decomposition) of the dyes and the glass Q-switch was readily damaged. Thus, the tetravalent chromium doped gadolinium scandium gallium garnet $Gd_3Sc_2Ga_3O_{12}$ (Cr^{4+} :GSGG) passive Q-switch ruby laser-offers for the first time high reliability, durability and high efficiency.

Cr:GSGG crystal – a crystal which shows high efficiency and high reliability.

Cr^{4+} : GSGG has been utilized for the first time to provide a saturable absorber Q-switch for the ruby laser. Single output pulse operation (100 mJ and 27 ns duration) with efficiencies relative to the free-running ruby laser operation of 25-30% was routinely obtained.

The crystalline material Cr^{3+} :GSGG is currently of interest as a broad-band, room temperature laser material. The small separation between the 4T_2 and 2E electron-

ic levels of Cr^{3+} in the system can result in interesting spectroscopic behaviour. People have investigated the temperature dependence of the CW and transient luminescence, and have found it to be consistent with a model for the dominant Cr^{3+} site in which the lowest energy 2E and 4T_2 levels are approximately coincident in energy at low temperature.

APPLICATIONS

- Cr^{4+} : GSGG used in saturable absorber Q-switch for the ruby laser.

The tetravalent chromium doped gadolinium scandium gallium garnet $Gd_3Sc_2Ga_3O_{12}$ (Cr^{4+} :GSGG) passive Q-switch ruby laser-offers for the first time high reliability, durability and high efficiency. Single output pulse operation (100 mJ and 27 ns duration) with efficiencies relative to the free-running ruby laser operation of 25-30% was routinely obtained.

FEATURES

- High reliability
- High efficiency
- High durability
- Strong and saturable absorption
- Good thermal conductivity



Cr:GSGG

PARAMETERS

SPECTRAL PROPERTIES

Emission wavelength (nm)	1061.2
Emission Cross Section (pm ²) ^a	13
R ₂ ->Y ₃ Transition Linewidth (cm ⁻¹)	11.5
Nd ³⁺ Fluorescence Lifetime (ps) at Low Concentrations (<10 ¹⁷ cm ⁻³)	273-283
Nd ³⁺ concentration for which lifetime is reduced by 50% (10 ²⁰ Nd ions cm ⁻³)	5

OPTICAL PROPERTIES

Refractive index at 1064 nm	1.9424
Index change with temperature dn / dt, (10 ⁻⁶ K ⁻¹)	10.9
Index change with temperature	
P11	-0.012 ± 0.003
P12	0.019 ± 0.003
P44	-0.0665 ± 0.0013

OPTICAL PROPERTIES

Density (g*cm ⁻³)	6.495
Calorific Capacity (J*g ⁻¹ *K ⁻¹)	0.4029
Thermal Conductivity (W*m ⁻¹ *K ⁻¹)	6
Thermal Expansivity (10 ⁻⁶ K ⁻¹)	7.5
Poisson Ratio	0.28
Young's Modulus (GPa)	210
Breaking Tenacity (MPa)	1.2
Thermal Stress Resistance (W*m ⁻¹) ^b	660

SPECTRA

