Laser Glass

Erbium Glass (Er,Cr,Yb Glass)

Erbium Glass doped with Er^{3+}, Yb^{3+} and Cr^{3+}, Erbium-doped glass laser provides a useful coherent source in the spectral range near 1.5 μm, which is relatively safe for the human eye and is convenient in many applications, such as lidar and range measurements, fiber-optic communication, and laser surgery. In spite of the considerable progress in the development of InGaAs laser diode pump sources, Xe flashlamp will continue to be used as pump sources of Er: glass lasers because of their high reliability and low cost, and also the simplicity of design of such systems. Since about half the flashlamp radiation energy is emitted in the visible and near infrared (IR) ranges, a second sensitizer Cr^{3+} is introduced into Yb-Er laser glasses to utilize this energy.

Key Features

- High laser efficiency
- Low laser threshold
- Safe for human eye
- High light conversion

Applications

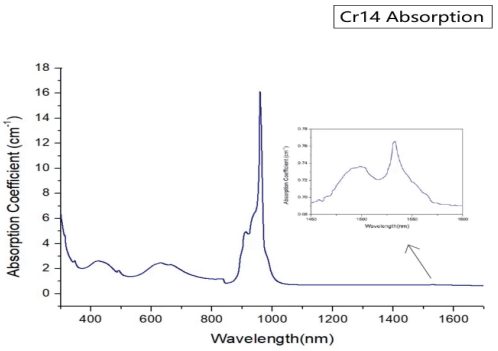
Lidar

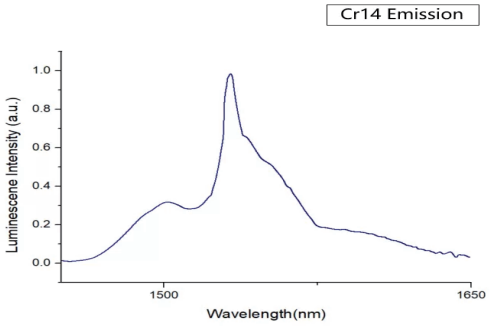
Range measurements

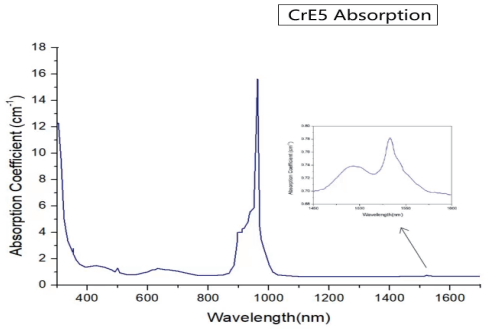
Fiber-optic communication

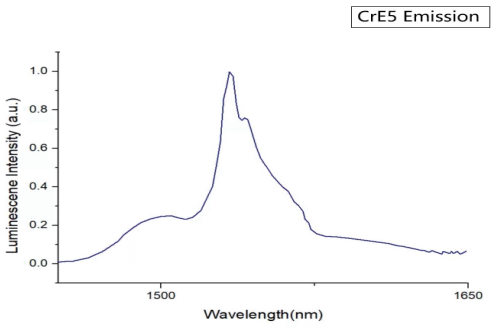
Laser surgery

Spectra









Technical Specifications

Material Specifications		
Materials	Cr14	CrE5
Mass Density	3.10 g/cm^3	2.95 g/cm^3
Mohs Hardness	8.5	8.5
Young's Modulus	57.6 GPa	57.6 GPa
Strength of Extension	2 GPa	2 GPa
Thermal Conductivity	0.7	0.8
Specific Heat Capacity/（J·g^{-1}·K^{-1}）	0.59	0.59
Thermal Shock Resistance Parameters	800 W/m	800 W/m
Thermal Coefficient Optical path length（10^{-7} /℃）（20~100℃）	3.6	-
Linear Thermal Expansion Coefficient（10^{-7} / K）（20~100℃）	103	80.5
Linear Thermal Expansion Coefficient（10^{-7} / K）（100~300℃）	127	87
Softening Temperature（℃）	493	519
Transformation Temperature（℃）	455	476
Chemical Durability (weight loss in 100 C distilled water)（μg/ hr.cm^2）	103	-
dn / dT（10^{-6} /℃）（20~100℃）	-5.2	-6.8
Refractive Index @ 1535 nm	1.53	1.533
Refractive Index @ 589.3nm	1.539	1.541
Abbe Value	64	63.6

Optical Properties	
Optical Density	0.1 to 0.8
Fluorescent Lifetime	7.7-8.2 ms
Concentration	0.5 mol % ~ 3 mol %
Emission Wavelength	1535 nm
Absorption Coefficient	1.0 cm^{-1} ~ 7 cm^{-1}
Emission Absorption Cross Section	0.75×10^{-20}cm^2@1535nm
Transmittance	10% to 90%
Coating	AR≤ 0.2% @1535nm
Damage Threshold	> 500 MW / cm^2

Polishing Specifications	
Orientation Tolerance	< 0.5°
Thickness/Diameter Tolerance	±0.05 mm
Flatness	<λ/8@632 nm
Wavefront Distortion	<λ/4@632 nm
Surface Finish	10^{-5}
Parallelism	10″
Perpendicularity	15′
Clear Aperture	>90%
Chamfer	<0.1×45°
Max. Size	dia (3-12.7)×（3-150）mm^2