

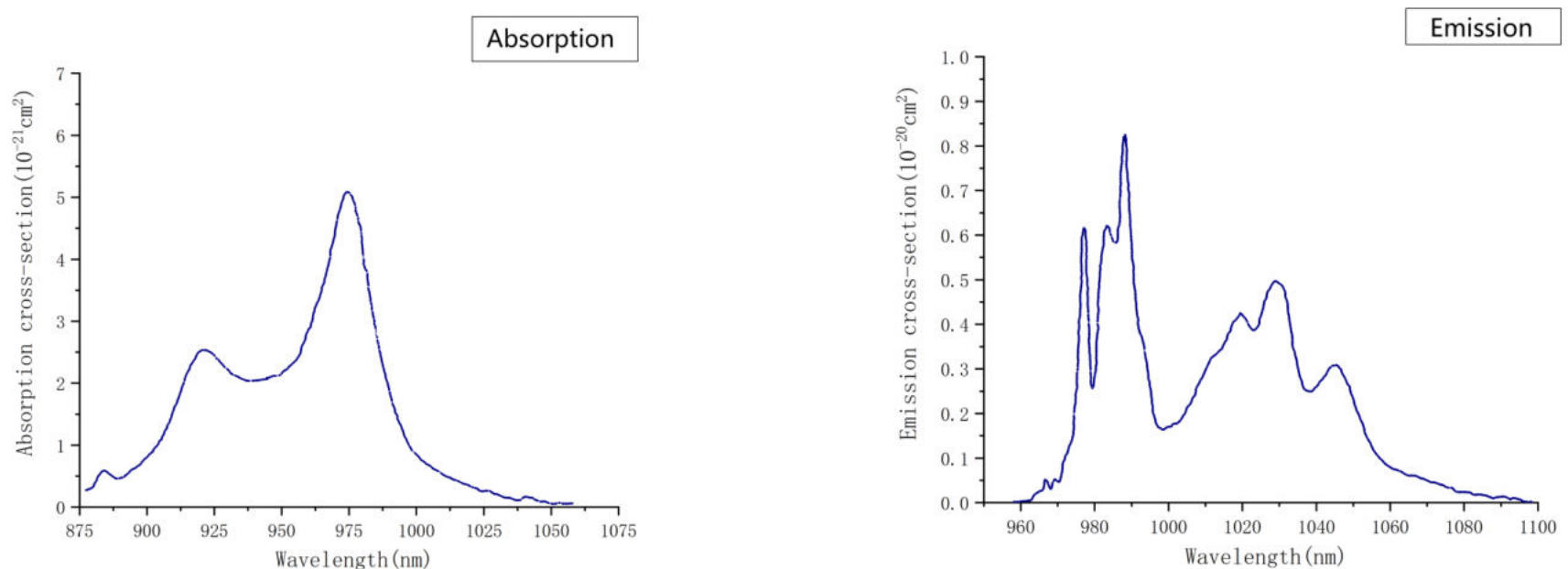
Yb:CaF₂



DESCRIPTION

Yb: CaF₂ is a new laser crystal which is formed by doping Yb into CaF₂. The main emission peak are reported to be at 1033 nm and 1050 nm with the emission linewidth of 70 nm. Because of the absence of undesired loss transitions such as up-conversion, excited state-absorption and concentration quenching, their low quantum defect, a comparably long fluorescence lifetime, high thermal conductivity and wide emission linewidth, ytterbium-doped CaF₂ is preferably utilized for high-power diode-pumped systems and laser amplifiers with high optical-to-optical conversion efficiencies, diode-pumped femtosecond (fs) lasers and amplifiers are one of the important potential application. Furthermore, at the current point of view the crystal growth technologies of Yb: CaF₂ promise to be scalable, which allows for the production of excellent optical quality material.

SPECTRA



PARAMETER

Material and Specifications

Concentration Tolerance (atm%)	0.5 mol % ~ 30 mol %
Orientation	[111] or [100] < $\pm 0.5^\circ$
Orientation Tolerance	< 0.5°
Parallelism	10"
Perpendicularity	15'
Surface Quality	10-5(MIL-O-13830A)
Wavefront Distortion	< $\lambda/8$ @632 nm
Surface Flatness	< $\lambda/8$ @632 nm
Clear Aperture	>90%
Chamfer	< $0.1 \times 45^\circ$
Thickness/Diameter Tolerance	± 0.05 mm
Maximum Dimensions	2*2-15*15 mm×20mm
Thermal Shock Resistance Parameter	800 W/m
Coatings	AR \leq 0.2% @1030nm

Physical and Chemical Properties

Crystal Structure	cubic
Lattice Constants	5.462
Density	3.18 g/cm ³
Melting Point	1418°C
Thermal Conductivity / (W·m ⁻¹ ·K ⁻¹ @25°C)	9.71
Specific Heat/ (J·g ⁻¹ ·K ⁻¹)	0.8876
Thermal Optical Coefficient(dn/dT)	-11.3
Thermal Expansion / (10 ⁻⁶ ·K ⁻¹ @25°C)	19
Hardness (Mohs)	4
Young`s Modulus /GPa	146
Tensile Strength/Gpa	2

Optical and Spectral Properties

Laser Transition	2F5/2→2F7/2
Laser Wavelength	1033/1050
Optical Density	0.1-0.8
Absorption Coefficient	1.0 cm ⁻¹ ~ 7 cm ⁻¹
Pump Wavelength	980 nm
Emission State Absorption Cross Section	2.2×10 ⁻²⁰ cm ²
Ground State Absorption Cross Section	0.8×10 ⁻²⁰ cm ²
Fluorescence Lifetime	2.4 ms
Emission Band Width	70 nm
Refractive Index @1.064μm	1.2996
Thermal Optical Coefficient (10 ⁻⁶ K ⁻¹)	-3.7
Transmission	10% to 90%
Damage Threshold	> 500 MW/cm ²

FEATURES

- Wide emission linewidth
- Low quantum defect
- Comparably long fluorescence lifetime
- High thermal conductivity
- Thermo-optical coefficient

APPLICATIONS

- Kerr-lens mode-locked oscillator
- Yb: CaF₂ thin-disk laser
- Diode-pumped Yb: CaF₂ amplifier

