

Yb:CaF₂ - Ytterbium Doped Calcium Fluoride

Introduction

Ytterbium-doped Calcium fluoride (Yb: CaF₂), grown by Czochralski technique, is with long fluorescence lifetime and broad absorption bands, which make it an ideal material for laser diode pumping.

Yb:CaF₂ exhibits broad emission bandwidth as well as limited non-linear effects under intense irradiation, supporting generation of ultra-short pulses and high-power operation.



CASTECH's laser crystal Yb: CaF₂ is featured by

- Low quantum defect, long fluorescence lifetime
- Wide optical transmission range (0.12 μm~10 μm)
- Low dispersion behavior
- Limited nonlinear effects under intense laser irradiation
- Customized coatings are available

Table 1. Basic Properties

Dopant Concentration	1~10 at.%
Absorption Peak Wavelength	979 nm
Absorption Cross Section @980 nm	$5.4 \times 10^{-21} \text{ cm}^2$
Emission Cross Section @1035 nm	$2.3 \times 10^{-21} \text{ cm}^2$
Fluorescence Lifetime	2.2 ms
Refractive Index @1035 nm	1.42866
Crystal Structure	Cubic
Cleavage Plane	(111)
Melting Point	1418 °C
Nonlinear Refractive Index	$1.9 \times 10^{-16} \text{ cm}^2/\text{W}$
Density	3.18 g/cm ³
Thermal Conductivity	9.71 W/m/K
Thermal Expansion Coefficient	$18.41 \times 10^{-6} / \text{K}$
Mohs Hardness	4 Mohs