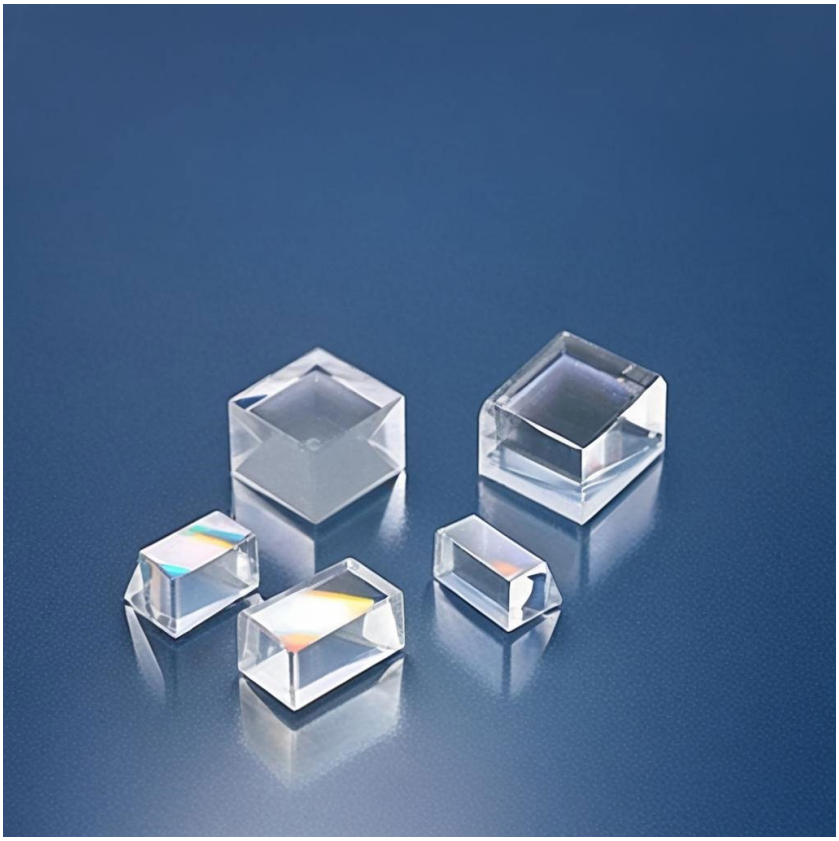
Photonics On Crystals

POC-OC-122454-Yb:YAP crystal Datasheet

1 Main Features

- Biaxial orthorhombic crystal with high thermal conductivity.
- High absorption cross-section dependent on crystallographic orientation.
- Wide absorption bandwidth near 978 nm.
- Low quantum defect, supporting high-efficiency applications.
- Custom crystals available upon request.



2. Material General Description

Ytterbium-doped Yttrium Aluminum Perovskite (Yb:YAP) is a biaxial orthorhombic crystal, exhibiting high anisotropic thermal expansion coefficients and birefringence. Unlike Yb:YAG, Yb:YAP crystals provide superior absorption cross-sections, which are highly dependent on their crystallographic orientation. This material is renowned for its excellent thermal conductivity and high optical efficiency, making it suitable for high-power laser applications. Yb:YAP crystals are polarized, with emission and absorption cross-sections optimized based on crystal orientation. These properties make them an excellent choice for femtosecond and mode-locked thin-disk laser systems.

3. General Applications and Examples

Yb:YAP crystals are utilized in a wide range of laser applications:

- **High-Power CW Lasers:** Due to their superior thermal conductivity and wide absorption spectrum, Yb:YAP crystals are suitable for continuous wave laser systems requiring efficient heat management.
- **Mode-Locked Thin-Disk Lasers:** The polarization and absorption characteristics allow for the generation of ultrafast femtosecond pulses.
- **Medical and Industrial Applications:** Their ability to handle high-power densities makes them ideal for cutting-edge medical lasers and industrial processes like material engraving or cutting.
- **Nonlinear Optical Applications:** Yb:YAP crystals are well-suited for generating second-harmonic or frequency-doubled laser outputs for various photonics applications.

4. Chemical, Physical, or Structural Properties

Property	Value
Absorption Peak Wavelength	978 nm
Absorption Cross-Section	6.6 x 10^-20 cm^2
Absorption Bandwidth	4 nm
Laser Wavelength	1040 nm
Lifetime of Yb Energy Level	500 µs
Emission Cross-Section	0.5 x 10^-20 cm^2
Refractive Index (at 632.8 nm)	n_o = 1.7015, n_e = 1.7757
Density	5.35 g/cm^3
Mohs Hardness	8.5
Thermal Conductivity	11.7 W/m·K
dn/dT	7.7 x 10^-6 K^-1 (n_o), 4.8 x 10^-6 K^-1 (n_e)
Thermal Expansion Coefficient	2 x 10^-6 K^-1
Typical Doping Level	2-4%

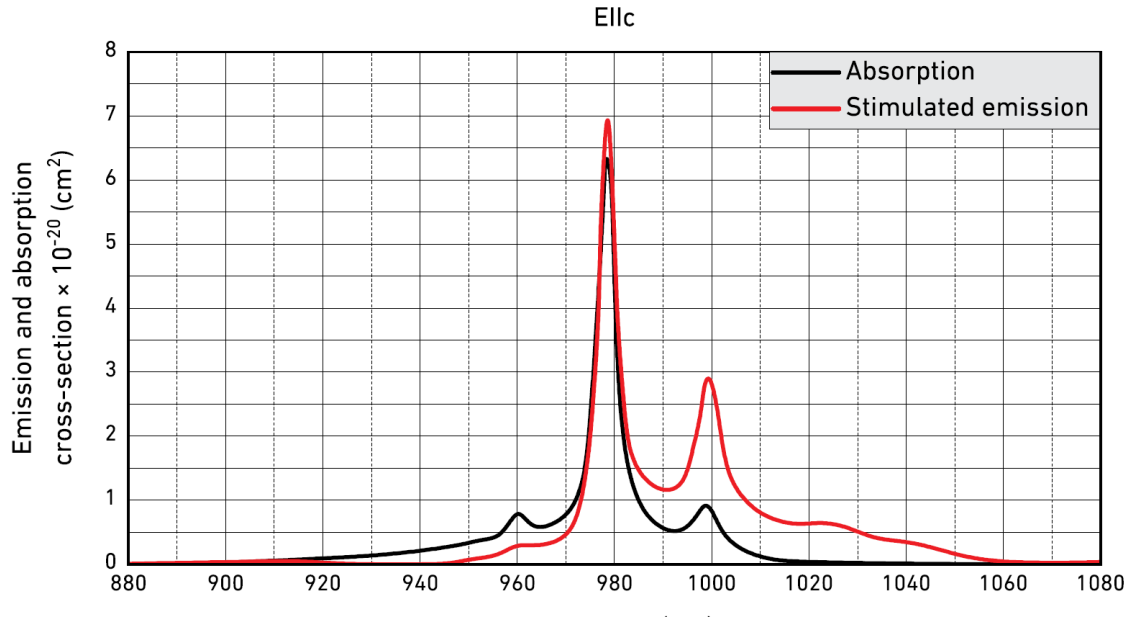
5. Optical, Laser, or Nonlinear Optical Properties

Parameter	Value
Absorption Peak Wavelength	978 nm
Emission Wavelength	1040 nm
Emission Cross-Section	0.5 x 10^-20 cm^2
Refractive Index	n_o = 1.7015, n_e = 1.7757
Thermal Conductivity	11.7 W/m·K

Lifetime	500 µs

6. Spectrum Transmission Curves

The Yb:YAP crystal has a high absorption coefficient at 978 nm and emission at 1040 nm, as shown in the graph. This supports efficient pump absorption and high laser output.



7. Coating Specification

- Anti-Reflective Coatings: AR@978-1040 nm.
- Reflectivity: R < 0.25% on both surfaces.
- Additional coatings can be customized upon request.

8. Standard Fabrication Specifications

Specification	**Value**
Orientation	c-cut, a-cut available
Clear Aperture	>90%
Face Dimension Tolerance	±0.01 mm
Length Tolerance	±0.1 mm
Parallelism Error	<20 arcsec
Perpendicularity Error	<10 arcmin
Surface Flatness	λ/10 @ 632.8 nm
Surface Quality	20-10 Scratch/Dig
Protective Chamfers	<0.1 mm at 45°
Laser-Induced Damage Threshold (LIDT)	>10 J/cm^2 @1040 nm, 10 ns

9. POC Strength and Capabilities

Photonics On Crystals (POC) specializes in the manufacturing and customization of advanced laser crystals. POC is committed to providing:

- High-quality laser crystals with optimized optical and thermal properties.
- Advanced fabrication capabilities to meet stringent customer requirements.
- Comprehensive technical support for tailored applications.
- Custom coatings and orientation specifications upon request.

10. Standard Products

Face Dimensions	**Length**	**End Faces**	**Orientation**	**Doping**	**Coatings**	**SKU**	**Price (USD)**
3 x 3 mm	2 mm	Right-angle cut	c-cut	10%	AR@AR@960-1060 nm	12826	Request
3 x 3 mm	2 mm	Brewster-angle cut	c-cut	10%	Uncoated	12827	Request
3 x 3 mm	2 mm	Right-angle cut	θ = 31°, ϕ = 0°	10%	AR@AR@960-1060 nm	12828	Request
Customization	**Upon Request**	**Available**	**Available**	**Custom**	**Available**	**--**	**Custom Quote**

This comprehensive data sheet for Yb:YAP crystals is tailored for technical and industrial needs, adhering to the highest standards of quality and precision for Photonics On Crystals.