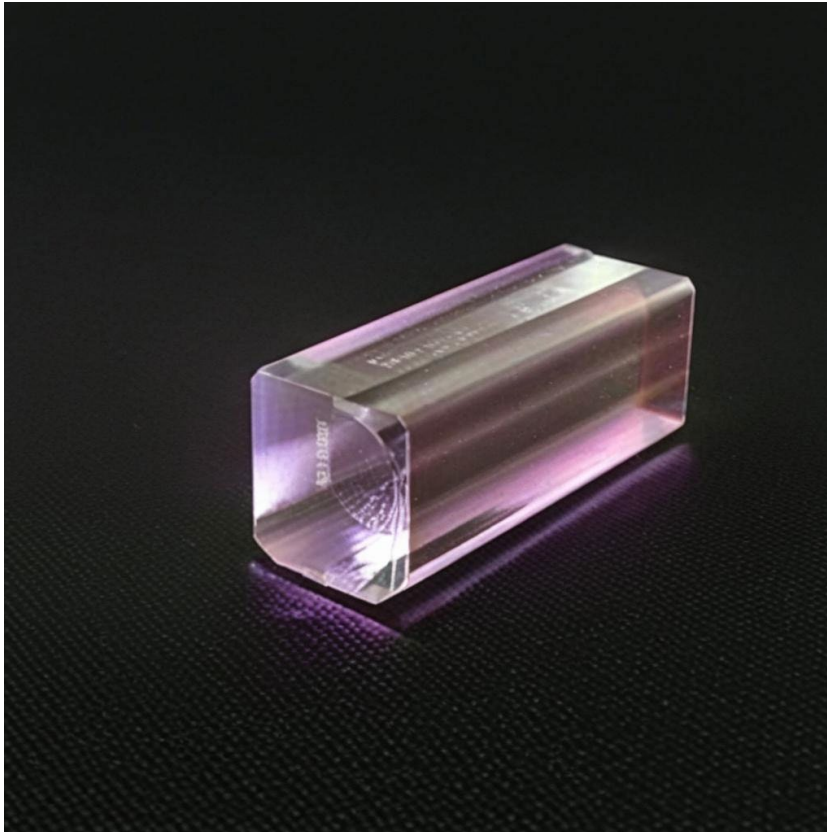


POC-OC-122482-Co²⁺ /ZnS Crystal Datasheet

1 Main Features

- Broad tunability for mid-IR laser systems (1.5–4.0 μm range).
- High absorption and emission cross-sections, enabling efficient laser performance.
- Excellent durability and thermal stability for demanding applications.
- Suitable for high-power laser systems and medical devices.
- Precise optical performance with customizable coating options.



2. Material General Description

Co²⁺/ZnS crystals are a unique class of doped materials that exhibit remarkable optical and physical properties. These crystals are optimized for mid-infrared (mid-IR) applications, offering wide tunability in the 1.5–4.0 μm wavelength range. Doping zinc sulfide (ZnS) with cobalt ions introduces strong absorption and emission characteristics, making it a superior gain medium for various laser applications. With excellent mechanical properties and thermal stability, Co²⁺/ZnS is highly durable and resistant to environmental degradation, ensuring longevity and consistent performance. These crystals are compatible with advanced laser technologies and are suitable for both continuous-wave (CW) and pulsed laser operations.

3. General Applications and Examples

1. Mid-IR Laser Systems:

Co²⁺/ZnS crystals are widely used in mid-IR laser systems, especially in high-power and tunable laser configurations for material processing and industrial applications.

2. Medical Applications:

These crystals are ideal for laser surgery and therapeutic devices operating in the mid-IR spectrum, where high absorption by water and soft tissues ensures precise and effective procedures.

3. Remote Sensing and Spectroscopy:

Co²⁺/ZnS crystals serve as gain media in laser systems used for environmental monitoring, remote sensing, and gas detection, owing to their ability to operate in the mid-infrared atmospheric transmission windows.

4. Research Applications:

In scientific research, these crystals are used to develop novel laser systems and investigate optical properties for advanced photonics research.

5. Optical Parametric Oscillators (OPOs):

Co²⁺/ZnS is commonly utilized in OPOs to generate mid-IR radiation for use in spectroscopy, bioimaging, and industrial diagnostics.

4. Chemical, Physical, or Structural Properties

Property	Value
Chemical Formula	ZnS with Co ²⁺ doping
Density	4.09 g/cm ³
Thermal Conductivity	~27 W·m ⁻¹ ·K ⁻¹
Melting Point	~1700°C
Hardness	~3.5 (Moh's scale)
Crystal Structure	Cubic
Refractive Index	~2.3
Orientation	<111>, <110>, <100>
Cleavage Plane	<111>

5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Transparency Range	0.4–12 μm

Emission Wavelength Range	1.5–4.0 μm
Absorption Cross-Section	High
Emission Cross-Section	High
Pump Wavelength Range	\sim 0.9–1.2 μm
Laser Damage Threshold	>500 MW/cm ²

6. Spectrum Transmission Curves

The transmission spectrum of Co²⁺/ZnS crystal demonstrates high transparency over a broad wavelength range, particularly in the mid-IR region (0.4–12 μm). This allows for efficient operation in laser and optical systems. Detailed graphs showcasing transmission curves can be provided upon request.

7. Coating Specification

- **Anti-Reflection Coating:** Customized for 1.5–4.0 μm with reflectance <0.5%.
- **Protective Coatings:** Enhance resistance to environmental damage and mechanical wear.
- **Specialized Coatings:** Tailored coatings available for specific wavelengths and applications.

8. Standard Fabrication Specifications

Specification	Value
Dimensional Tolerance	\pm 0.05 mm
Surface Quality	40-20 (scratch-dig rating)
Surface Flatness	$\lambda/8$ @ 632.8 nm
Parallelism	<30 arcsec
Bevel	<0.25 \times 45°
Diameter Range	Up to 100 mm
Thickness Range	1–10 mm

9. POC Strength and Capabilities

Photonics On Crystals (POC) is a leader in developing and manufacturing Co²⁺/ZnS crystals tailored for advanced laser and optical systems. Our expertise spans high-quality fabrication, cutting-edge research, and customized solutions to meet industry-specific demands. POC ensures the highest quality standards for all Co²⁺/ZnS products, delivering unmatched reliability and performance.

10. Standard Products

Product	Dimensions	Price (USD)
Co ²⁺ /ZnS Laser Rods	10–50 mm length	\$1,000–\$5,000
Co ²⁺ /ZnS Optical Windows	20–100 mm diameter	\$1,500–\$8,000
Co ²⁺ /ZnS Gain Mediums	Custom dimensions	\$3,000–\$15,000
Customization Options	Available on request	Contact for quote