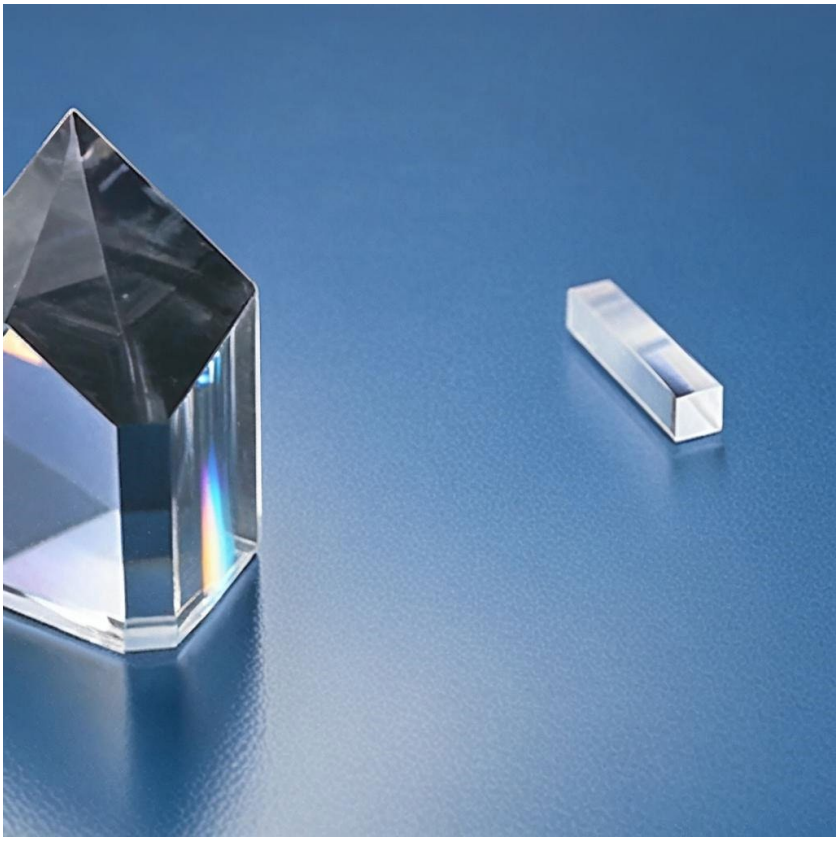
Photonics On Crystals

POC-OC-122434-Yb:KGW Crystal Datasheet

1 Main Features

- High absorption coefficient at 981 nm and stimulated emission cross-section.
- Extremely low quantum defect and broad polarized output (1023–1060 nm).
- High slope efficiency with diode pumping.
- Large gain bandwidth and small quantum defect.
- Customizable Yb doping levels for diverse applications.



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2. Material General Description

Ytterbium-doped Potassium Gadolinium Tungstate (Yb:KGW) is a monoclinic crystal known for its broad emission bandwidth, making it suitable for ultrafast laser applications. It features high thermal conductivity, enabling efficient heat dissipation under intense laser pumping conditions. The unique structural properties of Yb:KGW allow operation with high doping concentrations, minimizing quantum defects. These characteristics ensure low lasing thresholds, high efficiency, and superior performance for femtosecond lasers, CW lasers, and regenerative amplifiers.

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3. General Applications and Examples

Yb:KGW crystals are widely used in:

1. **Femtosecond Lasers**: Enable pulse durations below 100 fs, crucial for ultrafast spectroscopy and high-precision micromachining.
2. **CW Lasers and Mode-Locked Lasers**: Deliver stable and efficient output for scientific and industrial applications.
3. **Thin-Disk Lasers**: High gain bandwidth and excellent thermal conductivity make Yb:KGW ideal for thin-disk laser designs.
4. **Diode Laser Pumping**: The broad absorption spectrum at 981 nm ensures compatibility with commercial laser diodes.
5. **Medical Applications**: Provide high-powered outputs for advanced surgical techniques and diagnostics.

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4. Chemical, Physical, and Structural Properties

Property	**Value**
Crystal Structure	Monoclinic
Point Group	C2/c
Lattice Parameters (Å)	a = 8.09, b = 10.43, c = 7.588, β = 94.4°
Density	7.27 g/cm³
Melting Point	1075 °C
Mohs Hardness	5
Thermal Conductivity (W/m·K)	K_100 = 3.4, K_a = 2.6
Thermal Expansion Coefficients	a = 4 × 10^-6 K^-1, b = 8.5 × 10^-6 K^-1

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5. Optical and Laser Properties

Property	**Value**
Lasing Wavelength	1023–1060 nm
Absorption Bandwidth	981 nm (FWHM 3.7 nm)
Fluorescence Lifetime	600 µs (5% doping)
Stimulated Emission Cross-Section	3 × 10^-20 cm² (@ 1030 nm)
Refractive Index (1067 nm)	n_x = 2.033, n_y = 2.037, n_z = 1.986

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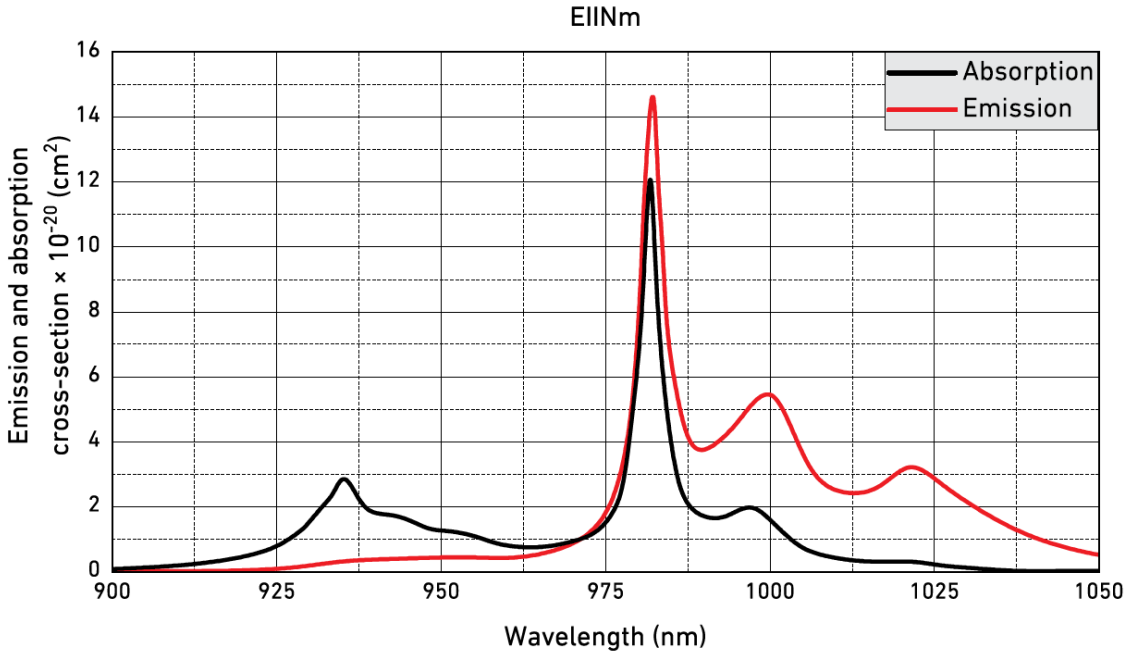
6. Spectrum Transmission Curve

The absorption and emission spectra highlight the broad bandwidth at 981 nm and efficient emission around 1030 nm, suitable for femtosecond and thin-disk lasers.



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7. Coating Specification

- AR coatings available for 1030/980 nm configurations.
- Reflectance: R < 0.2% @ 1030 nm; R < 0.5% @ 980 nm.
- Custom coating specifications can be provided upon request.

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8. Standard Fabrication Specifications

Parameter	**Specification**
Orientation	[010]
Standard Dopant Level	5 at.%
Maximum Length	50 mm
Dimensional Tolerances	Diameter: ±0.1 mm, Length: ±0.5 mm
Surface Quality (Scratch/Dig)	20/10
Surface Flatness	λ/6 @ 633 nm
Parallelism	20 arc sec
Perpendicularity	≤15 arc min

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9. POC Strength and Capabilities

Photonics On Crystals (POC) excels in the production of high-quality Yb:KGW crystals tailored for advanced laser applications. Our state-of-the-art facilities ensure precise doping, superior surface quality, and reliable performance. POC supports customization to meet specific project requirements and guarantees prompt delivery with stringent quality control.

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10. Standard Products

Face Dimensions	Length	End Faces	Doping	Coatings	Price (USD)
3 × 3 mm	10 mm	Brewster-angle cut	1%	Uncoated	$590
5 × 5 mm	5 mm	Right-angle cut	2%	AR 980/1030 nm	$640
3 × 3 mm	2 mm	Brewster-angle cut	3%	Uncoated	$590
5 × 5 mm	5 mm	Right-angle cut	5%	AR 980/1030 nm	$640
Custom Size	Custom	Any	Custom	Custom	Request