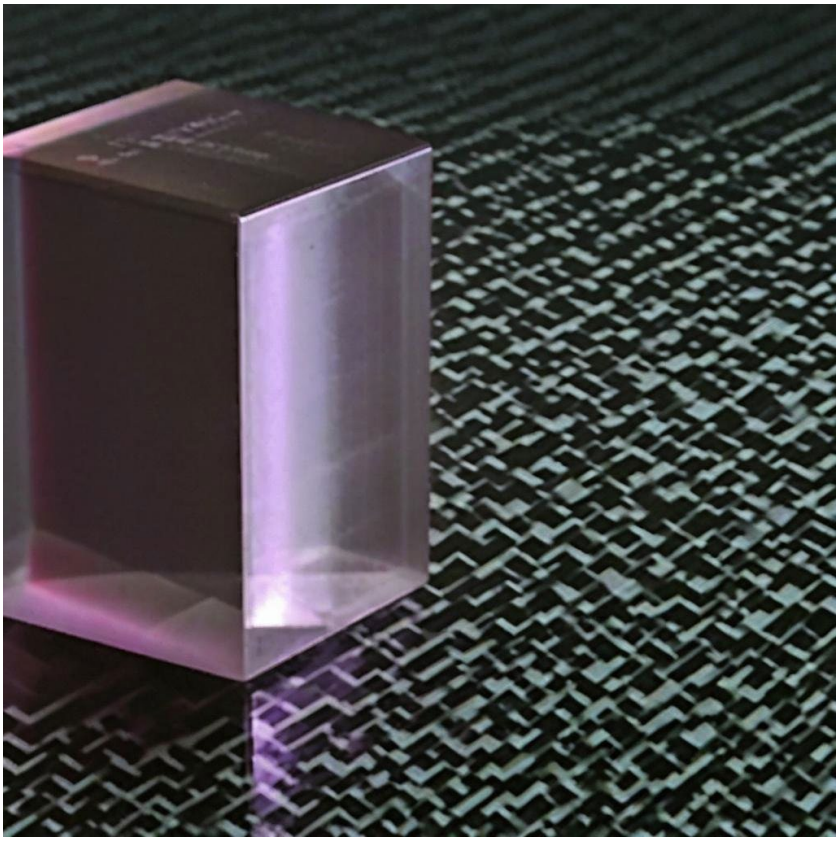
Photonics On Crystals

POC-OC-122436-Cr:LiSAF Crystal Datasheet

1 Main Features

- Broad absorption and emission bands suitable for femtosecond laser applications.
- High slope efficiency and energy storage capabilities.
- Nonlinear refractive index significantly lower than Ti:Sapphire, reducing parasitic nonlinearities.
- Customizable crystal dimensions and coatings upon request.
- Durable with excellent thermal and mechanical properties.



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2. Material General Description

Cr:LiSAF (Chromium-doped Lithium Strontium Aluminum Fluoride) crystals are exceptional laser materials for producing ultra-short pulses and high-energy lasers. The material is characterized by its trigonal crystal structure and high fluorescence efficiency, making it a reliable choice for femtosecond and CPA (Chirped Pulse Amplification) laser systems. Cr:LiSAF crystals offer broad absorption and emission spectra in the near-infrared region, ensuring effective pumping using flash lamps or diode lasers. They feature low nonlinear refractive indices, making them suitable for constructing high-Q cavities with minimal losses. Their tunable wavelength operation and high laser damage threshold position them as an efficient medium for laser development.

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3. General Applications and Examples

Cr:LiSAF crystals are widely utilized in:

1. **Femtosecond Lasers:** The wide emission spectrum facilitates the generation of femtosecond pulses (~10 fs) for precision material processing and biomedical applications.
2. **CPA Laser Systems:** Excellent energy storage and low thermal distortion make Cr:LiSAF ideal for high-power laser systems.
3. **Scientific Research:** Used in spectroscopy, pump-probe experiments, and advanced microscopy techniques.
4. **Industrial Applications:** Precision micromachining and fine material removal benefit from its ultra-short pulse generation capability.
5. **Medical Applications:** Laser systems for corneal surgery and other sensitive medical procedures.

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4. Chemical, Physical, or Structural Properties

Property	Specification
Formula	Cr:LiSAF
Crystal Structure	Trigonal (Point Group P31c)
Lattice Parameters	a = 5.084 A, c = 10.21 A
Melting Point	766 °C
Density	3.45 g/cm³
Hardness	4.6 (Mohs Scale)
Fracture Toughness	0.40 (1/c)
Thermal Conductivity	3.3 W/mK (parallel), 3.0 W/mK (perpendicular)
Thermal Expansion Coefficient	-10 x 10^-6 K^-1 (parallel), 25 x 10^-6 K^-1 (perpendicular)
Specific Heat	0.842 J/gK

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5. Optical, Laser, or Nonlinear Optical Properties

Property	Specification
Emission Peak	846 nm
Absorption Peak	670 nm
Emission Cross Section	4.8 x 10^-20 cm²
Fluorescence Lifetime	67 µs

Scatter Losses	< 0.2%/cm
dn/dT (Refractive Index Temp Coeff)	-4.8 x 10^-6 (parallel), -2.5 x 10^-6 (perpendicular)

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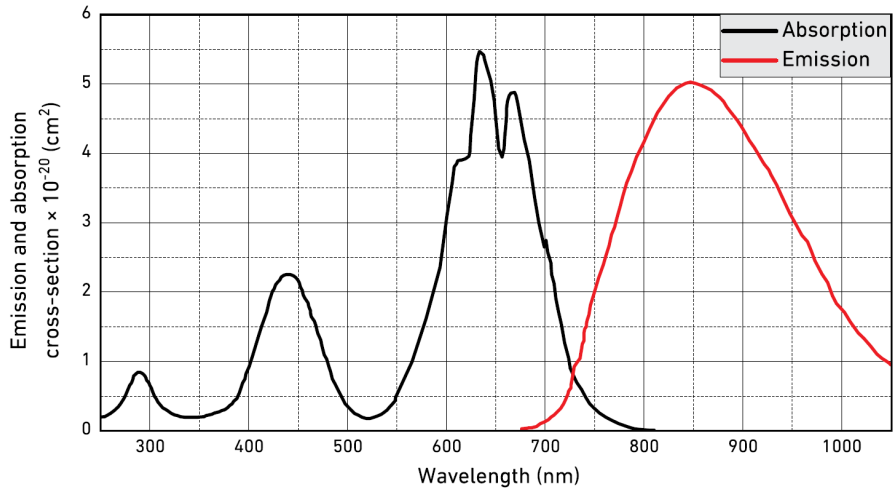
6. Spectrum Transmission Curves

The spectrum demonstrates broad absorption and emission bands, especially in the 650-900 nm range, suitable for tunable laser operations.



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7. Coating Specifications

- Anti-Reflective (AR) Coatings: R < 0.1% at 850 nm.
- Custom coatings available for broader wavelength ranges.

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8. Standard Fabrication Specifications

Property	**Specification**
Dopant Concentration	Cr: 0.5–1.0 at.%
Surface Quality	10/5 (MIL-PRF-13830B)
Dimensions	Diameter: 2-16 mm, Length: 1-60 mm
Flatness	Lambda/8 at 633 nm
Parallelism	< 20 arc sec
Perpendicularity	< 15 arc min
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9. POC Strength and Capabilities

Photonics On Crystals

Photonics On Crystals (POC) is dedicated to delivering high-quality laser crystal solutions. With advanced manufacturing techniques and customization options, POC ensures precise production standards, superior optical performance, and tailored solutions for various high-power laser applications.

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10. Standard Products

Dimensions	Length	Dopant	Coating	SKU	Price (USD)
5 x 5 mm	12 mm	3%	AR@670-1100 nm		770
5 x 5 mm	12 mm	3%	Uncoated		930

Customizations available upon request.