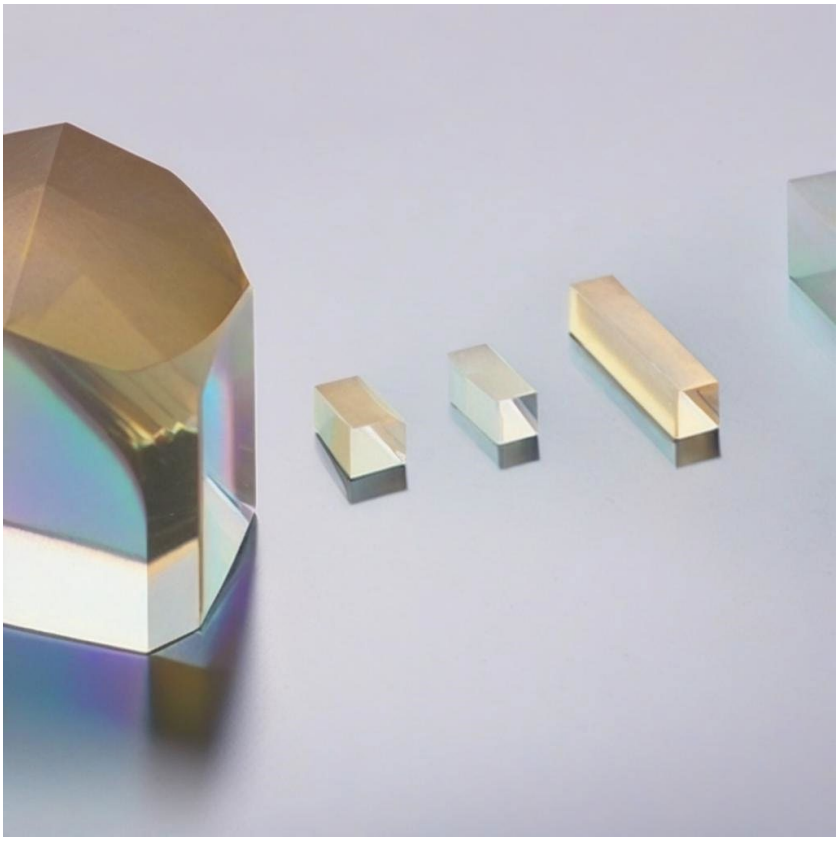
Photonics On Crystals

POC-OC-122430-Nd:YLF Crystal Datasheet

1 Main Features

- Long fluorescence lifetime (485 μs for 1% Nd doping)
- High UV transparency and wide transparency range (180–6700 nm)
- Low thermal conductivity but low thermal lensing distortion
- High optical quality and uniformity with Czochralski growth
- Customizable specifications for rods, slabs, and dopant concentrations



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2. Material General Description

Nd:YLF Crystal is a widely used laser material in solid-state laser systems, especially for continuous-wave and pulsed operations at 1047 nm and 1053 nm. Its tetragonal structure and wide transparency range make it suitable for both fundamental and higher harmonic generations. The lower thermal conductivity compared to Nd:YAG results in reduced thermal distortions, achieving superior beam quality.

Nd:YLF is grown using the precise Czochralski method to ensure excellent quality and minimal scattering losses. These qualities make it ideal for high-energy and high-precision laser systems in industries such as medical, scientific research, and manufacturing.

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3. General Applications and Examples

Nd:YLF Crystals are ideal for numerous laser applications, including:

- **Continuous-wave (CW) and pulsed laser operations** at 1047 nm and 1053 nm.
- **Material processing** such as cutting, welding, and drilling.
- **Medical applications** like ophthalmic surgery using laser systems.
- **Scientific applications** in Raman lasers and harmonic generation systems.
- **Aerospace and defense** for laser rangefinders and LIDAR systems.

Nd:YLF also offers self-polarization for certain orientations, making it particularly useful in resonators and high-precision applications.

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4. Chemical, Physical, or Structural Properties

Property	Value
Chemical Formula	$LiY_{1-o}NdF_4$
Crystal Structure	Tetragonal
Lattice Constants	a = 5.16, c = 10.85
Nd Concentration	~1.4×10^{20} for 1% Nd doping
Density	3.99 g/cm³
Melting Point	819°C
Hardness	300 Knoop
Thermal Expansion Coefficient	8.3×10^{-6} parallel c-axis
Thermal Conductivity	0.063 W/cm·K
Specific Heat	0.79 J/g·K

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5. Optical, Laser, or Nonlinear Optical Properties

Property	Value
Transparency Range	180–6700 nm
Peak Stimulated Emission Cross Section	1.2×10^{-19} cm² at 1053 nm
Fluorescence Lifetime	485 µs for 1% Nd doping
Scatter Losses	<0.2%/cm
Refractive Index (at 1050 nm)	n_o = 1.448, n_e = 1.470

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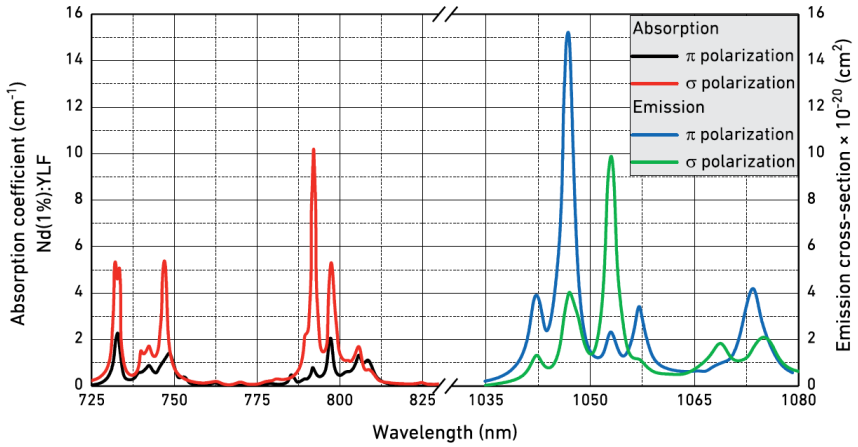
6. Spectrum Transmission Curves

The wide transparency range from UV to near IR is shown in the available data. Absorption peaks at 792 nm and 797 nm correspond to pump wavelengths, while emission peaks align with lasing wavelengths of 1047 nm and 1053 nm. The high transparency in UV and IR makes Nd:YLF suitable for diverse optical systems.



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7. Coating Specification

Nd:YLF Crystals can be AR-coated for wavelengths 1047 nm and 1053 nm. Coating options include:

- R < 0.2% @ 1047/1053 nm (AR-coated)
- Custom coating options available upon request.

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8. Standard Fabrication Specifications

Parameter	Specification
Orientation	c-cut, a-cut
Surface Quality	10/5 scratch/dig
Wavefront Distortion	λ/4 @ 633 nm
Flatness	λ/8 @ 633 nm
Parallelism	<20 arc sec
Perpendicularity	<15 arc min
Chamfer	≤0.2 mm x 45°
End Coating	R < 0.2% @ 1047/1053 nm
Damage Threshold	>10 J/cm² @ 1047/1053 nm, 10 ns, 10 Hz

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9. POC Strength and Capabilities

Https://www.poc.com.sg Photonics on Crystals, A brand of *Shapeoptics Holdings*
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Photonics On Crystals

Photonics On Crystals (POC) offers high-quality Nd:YLF Crystals grown using the Czochralski method. With precise control over doping levels, dimensions, and surface quality, POC ensures that each crystal meets the most demanding laser requirements. POC also offers customizable products and coatings to fit specific laser system designs.

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10. Standard Products

Face Dimensions	Length	Doping Levels	Coating Options	Price (USD)
3 x 3 mm	5 mm	0.4%	AR (R < 0.2% @ 1047/1053 nm)	$450
10 x 10 mm	20 mm	0.7%	AR (R < 0.2% @ 1047/1053 nm)	$600
Custom	Custom	Custom	Custom	Request