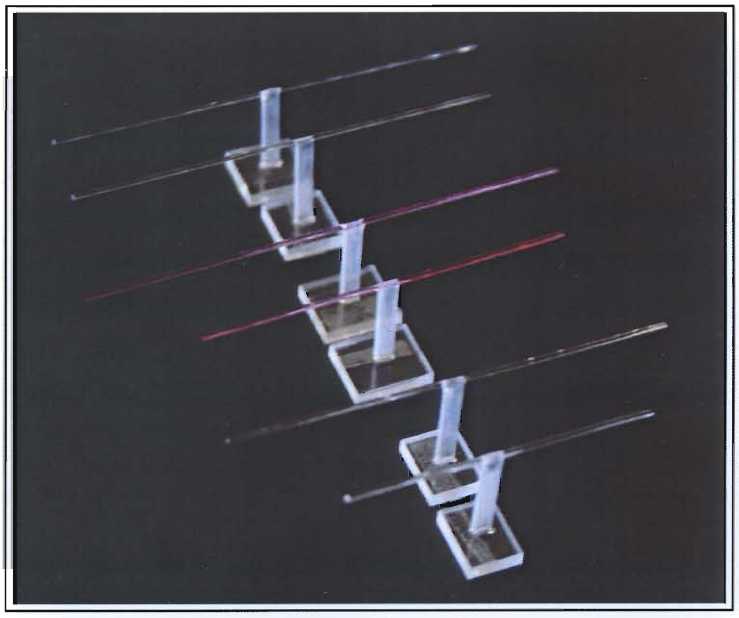
Product List

NLO Materials:	KLN Compositionally tuned for:	488nm	457nm
		473nm	397.5nm
	PPLN, Magnesium doped for:	532nm	
Laser Materials:	YAG fiber, sub 100 microns Nd: YAG, Er: YAG, Ho: YAG		
Composite Materials:	BondFree™ YAG		
Other Materials:	Sapphire, Ruby		
Other Services:	Contract Crystal Growth (R&D)		



Crystal Specifications:

Length Tolerance:	+/- .05mm
Diameter Tolerance:	+/- .001mm
Perpendicularity:	< 10' of arc
Parallelism:	< 1' of arc
Scratch/Dig:	10-5 per MIL -O-13830A

*All products grown, fabricated, polished and quality tested at our facility in Northern California.

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YAG Fiber

Shasta Crystals grows the world's thinnest YAG fibers, below 100 microns, utilizing the Laser Heated Pedestal Growth (LHPG) process. The YAG fibers can be doped with Holmium, Ytterbium, Erbium or Neodymium, based upon application requirements. As with all of our products growth, fabrication and polishing is carried out at our facility in Northern California.

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SHASTA CRYSTALS

Potassium Lithium Niobate - KLN

Potassium Lithium Niobate is a nonlinear optical material suitable for use in many optical systems. Its most common application is as a frequency doubler, generating wavelengths from 488 nm to 397.5 nm. It offers very high conversion efficiencies, shows no photochromic damage and is non-hygroscopic. Shasta Crystals has spent many years developing the crystal growth and fabrication processes for this material and we are pleased to offer it for your use.

Application

KLN's unique combination of properties, high nonlinear coefficients, high damage threshold, and the fact that it is non-hygroscopic as well, suit it to those laser systems applications requiring high power, high efficiency and/or duribility. It can be used in both commercial and military lasers including medical and laboratory systems, and systems for use in the semiconductor industry.

Crystal Growth

Shasta Crystals growth of KLN for nonlinear applications utilizes the Laser Heated Pedestal Growth (LHPG) process. The LHPG method's rapid rates of growth limit the technical barriers to growing KLN crystals. KLN is tunable to specific wavelengths based upon the composition of the starting material. Custom crystal lengths, thicknesses and AR coatings are available upon request.

KLN Nonlinear Properties

Property	Values	References
Transmission Range	At 300K : 350 nm - 5,000 nm	Appl. Phys. Lett. 11, (1967), 161-163
Nonlinear Optical Coefficients	d31(1064 nm) = 1.8pm/V d33(1064 nm) = 10.5pm/V	Appl. Phys. Lett. 62, (1993), 19-21 Appl. Phys. Lett. 12, (1968), 224
Refractive indices	For congruent material at 303K and at 1064 nm: no = 2.208 ne = 2.112 Sellmeier equation: see ref	S. Singh: "Nonlinear Optical Materials" in Handbook of Lasers, ed. by R. G. Pressley, pp 489-

Periodically Poled Lithium Niobate – PPLN
Mg:PPLN

Periodically Poled Magnesium doped Lithium Niobate (PPLN) is a nonlinear optical crystal suitable for use as a frequency doubler used to convert 1064 nm light from an infrared laser to 532 nm (green) light. Shasta Crystals has spent many years developing a proprietary crystal growth and fabrication process for this material and we are pleased to offer it for your use.

Applications

PPLN's unique combination of properties, high nonlinear coefficients, high damage threshold and the elimination of grey tracking suit it to laser applications requiring high power, high efficiency and /or durability. It can be used in both commercial and military lasers including projection systems, surface to air defense systems and medical and laboratory systems.

Crystal Growth

Shasta Crystals growth of PPLN for nonlinear applications utilizes a modified Laser Heated Pedestal Growth (mLHPG) process that allows for poling of the crystal during growth (in situ), eliminating the time consuming and expensive post-growth poling used in other methods. Further the mLHPG method allows for the growth of PPLN rods with thicker diameters. Custom crystal lengths, diameters and AR coatings are available upon request.

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SHASTA CRYSTALS

PPLN Nonlinear Properties

Property	Values	References
Transmission Range	At 300K: 316 nm - 5,000 nm at congruency (Li = 48.38%) and [Mg] = 5%.	J. Cryst. Growth, 208(1-4), (2000), 493
Nonlinear Optical Coefficients	For congruent material and [Mg] = 5%: |d31(1064 nm)| = 4.4 pm/V |d33(1064 nm)| = 25 pm/V	J. Opt. Soc. Am. B 14(9), (1997), 2268-2294
Refractive indices	For congruent material and 5% Mg, at 298K and at 1064 nm: no = 2.24 ne = 2.15 Sellmeier equation: see ref	J. Opt. Soc. Am. B, 14 (12), (1997), 3319
Photorefractive damage threshold	Congruent and 5% Mg, 20ns pulses at 1064 nm: 6.1x109 kW/m2	Proc. SPIE, 681, 20, (1990)
Coercive field	Congruent Material and 5% Mg: 4.5kV/mm at 298K	Jpn. J. Appl. Phys. 42 (2A), L108 (2003)

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BondFree™ Composite Crystals

Shasta Crystals' Laser Heated Pedestal Growth (LHPG) process allows for growth of composite YAG crystal materials without the use of adhesive bonding. The BondFree™ technology will allow cost-effective systems of increased output power and improved beam quality and will reduce absorption losses and thermal effects.

- Available with one or two end-caps or;
- Custom diffusion gradients;
- Tailored to Customer Specifications.

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