Cr-doped Colquiriite (Cr:LiSAF)

Introduction

CASTECH provides high quality, Cr-doped Colquiriite crystal (Cr:LiSAF) using the Czochralski technique. It is excellent laser material with high energy storage and high slope efficiency. It is also ideal working material under conditions of ultra short pulse and ultra high power. Currently, Cr:LiSAF related products such as flashlight pumping and diode pumping laser have been widely used.

Physical and Optical Properties

Physical Properties

Chemical Formula	Cr^{3+}:$LiSrAlF_6$
Lattice Parameters(Å)	a=5.084
	c=10.21
Crystal Structure	trigonal
Space Group	$P\bar{3}1c$
Cr atoms/cm^3 for 1% doping	$8.75x10^{19}$
Fracture Toughness(Mpam)	0.40(∥c)
Melting Point (℃)	766
Density(g/cm^3)	3.45
Modulus of Elasticity(GPa)	109
Thermal Expansion	-10(∥c)
Coefficient (10^{-6} / K)	25(⊥c)
Thermal Conductivity (W/m/K)	3.3(∥c)
	3.0(⊥ c)
Specific Heat(J/g·K) (@25℃)	0.842

Optical Properties

Emission Peak(nm)	846
Peak Stimulated Emission Cross Section($\times 10^{-20}cm^2$)	4.8(∥c)
Spontaneous Fluorescence Lifetime(μs)	67
Scatter Losses(%/cm)	<0.2
dn/dT($\times 10^{-6}/^0C$)	-4.8(∥c)
	-2.5(⊥c)

The Sellmeier equations (λ in μm)

$$n_c^2 = 1.98448 + 0.00235/(\lambda^2 - 0.010936) - 0.01057\lambda^2$$
$$n_a^2 = 1.97673 + 0.00309/(\lambda^2 - 0.00935) - 0.00828\lambda^2$$

Crystal	Wavelength(nm)	n_c	n_a
Cr:LiSAF	846	1.407	1.405
	670	1.409	1.407
	423	1.413	1.412
	290	1.420	1.420
	266	1.422	1.424

Specifications of Cr:LiSAF

- Size: Rod sizes from 2mm to 16mm in diameter and from 1mm to 180mm in length
- Cr dopant concentrations: 0.5~1.0 mol%
- Parallelism: <10 arc seconds
- Perpendicularity: <5 arc minutes
- Chamfer: 0.13±0.07mm X 45°
- Scratch/Dig code: 10/5 to MIL-PRF-13830B
- Flatness: λ/8 @ 632.8nm
- AR coating: R<0.10% @ 850nm

Large rod and slab dimensions and non-standard dopant concentrations are available upon request.