Cr:LiSAF - Chromium Doped Colquiriite (Cr^{3+}:LiSrAlF)

Introduction

CASTECH provides high quality, Cr-doped Colquiriite crystal (Cr:LiSAF, Cr^{3+}:$LiSrAlF_6$) using the Czochralski technique. It is an excellent laser material with high energy storage and high slope efficiency. It is also an 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.

Table 1. Basic properties

Chemical Formula	Cr^{3+}: $LiSrAlF_6$
Crystal Structure	Trigonal
Point Group	P31c
Lattice Parameter	a = 5.084 Å, c = 10.21 Å
Cr at/cm^3 for 1% doping	8.75×10^{19}
Fracture Toughness (Mpam)	0.40 (// c)
Melting Point	766 ℃
Density	3.45 g/cm^3
Modulus of Elasticity	109 GPa
Thermal Expansion Coefficients	-10×10^{-6}/K (// c) 25×10^{-6}/K (⊥c)
Thermal Conductivity	3.3 W/m/K (// c) 3.0 W/m/K (⊥c)
Specific Heat	0.842 J/g·K @25 ℃

Table 2. Optical Properties

Emission Peak	846 nm
Peak Stimulated Emission Cross Section	4.8×10^{-20} /cm^2(// c)
Fluorescence Lifetime	67 μs
Scatter Losses	< 0.2%/cm
dn/dT	-4.8×10^{-6}/℃ (// c) -2.5×10^{-6}/℃ (⊥c)
Sellmeier Equations (λ in μm) $n_c^2 = 1.98448 + 0.00235 / (\lambda^2 - 0.010936) - 0.01057\ \lambda^2$ $n_a^2 = 1.97673 + 0.00309 / (\lambda^2 - 0.00935) - 0.00828\ \lambda^2$	

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Crystal	Wavelength (nm)	n_c	n_a
Cr^{3+}: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^{3+}:LiSAF crystal from CASTECH

Table 3. Specifications

Dopant Concentration	Cr: 0.5~1.0 at.%
Size	Rod sizes from 2 mm to 16 mm in diameter and from 1 mm to 60 mm in length
Surface Quality (Scratch/Dig)	10/5 to MIL-PRF-13830B
Parallelism	20 arc sec
Flatness	λ/8 @633 nm
Perpendicularity	≦15 arc min
Chamfer	≦0.2 mm x 45 °
AR-coated	R<0.10% @850 nm

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