Alexandrite

Alexandrite (Allexite™) is the leader of a class of tunable solid-state laser materials. Enhanced by several years of research and development, it features a broad wavelength tuning range of 710 - 800 nm with the capability to store and efficiently extract multi-joule pulses of energy. It is one of the most robust solid-state laser materials available with a thermal shock resistance five times that of Nd:YAG.

Alexandrite's unique combination of properties offer application in such areas as dermatology, lithotripsy, spectroscopy, atmospheric lidar, testing of fiber optics and photodetectors, materials processing, pumping of dye lasers, non-linear optics studies and annealing of semiconductors.

Structural & Mechanical Properties

Formula:	Be $(Al_{1-x}Cr_x)_2 O_4$
Crystal Structure:	Orthorhombic
Unit Cell Dimensions: **(*contains four formula units*)**	a = 9.404 Å b = 5.476 Å c = 4.427 Å
X-Ray Density:	3.7 g/cm^3
Melting Point:	1870°C
Thermal Expansion:	||a 6.3 x 10^{-6} K^{-1} ||b 6.0 x 10^{-6} K^{-1} ||c 6.5 x 10^{-6} K^{-1}
Thermal Conductivity:	0.23 W / cmK
Hardness (Vickers):	2000 kg mm^{-2}
Young's Modulus:	469 GPa
Fracture Stress:	0.457 - 0.948 GPa
Thermal Shock Resistance:	35 - 74 W / cm

NORTHROP GRUMMAN

SYNOPTICS

General Specifications

Diameter Tolerance:	+0.000” / -0.002”
Chamfer:	0.005” ± 0.003” @ 45°
Barrel Finish:	55 ± 5 µinches
Perpendicularity:	within 5 arc minutes
Parallelism:	30 arc-seconds or less
Rod End Face Flatness:	within λ / 10 wave at 632 nm wavelength
Surface Quality:	10 - 5 scratch-dig per MIL-O-13830 A
Wave Front Distortion:	less than 1/2 wave per inch of length (measured at 1 micron)
Rod End Coatings:	Single-layer MgF_2 Single wavelength and broad band anti-reflection coatings available
Cr Concentrations:	standard range: 0.10 - 0.17 at % special order: < 0.10 or 0.17 - 0.20 at % optimum chrome concentration: 0.83 / d at % (d is laser rod diameter in mm)

Optical Properties

Chrome Concentration Range	0.01 – 0.2 at %
Chrome - ion Density (0.1 at %):	3.51×10^{19} cm^{-3}
Refractive Indices (750 nm): **(Biaxial, Positive)**	E ||a = 1.7367 E ||b = 1.7421 E ||c = 1.7346
Refractive Index Temperature Variation:	8×10^{-6} K^{-1}
Dopant Site Symmetry:	78% mirror (laser active) 22% inversion
Non-linear Refractive Index, n_2:	~ 10^{-13} esu
Findlay-Clay Insertion Loss:	< 0.3% cm^{-1}

References

1. National Bureau of Standards
2. C.F. Cline; R.C. Morris; M. Dutoit; P.J. Harget, Journal of Materials Science 14 (1979) pp. 941-944.
3. J.C. Walling; O.G. Peterson; H.P. Jenssen; R.C. Morris; E.W. O’Dell, IEEE Journal of Quantum Electronics QE-16 No. 12 (1980) pp. 1302-1315.

1-704-588-2340 • FAX 704-588-2516
1201 Continental Blvd., Charlotte, NC 28273
email: STSynopticsSales@ngc.com
Website: www.northropgrumman.com/synoptics