

Chromium, Erbium: Yttrium Scandium Gallium Garnet - Cr, Er:YSGG

YSGG (Yttrium Scandium Gallium Garnet) doped with Chromium and Erbium provides an efficient laser crystal for generating 2.8 micron light in an important water absorption band.

Advantages Of Cr, Er:YSGG Include:

- Lowest threshold and highest slope efficiency of common Erbium doped crystals^(1,2)
- Can be flash lamp pumped via Cr bands or diode pumped via Er bands
- Operates CW, free-running or Q-switched^(2,3)
- The intrinsic crystal disorder increases pump line widths and tunability

Crystal Properties

Formula:	$Y_{2.93}Sc_{1.43}Ga_{3.64}O_{12}$ ⁽⁴⁾
Structure:	cubic, Garnet
Density (g / cm ³):	5.67 (Cr & Er doped)
Index of Refraction at 1 micron:	1.92
dn / dT (10 ⁻⁶ K ⁻¹):	12 ⁽⁵⁾
Thermal Conductivity (W / m K):	8 ⁽⁵⁾
Hardness (Moh):	8
Chemical Resistance:	Inert

Material Specifications

Growth Method:	Czochralski
Chromium Concentration:	2 at % (1.7 x 10 ²⁰ cm ⁻³ , octahedral Cr ³⁺)
Erbium Concentration:	30 at % (3.7 x 10 ²¹ cm ⁻³ , dodecahedral Er ³⁺)
Rod Diameters:	up to 15 mm

NORTHROP GRUMMAN

Space Technology

SYNOPTICS

Standard Rod Specifications

Parameter	Nominal	Tolerance
Cr Concentration	2 at %	—
Er Concentration	30 at %	—
Diameter	—	+0.0000 / -0.0020 in
Length	—	+0.040 / -0.000 in
Length ([10 mm)	—	±0.010 in
Length (as-cut)	—	+0.080 / -0.000 in
Tilt / Wedge Angle	—	±5 min
Chamfer	0.005	±0.003 in
Chamfer (< 5 mm diameter)	0.004	+0.001 / -0.002 in
Chamfer Angle	45 deg	±5 deg
Barrel Finish	55 micro-inch	±5 micro-inch
Parallelism	30 arc seconds	—
Parallelism ([10 mm length)	60 arc seconds	—
End Figure	$\lambda / 10$ wave at 633 nm	—
Perpendicularity	5 arc minutes	—
Perpendicularity ([10 mm length)	20 arc minutes	—
Surface Quality	10 - 5 scratch-dig	—
Surface Quality ([10 mm length)	20 - 10 scratch-dig	—
Wavefront Distortion	1/2 wave per inch of length	—

- Grit blast serial number into barrel approx. 0.5 inch from the end of rod.

References

1. PF Moulton, JG Manni and GA Rines, IEEE J. Quantum Electr. **24**, 960-973 (1988).
2. BJ Dinerman and PF Moulton, Optics Letters **19**, 1143-1145 (1994).
3. EV Zharikov et al., Sov. J. Quantum Electron. **16**, 635-639 (1986).
4. GM Kuz'micheva et al., Russ J. Inorg. Chem. **34**, 792 (1989).
5. VG Ostroumov, et al., Tunable Solid State Lasers, Vol. 5 of the OSA Proceeding Series, pp. 124 - 129 (1989).



光技術をサポートする
株式会社オプトサイエンス
<http://www.optoscience.com>

東京本社 〒160-0014 東京都新宿区内藤町1番地 内藤町ビルディング
TEL:03(3356)1064 FAX:03(3356)3466 E-mail:info@optoscience.com
大阪支店 〒532-0011 大阪市淀川区西中島7-7-2 新大阪ビル西館
TEL:06(6305)2064 FAX:06(6305)1030 E-mail:osk@optoscience.com
名古屋営業所 〒450-0002 名古屋市中村区名駅2-37-21 東海ソフトビル
TEL:052(569)6064 FAX:052(569)8064 E-mail:ngo@optoscience.com

NORTHROP GRUMMAN

Space Technology

SYNOPTICS