

Yttrium Aluminium Garnet (YAG)

MATERIALS DATA

YAG crystal is produced by the Czochralski growth process up to approximately 100mm diameter.

APPLICATIONS: YAG (Yttrium aluminium oxide $Y_3Al_5O_{12}$) is an active laser crystal when dopants such as Nd, Tm, Er, and Cr are used. Being cubic there is no double refraction and it is sometimes used for a window material substituting for sapphire.

Transmission Range	0.21 to 5.5 μ m
Refractive Index	1.81523 at 1.06 μ m (1)
Reflection Loss	16.7% at 1.06 μ m
Absorption Coefficient	n/a
Reststrahlen Peak	n/a
dn/dT	+9.1 x 10 ⁻⁶ K ⁻¹ at 1064nm (2)
dn/d μ = 0	n/a
Density	4.56 g/cc
Melting Point	1940 °C
Thermal Conductivity	12.9 W m ⁻¹ K ⁻¹
Thermal Expansion	7.8 (111), 7.7 (110), 8.2 x 10 ⁻⁶ K ⁻¹ (100)
Hardness	Knoop 1215
Specific Heat Capacity	590 J Kg ⁻¹ K ⁻¹
Dielectric Constant	11.7
Youngs Modulus (E)	300 GPa
Shear Modulus (G)	n/a
Bulk Modulus (K)	n/a
Elastic Coefficients	C ₁₁ =333; C ₁₂ =111; C ₄₄ =115
Apparent Elastic Limit	280 MPa
Poisson Ratio	0.28
Solubility	Insoluble in water
Molecular Weight	593.62
Class/Structure	Cubic garnet, m3m

(1) Handbook of Optical Constants, ed Palik, V3, ISBN 0-12-544423-0

(2) Wilson, Thermo-Optic Coefficients. PhD dissertation. U Southern Calif. Jan 1980



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μm	No	μm	No	μm	No
0.266	1.9278	0.354	1.8725	0.532	1.8368
0.800	1.8245	0.808	1.8217	0.946	1.8186
1.030	1.8173	1.064	1.8169	1.333	1.8146
1.444	1.8140	1.500	1.8137	1.640	1.8132
2.014	1.8123	2.097	1.8121	2.123	1.8121
2.940	1.8113				

