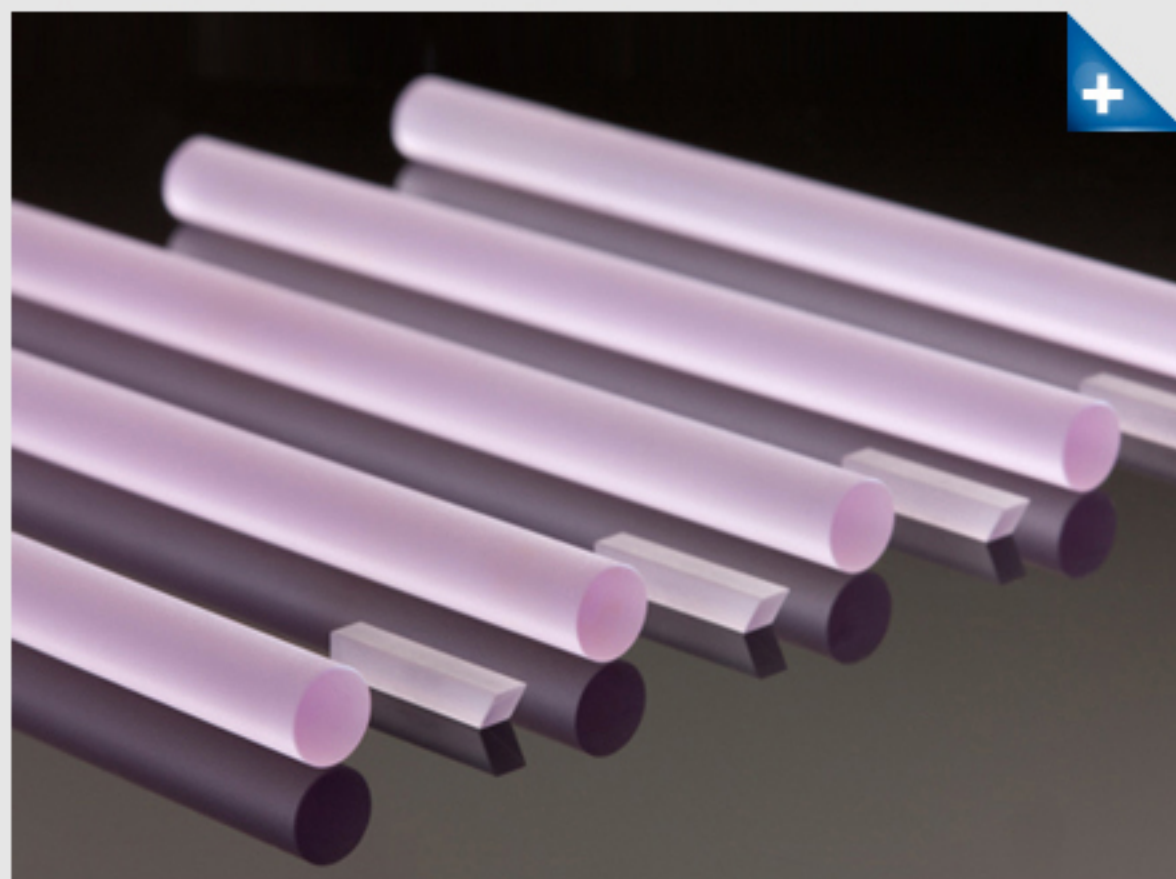


Laser Materials Nd:YAG



General Information

The first operation of yttrium aluminum garnet doped with tri-valent Neodymium as a laser gain media was demonstrated at Bell Labs in 1964 [1]. Today, Nd:YAG has achieved a position of dominance among solid-state laser materials, being the most widely used lasing medium world-wide, with applications spanning medical, industrial, military and scientific markets. Nd:YAG lasers typically emit infrared light at 1064nm - however other transitions near 940, 1120, 1320, and 1440 nm are also used [2].

At SMC, we specialize in the growth and fabrication of high-purity low-loss rare-earth doped YAG laser materials. SMC's research has led to numerous discoveries resulting in laser materials that have demonstrated increased efficiency, increased output power, increased damage resistance, reduced thermal lensing, higher brightness, and higher TEM00 output. We offer custom manufacturing of laser rods, slabs, discs, passive q-switches & YAG optics, for your high volume production quantities, or low volume development efforts.

[Contact us](#) with your specific requirements or for availability and pricing.

Dopant Ion

Nd ³⁺ concentration range	0.1 - 1.3 atomic %
Dopant Ion Density @ 1 atomic %	
Y ³⁺ Site	1.38 x 10 ²⁰ cm ⁻³
Al ³⁺ Site (IV)	1.38 x 10 ²⁰ cm ⁻³
Al ³⁺ Site (VI)	0.92 x 10 ²⁰ cm ⁻³

Common Operating Specs

Emission Wavelength	1.064 μm
Laser Transition	⁴ F _{3/2} → ⁴ I _{11/2}
Flourescence Lifetime	230 ms
Pump Wavelength	808 nm

Physical Properties

Coefficient of Thermal Expansion	6.14 x 10 ⁻⁶ K ⁻¹
Thermal Diffusivity	0.041 cm ² s ⁻²
Thermal Conductivity	11.2 W m ⁻¹ K ⁻¹
Specific Heat (Cp)	0.59 J g ⁻¹ K ⁻¹
Thermal Shock Resistant	800 W m ⁻¹
Refractive Index @ 632.8 nm	1.83
dn/dT (Thermal Coefficient of Refractive Index) @ 1064nm	7.8 10 ⁻⁶ K ⁻¹
Melting Point	593.7 g mol ⁻¹
Density	1965°C
MOHS Hardness	4.56 g cm ⁻³
Young's Modulus	8.25
Thermal Shock Resistant	335 Gpa
Tensile Strength	2 Gpa
Crystal Structure	Cubic
Standard Orientation	<111>
Y ³⁺ Site Symmetry	D ₂
Lattice Constant	a=12.013 Å

References

1) Laser operation of Nd:YAG was first demonstrated at Bell Laboratories in 1964 in J. E. Geusic, et. al., *Applied Physics Letters*, 4, 182 (1964).

2) Koechner, Walter (1992). *Solid-State Laser Engineering (3rd ed.)*. Springer-Verlag. ISBN 0-387-53756-2

Absorption Coefficient Chart

