

## YAG & Nd:YAG “High Grade Rods”

Among solid-state laser crystals, Nd:YAG is the most versatile and suitable for a wide range of applications due to its physical properties, low threshold, high gain and narrow linewidth. Typical applications include the military, medicine and material processing industries for cutting, welding, drilling, marking and repairing.

Nd:YAG lasers are also employed in application areas characterized by harsh environmental conditions, like remote sensing, ocean and atmospheric experiments.

Ultra-pure gas and superior raw material purity, together with a tightly controlled proprietary process, allow Opto Materials to proudly offer premium grade Nd:YAG crystal rods with low losses and superior efficiency.

Nd concentration uniformity along each rod is achieved by using only a small portion (about 20%) of the melt. A very uniform Nd profile is certified for each boule, that is also marked with laser for identification.

Rods with low wavefront distortion are obtained by carefully mapping the boule with double pass interferometer to identify the low stress regions.

In-house coating allows a short cycle time after end polishing, assuring high adherence and contamination-free layers.

Controlled environment and process from raw materials to final packaging result in a stable and reliable compositional crystal quality. Particularly, our Ir-free rods assure a long term stability to the laser system.



### General Features

- Low losses and superior lasing efficiency
- Certified Nd concentration uniformity
- Low wavefront distortion
- Multiple specifications on sizes
- Guaranteed traceability through laser marking
- Long term stability

### Customization

- Different configurations and shapes: flat/parallel, tilted, Brewster or radius ends
- Different surface coating: standard AR@1064 or wideband AR@800-1064 for end-pumping design



### Material Specifications

Optical Properties	
Refractive index	1.817 @ 1064 nm
Lasing wavelength	1064 nm
Primary diode pump band	808.6 nm
Fluorescence lifetime	235 $\mu$ s @ 1.0 at% Nd

Physical Properties	
Nd doping level	0.0 – 1.4 at%
Chemical formula	$Y_{3-x}Nd_xAl_5O_{12}$
Primary diode pump band	808.6 nm
Molecular weight	595.3 g/mole
Crystal structure	Cubic / garnet
Lattice constant	12.01 Å
Melting point	1970 °C
Density	4.55 g/cm <sup>3</sup>
Mohs hardness	8.5 @ 20 °C

Thermal Properties	
Thermal conductivity	13 W/(cm•K)
Specific heat	0.59 J/(g•K)
Linear expansion coefficient	$8.2 \times 10^{-6} / K <100>$
	$7.7 \times 10^{-6} / K <110>$
	$7.8 \times 10^{-6} / K <111>$
Dissipative fracture limit	~ 200 W/cm
Thermal optical coefficient (dn/dT)	$+8.0 \times 10^{-6} / K$