TSAG - Terbium Scandium Aluminum Garnet ($Tb_3Sc_2Al_3O_{12}$)

Introduction

Terbium Scandium Aluminum Garnet ($Tb_3Sc_2Al_3O_{12}$, TSAG) is the key isolator material for next generation fiber laser. As an ideal magneto-optic crystal in visible and infrared regions, TSAG has the advantages of high Verdet constant, excellent thermal and mechanical properties.

CASTECH's magneto-optical crystal TSAG is featured by

- Large Verdet constant (48 Rad $T^{-1}m^{-1}$ at 1064 nm), about 20-30% higher than that of TGG
- Low absorption (<3000 ppm/cm at 1064 nm), about 30% less than that of TGG
- High power compliant
- Low thermally-induced birefringence
- Ideal for compact magneto-optic devices

Main Applications

- Faraday Rotators
- Optical Isolators

Table 1. Basic Properties

Transparency Range	400-1600 nm
Crystal Structure	Cubic, Space group Ia3d
Chemical Formula	$Tb_3Sc_2Al_3O_{12}$
Lattice Parameter	a = 12.3 Å
Growth Method	Czochralski
Density	5.91 g/cm^3
Melting Point	1970 ℃ ± 10 ℃

Specifications of TSAG crystal from CASTECH

Table 2. Specifications

Orientation	within±15′
Extinction Ratio	≥ 30 dB
Diameter Tolerance	± 0.1 mm
Length Tolerance	± 0.2 mm
Surface Qquality (scratch/dig)	10/5 to MIL-PRF-13830B
Flatness	<λ/8 @633 nm
Wavefront Distortion	<λ/8 @633 nm
Parallelism	20 arc sec
Perpendicularity	≦15 arc min
Chamfer	≦0.2 mm × 45°
AR coating	<0.2% @1064 nm Other coatings are available upon request