

## Gadolinium Gallium Garnet (GGG/SGGG)

### Introduction:

GGG, SGGG and NGG Garnets are used as substrates for liquid epitaxy. GGG substrate is dedicated substrates for magneto-optical film growing. In the optical communication devices, require a lot of using 1.3 $\mu$ m and 1.5 $\mu$ m optical isolator, its core component is the YIG or BIG film been placed in a magnetic field. GGG single crystal substrates of different tangential, which can achieve the best lattice match with this magneto-optical material, thus ensuring the YIG, BIG film epitaxial growth be successful. It has good physical and mechanical properties and chemical stability. And SGGG (calcium magnesium zirconium doped gadolinium gallium garnet) is an excellent substrate material for bismuth iron garnet epitaxial films.

GGG has been successfully applied in the magnetic refrigeration industry in the temperature zone below 20 K for market He II flow and helium-nitrogen liquefaction pre-stage refrigeration.



### Main Advantages:

- ✧ Low optical losses (<0.1%/cm)
- ✧ High thermal conductivity (7.4W m<sup>-1</sup>K<sup>-1</sup>)
- ✧ High laser damage threshold (>1GW/cm<sup>2</sup>)

### Typical applications:

- ✧ Substrate materials for YIG and BIG magneto-optical epitaxial membranes
- ✧ Magnetic bubble memory storage
- ✧ Magnetic refrigeration

### Material Properties:


Material	GGG	SGGG
Chemical Formula	Gd <sub>3</sub> Ga <sub>5</sub> O <sub>12</sub>	Substituted Gd <sub>3</sub> Ga <sub>5</sub> O <sub>12</sub>
Crystal Structure	Cubic	Cubic
Lattice Constant	a=12.383 Å	a=12.497 Å
Growth Method	Czochralski	Czochralski
Hardness	8.0	7.5
Density	7.13g/cm <sup>3</sup>	7.09g/cm <sup>3</sup>
Melting Point	1725°C	1730°C
Refractive Index	1.954 @ 1064nm	1.954 @ 1064nm

### Crystro offers:


Dimensions	Max Diameter 101.6mm (4 inch)
Thickness	0.5mm Other thickness upon request
Polishing	Single or double sides polishing
Orientation	<111>±0.2°
Orientation Flat	2° (within 1° for special requirement)
Ra	Ra≤1nm, EPI ready
Angle of Crystalline	Special size and orientation are available upon request

**Note: Above parameters for reference only, please contact our sales Rep. for your specific requirement.**

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