

Yttrium iron garnet

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Yttrium iron garnet (YIG) is a kind of synthetic garnet, with chemical composition

Y

3

Fe

2

(FeO

4

)

3

,
or
Y

3

Fe

5

O

12

. It is a ferrimagnetic material with a Curie temperature of 550 K.

In YIG, the five iron(III) ions occupy two octahedral and three tetrahedral sites, with the yttrium(III) ions coordinated by eight oxygen ions in an irregular cube. The iron ions in the two coordination sites exhibit different spins, resulting in magnetic behaviour. By substituting specific sites with rare earth elements, for example, interesting magnetic properties can be obtained.

YIG has a high Verdet constant which results in the Faraday effect, high Q factor in microwave frequencies, low absorption of infrared wavelengths up to 600 nm, and very small linewidth in electron spin resonance. These properties make it useful for MOI (magnetic optical imaging) applications in superconductors.

YIG is used in microwave, optical, and magneto-optical applications, e.g. microwave YIG filters. It is transparent for infrared light wavelengths over 600 nm. It also finds use in solid-state lasers in Faraday rotators, in data storage, and in various nonlinear optics applications.^[1]

See also

- Yttrium aluminium garnet
- Gadolinium gallium garnet
- Yttrium iron garnet filter

References

- ↑ Holm, U., Sohlstrom, H., & Brogardh, T. (1984). YIG-Sensor Design for Fiber Optical Magnetic-Field Measurements. Proceedings of the Society of Photo-Optical Instrumentation Engineers, 514, 333–336.

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Categories: Synthetic minerals | Oxides | Iron compounds | Yttrium compounds | Nonlinear optical materials | Ferromagnetic materials

Yttrium iron garnet	
	
General	
Category	Synthetic mineral
Formula (repeating unit)	 Y 3 Fe 2 (FeO 4) 3 , or Y 3 Fe 5 O 12
Identification	
Other characteristics	Ferrimagnetic material

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