LuAG:Ce Scintillation Material

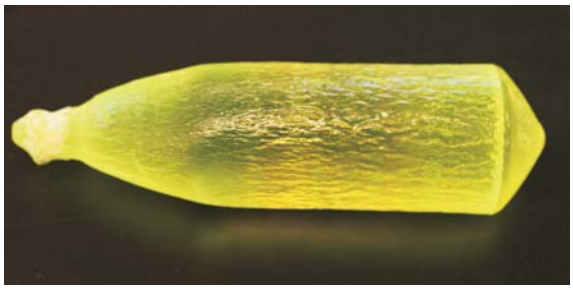
LuAG:Ce, Lutetium Aluminum Garnet activated by cerium (chemical formula Lu3Al5O12), is a relatively dense and fast scintillation material. Its density of 6.73 g/cm3 is about 94% of the density of BGO (7.13 g/cm3). Its decay time is much faster (70 ns) than that of BGO (300 ns). This is of advantage in time dependent and coincidence measurements. The wavelength of scintillation emission is about 535 nm, which is ideal for photodiode and avalanche diode readout. The material can also be used for imaging screens, similarly to YAG:Ce. A particular advantage of LuAG:Ce is its higher density resulting in thinner screens with higher spatial resolution. The material is mechanically and chemically stable,

Table of physical parameters

	NaI:Tl	BGO	YAG:Ce	YAP:Ce	CRY-019	LuAG:Ce	CRY-018
Density [g/cm^3]	3.67	7.13	4.55	5.37	7.4	6.76	4.50
Hardness [Mho]	2	5	8.5	8.6	5.8	8.5	5.8
Index of refraction	1.85	2.15	1.82	1.95	1.82	1.84	1.79
Crystal structure	cubic	cubic	cubic	rhombic	monoclinic	cubic	monoclinic
Hygroscopic	yes	no	no	no	no	no	no
Cleavage	yes	no	no	no	yes	no	yes
Light output [% NaI:Tl]	100	15 - 20	40	60	40 - 75	20	80
Emmision [nm]	415	480	550	370	415 - 420	535	425
Decay Time [ns]	230	300	70	25	46	70	45
Energy Resolution [% at 661 keV]	7.2	12	7.2	6.7	8.5	-	7
Radiation length x_0 [cm]	2.9	1.1	3.5	2.7	1.2	-	2.74
Photon yield @300K [10^3 Ph/MeV]	38	8 - 10	35	25	28	20	32

Advantage

- High density and fast decay time
- Fast decay time
- Suited for photodiode and avalanche diode readout
- Very good machining properties
- Chemical, mechanical and temperature resistance



Main usage

- High energy gamma and charged particle detection
- PET matrixes
- High spatial resolution imaging screens for X ray, gamma and beta

The material can be machined into a variety of shapes and sizes including prisms, spheres and very thin plates.

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