

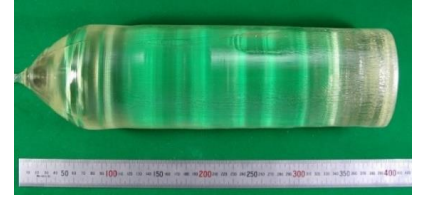
NEW

GSO

Key Scintillator Materials for Novel Radiation Detectors

Features

- ✓ Good balance of all scintillation characteristics
- ✓ Good energy resolution up to 150°C
- ✓ Verity decay by Ce concentration
- ✓ Good radiation-hardness
- ✓ No radiation background
- ✓ Better transparency by Zr doping



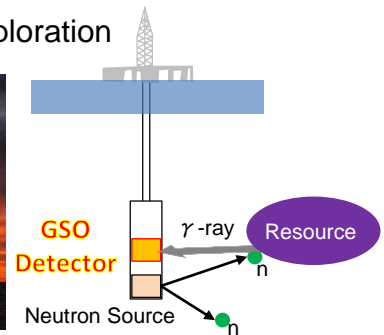
GSO (Ce:Gd₂SiO₅)

Applications

Positron Emission Tomography



Underground Resource Exploration



Comparison of Typical Scintillators

	GSO	LGSO	LSO	BGO	NaI:Tl
Light output (NaI=100)	20	80	80	12	100
Decay time (ns)	30-60	41	41	300	230
Peak wavelength λ_{em} (nm)	430	410	410	480	415
Density (g/cm ³)	6.7	7.3	7.4	7.13	3.67
Effective atomic number Z_{eff}	58	63	63	77	50
Hygroscopicity	No	No	No	No	Yes
Self-radiation	No	Yes	Yes	No	No
Temperature quench	150°C	-	-	-	-

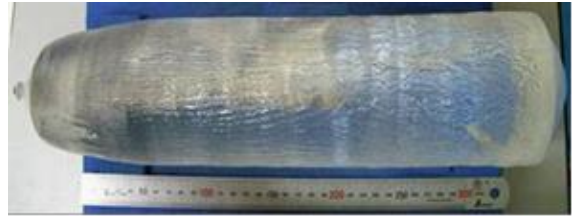
NEW

LGSO

Key Scintillator Materials for Novel Radiation Detectors

Features

- ✓ High light output
- ✓ Good energy resolution
- ✓ Fast decay
- ✓ High stopping power
- ✓ Good for TOF PET



LGSO ($\text{Lu}_x\text{Gd}_{(2-x)}\text{SiO}_5$)

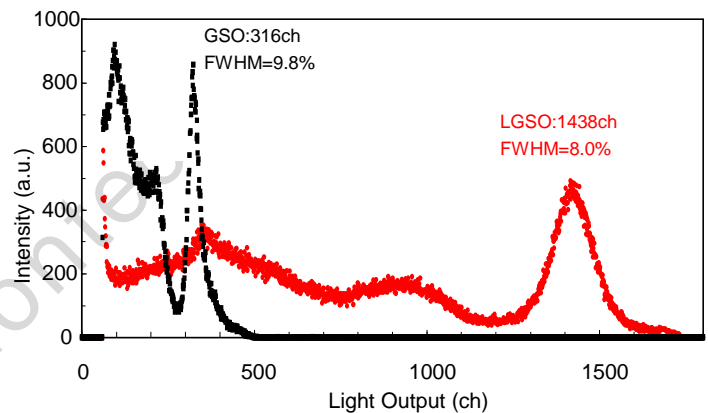
Applications

Positron Emission Tomography



Property

Typical energy spectra of ^{137}Cs



Comparison of Typical Scintillators

	GSO	LGSO	LSO	BGO	NaI:Tl
Light output (NaI=100)	20	80	80	12	100
Decay time (ns)	30-60	41	41	300	230
Peak wavelength λ_{em} (nm)	430	410	410	480	415
Density (g/cm^3)	6.7	7.3	7.4	7.13	3.67
Effective atomic number Z_{eff}	58	63	63	77	50
Hygroscopicity	No	No	No	No	Yes
Self-radiation	No	Yes	Yes	No	No
Temperature quench	150°C	-	-	-	-

NEW

Fast-LGSO

Key Scintillator Materials for Novel Radiation Detectors

Features

- ✓ **Faster decay than conventional LGSO**
- ✓ **Other performances such as light output are similar to conventional LGSO.**



Fast-LGSO ($Ce:Lu_xGd_{(2-x)}SiO_5$)

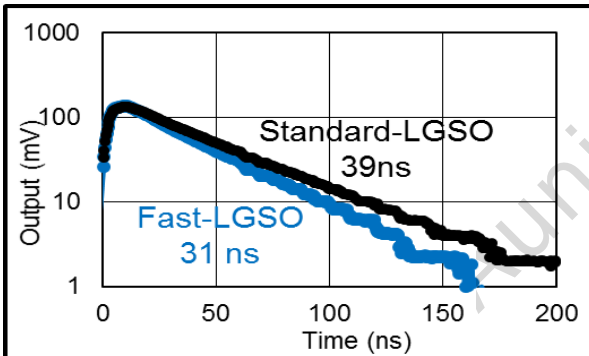
Applications

Positron Emission Tomography

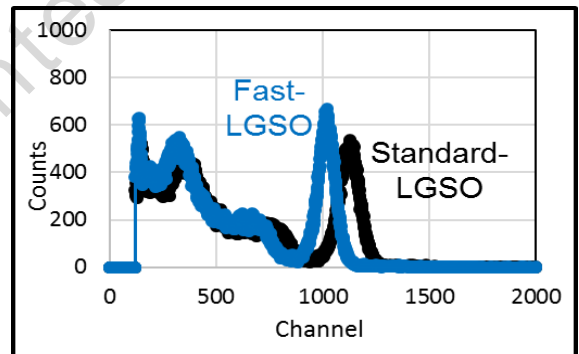


Properties

Decay curves



Energy spectra



Comparison of typical scintillators

	Nal:TI	LGSO	Fast-LGSO	LSO	LYSO
Light yield (NaI=100)	100	80	70 - 80	~80	~80
Decay time (ns)	230	39 - 42	30 - 35	~40	~40
$\Delta E/E$ (^{137}Cs , %)	7	8 - 10	8 - 10	~10	~10
Density	3.7	7.3	7.3	7.4	7.2
Hygroscopicity	Yes	No	No	No	No
Self-radiation	No	Yes	Yes	Yes	Yes