Gamma-Neutron Scintillator Properties

CLYC

Dual Mode Detection

Room Temperature Operation

Single Scintillation Material

The Science Behind the Technology

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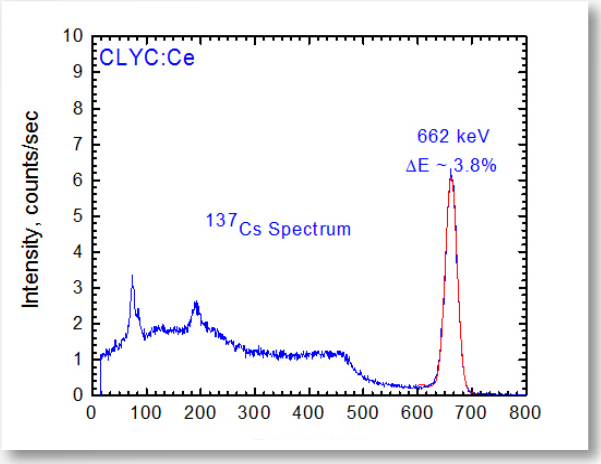
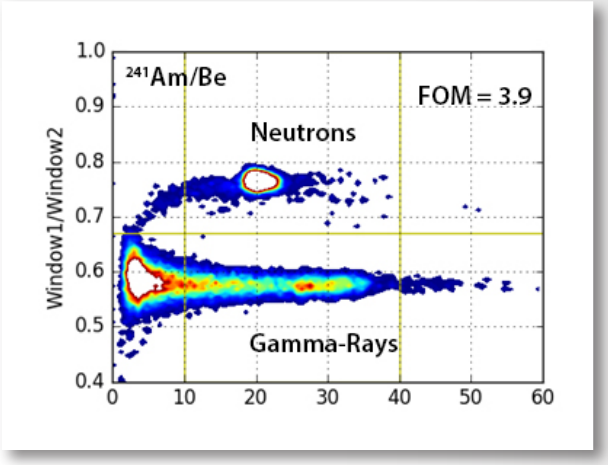
Gamma-Neutron Scintillation Detector



2" CLYC - Pulse Height Analysis



2" CLYC - Pulse Shape Discrimination

CLYC

The new scintillator Cs_2LiYCl_6:Ce (CLYC) is the first practical gamma-neutron scintillation detector for use as a replacement for both medium resolution gamma-ray detectors and Helium-3 proportional counter tubes for neutron detection. The ease of using Pulse Shape Discrimination (PSD) for neutron detection, combined with better gamma-ray resolution than NaI or CsI, make the CLYC detector an ideal solution for several classes of handheld instruments, including personal radiation detectors (PRDs), spectroscopic personal radiation detectors (SPRDs), and radioisotope identification devices (RIDs). Other applications requiring gamma-neutron detection can also benefit from using CLYC.

Instrument manufacturers will also find the simplicity of implementing a dual-mode detector to be advantageous. The neutron cross-section of 95% ^{6}Li-enriched CLYC is 2.3 times that of ^{3}He (10 atmospheres), compared on a volume basis. Energy resolution for 662 keV gamma rays is typically better than 5% using CLYC. While the energy resolution of the material varies based on the size and configuration of the detector, CLYC has generally 25 to 30% percent better resolution than sodium iodide.

Material	Cs_2LiYCl_6:Ce
Melting Point	640°C
Density	3.31 g/cm^3
Crystal Structure	Cubic
Cleavage planes	None
Water Solubility	Hygroscopic
Refractive index	1.81 ± 0.037 @ 405 nm
Coefficient of Thermal Expansion	34.34x10^{-6}/°C @ 30°C
Emission Spectral Range	275 – 450 nm
Peak Scintillation Wavelength	370 nm
Decay Constants (CVL, Ce3+, Ce-STE)	1 ns, 50 ns, 1000 ns
Scintillation Light Yield	20,000 ph/MeV
GEE for Thermal Neutrons	3.2 MeV
X-ray Absorption Coef. at 100 KeV	3.97 cm^{-1}
X-ray Absorption Coef. at 662 KeV	0.251 cm^{-1}
Radiation Length	3.42 cm
Heat Capacity	0.379 J/(g*K)
Thermal Conductivity	0.0067 W/(cm*K) at 50°C

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