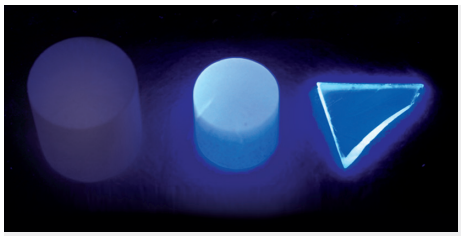
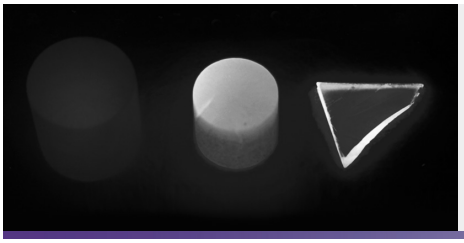
Hellma® Materials
Lithotec Crystals



Radiation Detection Materials

$CeBr_3$ | LBC:Ce | CaF_2:Eu | BaF_2



Scintillation Crystals

Hellma Materials scintillation crystals are the preferred detector materials used in advanced instrumentation for detection of radiation and high energy particles covering a broad spectrum of energy ranges:

	$CeBr_3$	LBC:Ce	CaF_2:Eu	BaF_2
X-ray	✓	✓	✓	✓
γ ray	✓	✓	✓	✓
α-radiation			✓	
β-radiation			✓	
Fast neutron				✓

Each of our radiation detection crystals features a unique combination of scintillation parameters including

- Exceptionally low background
- Excellent energy resolution
- Outstanding light yield
- Short decay time

These individual strengths of Hellma Materials scintillation materials enable a superior detection sensitivity and highly-detailed Gamma-spectra. These performance parameters allow a wide range of advanced applications for radiation detection.

Security Applications

- Contamination monitoring
- Nuclide identification
- Cargo and luggage scanning

Medical Applications

- Positron Emission Tomography (PET)
- Computed Tomography (CT)

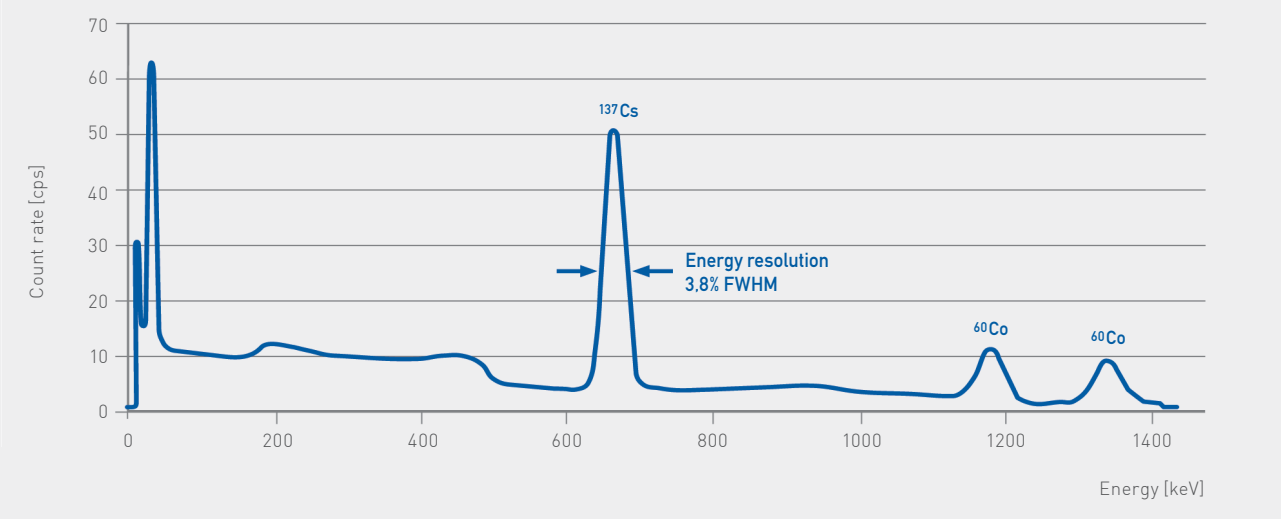
Geophysical Applications / Oil and Gas Exploration (only $CeBr_3$)

- Measurement while drilling (MWD)

Space Applications

- Investigation of planetary geology and atmosphere

High resolution gamma spectrum with $CeBr_3$



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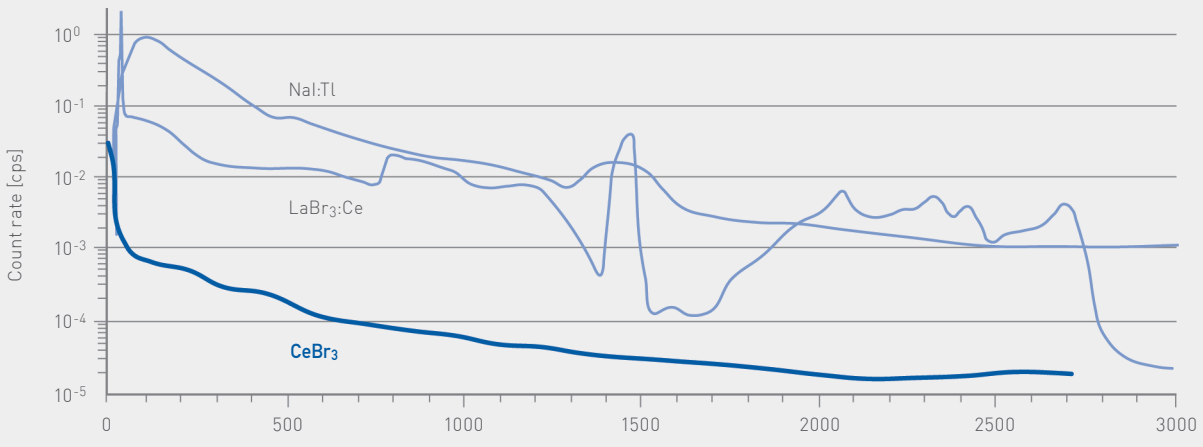
Properties of Scintillation Crystals

Scintillation properties				
	$CeBr_3$	LBC:Ce	CaF_2:Eu	BaF_2
Emission wavelength [nm]	380	380	435	220 (fast) 310 (slow)
Energy resolution @ 662 keV [% FWHM]	3.8	2.8	5.4	
Light yield [photons / MeV]	60,000	75,000	30,000	1,500 (fast) 10,000 (slow)
Decay time [ns]	19	< 25	950	0.6 (fast) 620 (slow)
Background [Bq/cm³]	<= 0.002	~1.5		
Z_{eff}	45.9	44...45.2	16.5	51.0
Optical, mechanical, thermal properties				
Refractive index @ emmission wavelength	2.09	2.1	1.44	1.54@220nm 1.50@310nm
Density [g/cm³]	5.10	~5.0	3.18	4.89
Thermal conductivity [W m^{-1} K^{-1}], [along the a-axis]	0.9	0.9	9.7	11.72
Linear coefficient of expansion [10^{-6} K^{-1}], [along the a-axis]	26.3	22.2	19.5	18.1
Crystal structure	hexagonal, anisotropic	hexagonal, anisotropic	cubical	cubical
Hygroscopic	yes	yes	no	no
Delivery forms				
Diameter max. [mm]	102	25 | 50	360	360
Thickness max. [mm]	153	178 | 50	150	150
Surface finish	fine ground	fine ground	fine ground/polished	fine ground/polished

Background Spectrum $CeBr_3$



Detector sizes: $CeBr_3$: 1"x1", $LaBr_3$: 1.5"x1.5", NaI: 2"x2", Background spectra in Canberra 777 shield (15.2 cm Pb)
F. Bronson et al.; Evaluation of resolution and nuclide identification performance of large volume $CeBr_3$ scintillation crystals

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Lithotec Crystals

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