



FOMOS

M A T E R I A L S

JSC FOMOS-MATERIALS has developed a growth technology for scintillation monocrystals of Gadolinium gallium-aluminium garnet (GAGG) doped with cerium ($Gd_3Ga_3Al_2O_{12}:Ce$). This scintillator has a high density and Z_{eff} , light output ~ 40000 photon/MeV, decay time ~ 80 ns in the absence of an afterglow. The maximum luminescence of GAGG is 520 ns.

Additional information, publications are available on our website www.newpiezo.com. If you are interested, it's possible to provide the samples for testing.

The main parameters of GAGG(Ce) in comparison with scintillators applicable today for X-ray diagnostic systems are shown in table 1 below.

Table 1. Comparative parameters of **GAGG:Ce**, **GOS: Pr**, **BGO**

| Material | GAGG:Ce | GOS: Pr | BGO |
|------------------------------|----------------|----------------|------------|
| Luminescence Wavelength [nm] | 520 | 513 | 480 |
| Light output photon/MeV | 38 000 | 25 000 | 8 000 |
| Decay time [μ s] | 0.08 | 2.40 | 0.30 |
| Density [g/cm ³] | 6.68 | 7.34 | 7.13 |
| Hygroscopy | n/a | n/a | n/a |
| Radiation Length (cm) | 1.59 | - | 1.1 |
| Refraction index | 1.85 | 2.2 | 2.15 |

Figure 1 provides the amplitude gamma-ray spectrum of ²⁴¹Am isotope, measured using **GAGG:Ce** scintillation monocrystal (3x3x3 mm size) and solid-state silicon photomultiplier (SiPM) with a sensitive area of 4x4 mm. Resolutions of the main emission line 59.5 keV and group of soft lines with the average energy of about 17 keV are clearly visible. Energy resolution on the emission line 59.5 keV is 25% FWHM. Readout noises are visible in the energy range $E < 10$ keV. Energy resolution for energy 511 keV is less than 7%.

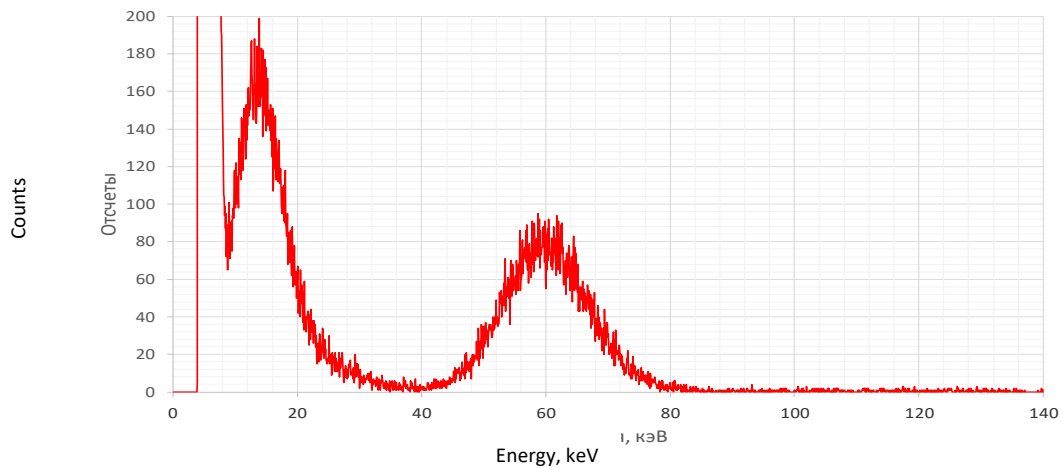


Figure 1. Energy selectivity of a detector based on scintillation monocrystal $Gd_3Al_2Ga_3O_{12}:Ce$ with SiPM when ²⁴¹Am radiation recording.