Scintillation properties of Mo co-doped Ce:$Gd_3Al_2Ga_3O_{12}$ single crystal scintillators

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Rare earth activated wide band gap oxide crystals have been found very useful as detectors of ionizing radiation in nuclear and high-energy physics, astrophysics, nuclear medicine and industry. A number of crystals activated by Ce^{3+} ions have been studied as potential fast and efficient scintillators. The cerium doped multicomponent Gadolinium Aluminum Gallium Garnet (Ce:$Gd_3Al_2Ga_3O_{12}$, Ce:GAGG) is one of the recently developed scintillator material [1]. Our group reported that Ce:GAGG offers excellent scintillation properties of high light yield(46,000–56,000 phot/MeV) and fast decay time(55 ns) [2,3]. Recently, Mg and Ca co-doped GAGG was reported and noticeable decay time acceleration was obtained [4,5]. And co-doping effects of Li^+ ions on Ce:GAGG was also reported [6]. In this study, we investigated Mo^{3+} co-doping effects on scintillation properties of Ce:GAGG scintillator.

The Mo co-doped Ce:GAGG single crystals were prepared by micro pulling down method with a wide concentration range 0–5000 ppm of the codopants. Absorption and luminescence spectra were measured together with several other scintillation characteristics, namely the scintillation decay and light yield to reveal the effect of Mo co-doping. Comparing to Ce^{3+} only doped standard GAGG, the Mo co-doped samples showed accelerated scintillation decays and higher light ouput with increasing Mo dopant concentration. Details of changes in scintillation prooperties with Mo co-doping will be reported in my presentation.

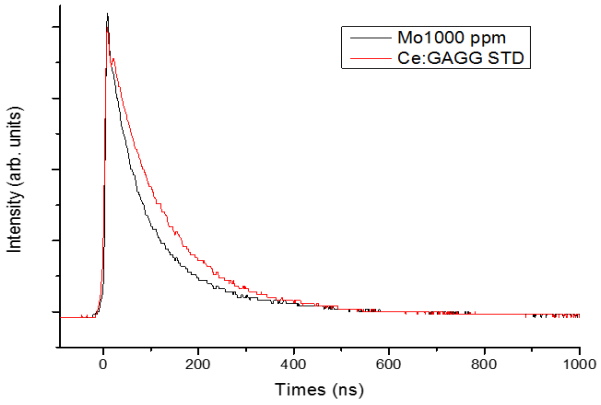

Fig. 1. Decay curves of Ce:GAGG excited by 662keV gamma-ray.

References

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