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Scintillation properties of Gd3(Al5-xGax)O12:Ce; x = 2.3, 2.6, 3.0 single crystals

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Scintillation properties of Czochralski-grown Gd3(Al5-xGax)O12:Ce; x = 2.3, 2.6, 3.0 single crystals were investigated. The light yield (LY) and energy resolution were measured using an R6231 photomultiplier. LY non-proportionality and intrinsic resolution were evaluated. At 662 keV γ-rays, the LY value of 46,200, 65,800 and 59,400 ph/MeV was obtained, respectively, for Gd3(Al2.7Ga2.3)O12:Ce, Gd3(Al2.4Ga2.6)O12:Ce and Gd3(Al2Ga3)O12:Ce. In spite of a lower LY value, Gd3(Al2.7Ga2.3)O12:Ce shows superior energy resolution (5.4%) among the studied crystals due to its better proportionality of LY. The ratio of LY values under excitation with α- and γ- rays (α/γ ratio) was also determined. Scintillation decay time and coincidence time resolution were measured in order to investigate the timing characteristics in the scintillation response. The dependence of LY on sample height was also measured and light loss coefficient was evaluated.

Keywords: Coincidence time resolution; Energy resolution; Gd3(Al,Ga)5 O12:Ce; Light yield; Nonproportionality of light yield; Scintillation decay

Has accepted

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