Scintillating properties of rare earth aluminum garnets

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Rare earth aluminum garnets, $RE_3Al_5O_{12}$, where RE are Lu, Y or their mixture in asked ratio, doped with Ce^{3+} or Pr^{3+} are efficient scintillators characterized by high or medium light yield (L.Y.) up to 27000 ph/MeV [1,2]. These scintillators are tested and used in various applications such as medical imaging (PET, PEM, radiography etc. [3]) or in 2D X-ray micro-radiography [1]. Crystalline samples of above mentioned aluminum garnets can be prepared as the single crystals grown by the Czochralski or Bridgman methods [4,5], as epitaxial layers grown by the liquid phase epitaxy (LPE) and in the form of ceramics [7]. In particular the epitaxial layers seem to be very promising medium materials regarding their good scintillating properties and cost [5,6]. Scintillation properties of garnet structure materials were investigated by pulse height spectroscopy using a HPMT photomultiplier [2]. Scintillating properties of garnet structure materials can be influenced by (i) garnet sample composition, by (ii) annealing at different temperatures and atmospheres and by (iii) effective doping if energy transfer is present. The main goal of this report is to present short summary of scintillating properties (L.Y. and energy resolution) of various aluminum garnet structure materials depending on the above described modifications (i)-(iii).

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