

Mechanical Structural and Optical Properties of Lu_2SiO_5 Scintillator-Polymer Composite Films

Authors : M. S. E. Hamroun, K. Bachari, A. Berrayah, L. Mechernene, L. Guerbous

Abstract : Composite films containing homogeneously dispersed scintillation nano-particles of $\text{Lu}_2\text{SiO}_5:\text{Ce}^{3+}$, in optically transparent polymer matrix, have been prepared and characterized through X-ray diffraction, differential scanning calorimetric (DSC), thermogravimetric analysis (ATG), dynamic mechanical analysis (DMA), electron scanning microscopy morphology (SEM) and photoluminescence (PL). $\text{Lu}_2\text{SiO}_5:\text{Ce}^{3+}$ scintillator powder was successfully synthesized via Sol-Gel method. This study is realized with different mass ratios of nano-particles embedded in polystyrene and polylactic acid polymer matrix (5, 10, 15, 20%) to see the influence of nano-particles on the mechanical, structural and optical properties of films. The composites have been prepared with 400 μm thickness. It has found that the structural proprieties change with mass ratio on each sample. PL photoluminescence shows the characteristic $\text{Lu}_2\text{SiO}_5:\text{Ce}^{3+}$ emission in the blue region and intensity varied for each film.

Keywords : nano-particles, sol gel, photoluminescence, Ce^{3+} , scintillator, polystyrene

Conference Title : ICTMP 2019 : International Conference on Termomechanics and Materials Physics

Conference Location : Dubai, United Arab Emirates

Conference Dates : January 30-31, 2019