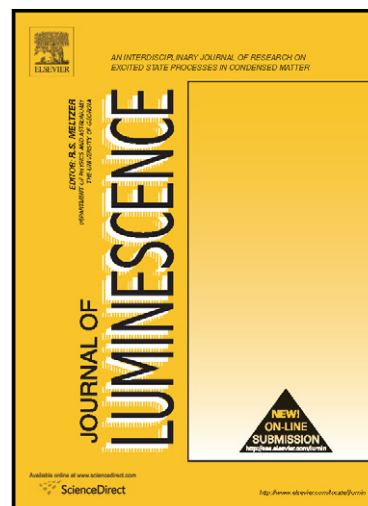


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Identification and development of nanoscintillators for biotechnology applications

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ABSTRACT

The purpose of this work is to investigate the radioluminescence emission properties in the range 300-400 nm of 15 nanoscintillators for potential application in radiation-triggered photodynamic therapy, and compare to those reported for single crystals with same composition. Garnet structures, silicates and an oxide activated with Pr³⁺ or Ce³⁺ were prepared by combustion synthesis and subsequently annealed at 1200°C. The (Y_{1-x}Pr_x)₃Al₅O₁₂ (x = 0.0075, 0.01, 0.0125, 0.015, 0.0175) compositions have the highest luminosity, showing concentration behavior for x > 0.01. The average particle size of (Y_{0.99}Pr_{0.01})₃Al₅O₁₂ is 80 nm, which was obtained by post-annealing high power ultrasonic processing. These results demonstrate that (Y_{1-x}Pr_x)₃Al₅O₁₂ is an excellent candidate for nanoscintillators-based biomedical applications. Comparisons to single crystal data indicate a general trend cannot be established between the radioluminescence emission intensity of nanoscintillators and single crystals with the same composition.

Keywords: Nanoscintillators, drug delivery, biomedical application, UV-emitting

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