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Synthesis and optical characterization of Y2O3:Eu and Y2O3:EuTi nanoparticles for use in bioimaging

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The use of bioimages has allowed for great progress in diagnosis and treatment of diseases. With the development of new materials and imaging techniques, causes of diseases have been elucidated and specific treatments have been developed. Due to these new developments, materials and methods that can help to understand the physiological behavior of living organisms have been largely studied. Luminescent nanoparticles, which can be functionalized and directed to target organs, are among them because they can be used as markers during in situ biological processes, for example [1- 3]. In this work the main goal is to synthesize and study the optical behavior of nanosized Y2O3 based phosphors for use as markers in bioimaging.

Eu and EuTi-doped Y2O3 oxides were synthesized via sol-gel and a modified sol-gel based on coconut water [4] and their structural, morphological and optical properties were evaluated. Analysis carried out in powder X-rays diffraction indicated the presence of a Y2O3 single crystalline phase. Scherrer's equation was used for estimating the crystallite size. Scanning Electron Microscopy analysis revealed the synthesis method strongly influences the degree of agglomeration and the particle size. The photoluminescence studies showed that the observed emission is attributed to the dopants, mainly the Eu3+, and in all cases the Eu3+ 5D0 ☾ 7F2 transition was the strongest, suggesting the ion is located in a site without inversion center symmetry [5]. The vacuum ultraviolet excitation and emission studies were done to explore the samples' optical behavior around their band gap. The produced samples presented emission in the optical transparence window of the biological tissue.

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