SiO_2-CeF_3:Eu^{3+} NANO-GLASS-CERAMICS PREPARED BY SOL-GEL METHOD STRUCTURAL AND OPTICAL CHARACTERIZATION

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A great effort has been devoted in recent years to synthesize inorganic nanocrystals of controlled size and shape by using different methods due to the quantum confinement effects on their properties [1]. Lanthanide compounds have been extensively investigated in diverse applications ranging from high-performance luminescent displays, optical communications and biochemical probes to laser materials [2]. SiO_2 based glasses shows excellent durability and optical quality, although their large phonon energy increases the non radiative decay rate that reduces the luminescence efficiency. On the other hand, cerium fluoride (CeF_3) has been attracting increasing attention due to its technological importance as an inorganic scintillating crystal [3] presenting obvious advantages over other conventional scintillators in their high density, fast response and high radiation resistance. Furthermore, it is also an important fluorescent host material owing to its low vibrational energies and the subsequent minimization of the quenching of the excited state of the rare earth ions [4].

In that effect, oxyfluoride glass-ceramics with composition of $94.9SiO_2$-$5CeF_3$-$0.1Eu^{3+}$ (mol%), were prepared by hydrolysis of tetraethoxysilane (TEOS) in a similar way as Fujihara et al. [5]. The structural analysis has been carried out by means of X-Ray diffraction confirming the precipitation of hexagonal CeF_3 nanocrystals. Luminescent study has confirmed the incorporation of Eu^{3+} ions in the CeF_3 nanocrystals discerning the contribution to the spectra of the Eu^{3+} ions partitioned into the CeF_3 nanocrystals and those remaining in the glassy phase.

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