

STRUCTURAL CHARACTERIZATION AND LUMINESCENT STUDY OF TRANSPARENT NANOSTRUCTURED Eu^{3+} DOPED SOL-GEL DERIVED $\text{SiO}_2\text{-PbF}_2$ GLASS-CERAMICS

J. del-Castillo¹, A. C. Yanes¹, J. Méndez-Ramos², J. J. Velázquez² and V. D. Rodríguez²

¹*Dpto. Física Básica, Universidad de La Laguna, 38206 La Laguna, Tenerife, SPAIN*

²*Dpto. Física Fundamental y Experimental, Electrónica y Sistemas, Universidad de La Laguna, 38206 La Laguna, Tenerife, SPAIN*

fjvargas@ull.es

Transparent rare-earth-doped glass-ceramics have been widely studied for their promising application in various fields like colour display, optical data storage, sensor, and optical communication [1–2]. Oxyfluoride glass-ceramics have been studied as host materials for active optical ions because they combine the particular optical properties of these ions in fluoride hosts with the elaboration and manipulation advantages, high mechanical and chemical stabilities of oxides glasses [3]. SiO_2 based glasses shows excellent durability and optical quality, although their large phonon energy increases the non radiative decay rate. On the other hand, PbF_2 provides a low phonon energy environment for rare-earth ions that enhances their luminescent efficiency.

Thus, glass-ceramics with an oxyfluoride composition of $89.9\text{SiO}_2\text{-}10\text{PbF}_2\text{-}0.1\text{Eu}^{3+}$ (mol%), were prepared by hydrolysis of tetraethoxysilane (TEOS) in a similar way as Fujihara et al. [4]. Structural analysis has been carried out by means of X-Ray diffraction confirming the precipitation of cubic $\beta\text{-PbF}_2$ nanocrystals. Finally, luminescent study has confirmed the partition of Eu^{3+} ions in the PbF_2 nanocrystals.

References:

- [1] M. Takahashi, M. Shojiya, R. Kanno, Y. Kawamoto, K. Kadono, T. Ohtsuki, N. Peyghambarian, J. Appl. Phys. 81 (1997) 2940.
- [2] S.Q. Man, E.Y.B. Pun, P.S. Chung, Appl. Phys. Lett. 77 (2000) 483. [5] S.Q. Xu, Z.M. Yang, J.J. Zhang, G.N. Wang.
- [3] M.J. Dejneka, J. Non-Cryst. Solids 239 (1998) 149.
- [4] S. Fujihara, C. Mochizuki and T. Kimura, J. Non Cryst. Solids 244, 267 (1999).