VI Encontro SBPMat 2007 — 28 out 11 nov — NATAL

6th Brazilian MRS Meeting
October 28th - November 1st

SBPMat Brazil-MRS

White persistent luminescence of silicates doped with Dy^{3+} .

Paolini, T. B. [(1)], Stefani, R. [(1)], Rodrigues, L.C.V.[(1)], Kodaira, C.A.[(2)], Lourenço, A.V.S. [(1)*], Felinto, M.C.F.C. [(2)] and Brito, H.F. [(1)]

(1) Instituto de Química/ USP-SP, Departamento de Química Fundamental, Av. Prof. Lineu Prestes, 748, São Paulo, SP.
(2) Instituto de Pesquisas Energéticas e Nucleares, Centro de Química e Meio Ambiente, Av. Prof. Lineu Prestes, 2242, São Paulo, SP.
* anavl@iq.usp.br

Abstract – This work refers to luminescent phenomenon in Dy^{3+}-doped $CdSrSiO_3$ long-lasting phosphor. After irradiation by a 254-nm UV lamp for 5 min, the Dy^{3+}-doped $CdSrSiO_3$ phosphor emits white light-emitting long-lasting phosphorescence after the irradiation source has been removed. Photoluminescence, time-live phosphorescence spectra are used to explain this phenomenon. Photoluminescence spectra reveal that the white light-emitting long-lasting phosphorescence originated from the two mixtures of Dy^{3+} characteristic luminescence.

.

Long-lasting phosphorescence, a phenomenon due to the thermal stimulated recombination of holes and electrons at traps, which leave holes or electrons in a long-lived excited state at room temperature, is an interesting phenomenon in which the material persists for a long time after the removal of the excitation source [1,2]. Based on this intrinsic merit, much interest was aroused in various rare earth ion-doped crystals and glasses excited by UV or infrared femtosecond laser, and their applications for luminous glass, emergency signs, watches and graphic arts, etc [3].

This present work is aimed at searching for the white light-emitting long-lasting phosphors. The introduction of Dy^{3+} ions into the $CdSrSiO_3$ host produces a highly dense trapping level, which is responsible for the long-lasting phosphorescence at room temperature. It is considered that the long-lasting phosphorescence is due to persistent energy transfer from the electron traps to the Dy^{3+} ions, which creates the persistent luminescence of Dy^{3+} to produce the white light-emitting long-lasting phosphorescence.

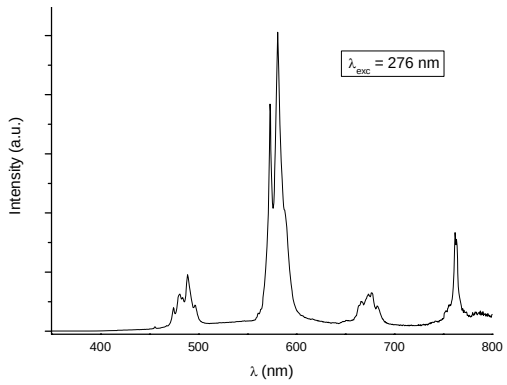

Figure 1: Emission spectrum of the compound

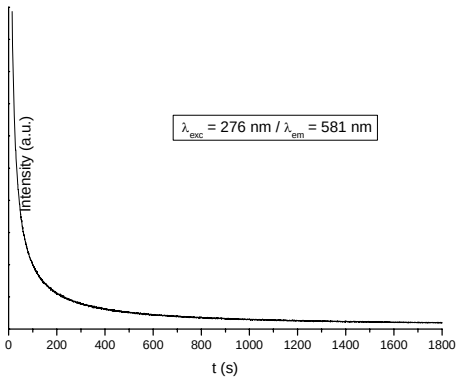

Figure 2: Delay time of the compound emission

References

[1] J. Qiu and K. Hirao, *Solid State Commun.* **106** (1998), p. 795.
[2] T. Matsuzawa, Y. Aoki, N. Takeuchi and Y. Murayama, *J. Electrochem. Soc.* **143** (1996), p. 2670.
[3] T. Katsumata, K. Sasajima, T. Nabae, S. Komuro and T. Morikawa, *J. Am. Ceram. Soc.* **81** (1998), p. 413.