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Emission of Light in Polycrystallines Matrixes of H_3BO_3

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Abstract- Polycrystalline matrix H_3BO_3 were obtained trough pressing and heating the powder of B_2O_3 at 180º C. The addition of 1% of Eu(fod) $_3$difenil in relation to the mass of B_2O_3 extraordinarily increased the emission of light from the sample, showing a very intense band emission in the red because of the electronic transitions typical of europium complex.

The phosphorescence emission is a way in which a luminescent substance radiates light of a wavelength, after having absorbed electromagnetic radiation of wavelength lower and hence the higher frequency of vibration and energy. This expression differs from the fluorescence for a longer duration and persist for periods commensurate with the duration of the stimulus that caused it [1].
The polycrystalline matrixes of were obtained as a first step, from the dust of B_2O_3 which was placed in a hydraulic press where he remained for 5min at a pressure of 1.3 GPa. Then the samples underwent a heating time of 5 and 10 minutes at a temperature of 180°C. In a second step, add 1% of the complex of europium, Eu(fod)$_3$difenil, for the mass of B_2O_3 and repeated the procedure is earlier.
Samples of the pure matrix (Fig. 1a and 1b) showed luminescence in the visible region in green, typical of boron when subjected to UV light. The wavelengths of excitation ($\lambda_{excitation}$) analyzed were 200, 210, 220, 380, 390 nm. In general, there are two intense and broad emissions: C_1 (400-500nm) around green and C_2 (550-650nm) around orange. Realizes that the next issue of C_1 is stronger than the close of C_2 showing the green depending on the $\lambda_{excitation}$, a weak emission around infrared region. The addition of 1% of Eu(fod)$_3$difenil on the mass of B_2O_3 (Fig. 2a and 2b) shows strong emission in the red, typical of europium due to transitions in the lowest excited state $^5D_0$ for multipletos ^7F_J (J = 0, 1, 2, 3, 4, 5.6). In this region the issue is such that gives the impression that there is no emission in the green feature of B_2O_3. A transfer of power must have occurred to that issue in green were low. However, a reverse process occurs when the excitation is stopped.

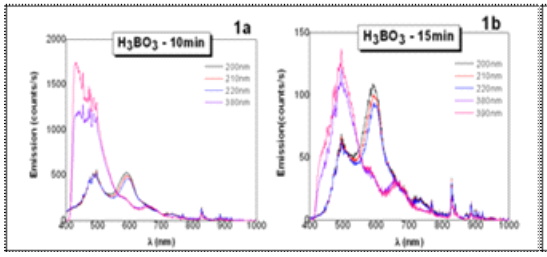

Figure 1: Emission spectrum of B_2O_3 subjected to a pressure of 1.3GPa and heat treatment at 180 °Ca) 10min b) 15min

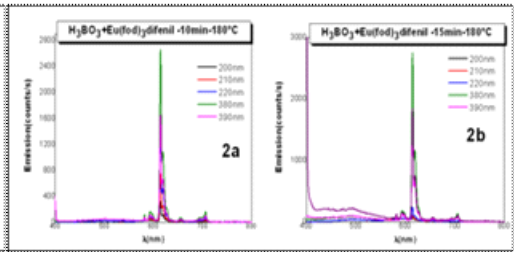

Figure 2: Emission spectrum of B_2O_3 + Eu (fod)$_3$dufenil subjected to a pressure of 1.3GPa and treatment heat to 180 ° C.A) 10min b) 15min.

[1] Santos, E. R. Estudos Espectroscópicos de Lantanídeos Livres e em Matrizes Vítreas. São Cristóvão, 2006. 115p. Dissertação de Mestrado-Departamento de Química, Universidade Federal de Sergipe.