Synthesis of crystalline $YNbO_4:Eu^{3+},Bi^{3+}$ phosphor obtained by the Spray Pyrolysis process

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White light-emitting diodes (LEDs) can offer benefits in terms of high luminous efficiency, energy-saving, maintenance and environmental protection, therefore, they are called the next-generation solid-state light, the replacement of conventional incandescent and fluorescent lamps. Therefore, it is important to find a new red phosphor source that can exhibit intense red emission with high absorption in the UV spectral region. Spray pyrolysis (SP) is an aerosol process commonly used to form or process a wide variety of materials in powder form. The particles produced by spray pyrolysis are more uniform in composition than those produced by many other techniques due to the reaction being confined to a micrometer scale (within the droplet). This work reports the synthesis, characterization and photoluminescence properties of $YNbO_4:Eu^{3+}:Bi^{3+}$ obtained by spray pyrolysis process in order to obtain more efficient luminophores that emit at the red. The X-ray patterns indicates that doped Bi^{3+} and Eu^{3+} ions have no obvious influence on the structure of the host. Excitation spectra show that the addition of Bi^{3+} provides the appearance of a peak at 306 nm assigned to $Bi^{3+} \rightarrow Nb^{5+}$ charge transfer band (CTB). Moreover, sharp lines relative to the $^7F_0 \rightarrow {}^5L_J$ (L = D, H, and L, where J = 0–7) transitions of the Eu^{3+} ion were observed in the 350-550 nm spectral range. The emission spectrum of Eu^{3+} doped samples excited at the CTB (306 nm) and at 394 nm presented lines between 550 and 725 nm, characteristic of the transition from the excited level $^5D_0$ to the manifold level ^7F_J (J = 0, 1, 2, 3, and 4).

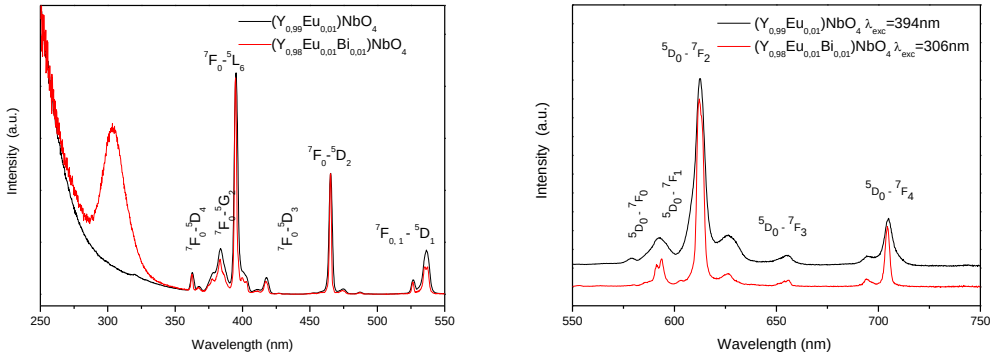

Figure 1: Excitation spectra (λ_{em} = 612 nm) and emission (λ_{exc} = 306 and 394nm) .