

Mn activated Y_2O_3 and Y_2O_3 -ZnO composite yellow emitting thin film phosphor for thick ceramic thin film electro-luminescence (TCTFEL) display devices – preparation and characterization

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Abstract

High-luminance yellow emitting Mn activated Y_2O_3 and Y_2O_3 -ZnO composite thin-film electro-luminescent (TFEL) devices were fabricated onto a $BaTiO_3$ ceramic substrate by sol-gel dip coating method. The EL device comprises of Al and ZnO:Al coating on the $BaTiO_3$ and EL thin film, respectively. Photo and electro luminescent characteristics were dependent on the preparation condition and Zn content in the thin film. The growth of high electro-luminescent (EL) monoclinic Y_2O_3 phase was formed at low temperature ($400^\circ C$) whereas the addition of Zn enhances the growth of monoclinic phase at high temperature ($600^\circ C$). The growth of monoclinic Y_2O_3 is also studied as a function of pH of the solution in the presence of Zn. The EL film that was deposited at low pH (1.5) shows low EL emission intensity where as at pH (5) shows increased EL intensity. The addition of Zn enhances the growth of monoclinic phase of Y_2O_3 , crystal quality, photo luminescent (PL) and Electro-luminescent (EL) emission properties. A high luminance of 2640 cd/m^2 was obtained using a $(Y_2O_3)_{0.9}-(ZnO)_{0.2}$:Mn, whereas Zn un-doped Y_2O_3 :Mn shows 240 cd/m^2 driven at 1 kHz.

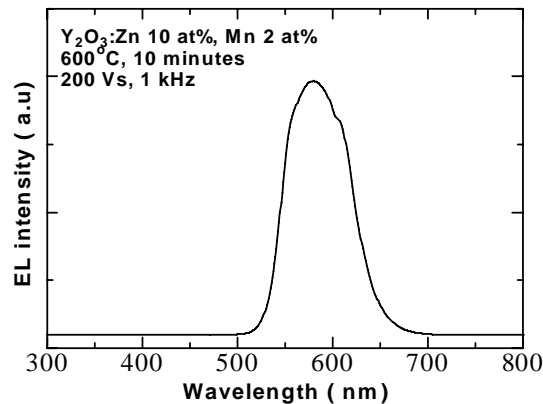


Figure1. EL spectrum of Zn co-doped Y_2O_3 :Mn thin film