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Microestructure and luminescence of magnesium tungstate doped with La(III)

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Abstract – In this paper we prepared $Mg_{1-x}La_xWO_4$ (x = 0 and 0.2) oxides by Pechini method. The powders were characterized by Thermogravimetric analysis, X-ray diffraction and scanning electronic microscopy. Measurements of photoluminescence at room temperature were made on the samples calcined at 1000℃. XRD patterns showed the formation of secundary phase in the doping material. The photoluminescence spectra of powders presented a broad band of maximum intensity about at 470nm. However, the introduction of lanthanum in the crystalline lattice decreases the propertie.

Metal tungstates of the general formula ABO_4 have been studied extensively for decades, owing to their technological importance in a variety of applications such as phosphors, detectors of ionizing radiation or optoelectronic devices [1-3]. The optical and luminescence properties of materials are of particular significance in such applications. Research on these compounds intensified recently due to need to provide different scintillation targets for cryogenic particle physics experiments [4]. This paper reports the preparation of $Mg_{1-x}La_xWO_4$ (x = 0 and 0.2) oxides by Pechini method in order to observe the effect of doping in the microestructural characteristics and photoluminescence properties of materials. The powders were characterized by thermogravimetric analysis (TGA), x-ray diffraction (XRD) and scanning electronic microcopy (SEM). Measurements of photoluminescence at room temperature were made on the samples calcined at 1000℃.

The TG curves of precursor powders presented similar behavior. The results showed weight loss associated the dehydratation of compounds and decomposition of organic matter followed by the oxide formation around 750℃ and 800℃ for $MgWO_4$ and $Mg_{0.8}La_{0.2}WO_4$, respectively. X-ray patterns showed single phase with monoclinic type wolframite structure for MgWO4. Evidence of secondary phase was observed in the doped material. The crystallite sizes obtained were 85 nm and 74 nm for $MgWO_4$ and $Mg_{0.8}La_{0.2}WO_4$, respectively. The micrographs reveal high porosity and uniform distribution of particles sizes. The photoluminescence spectra of powders presented a broad band of maximum intensity about at 470nm. However, the introduction of lanthanum ion in the crystalline lattice decreases the propertie.

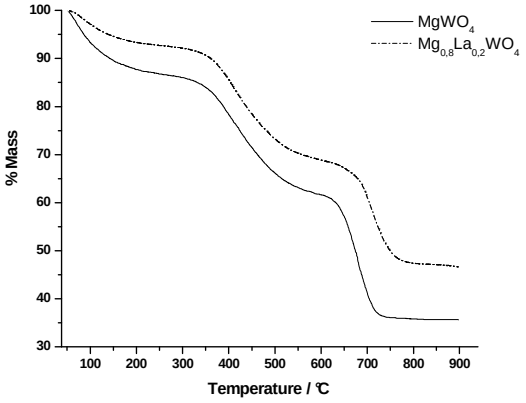

Figure 1: TG curves of $Mg_{1-x}La_xWO_4$ powders calcined at 300℃ for 2h.

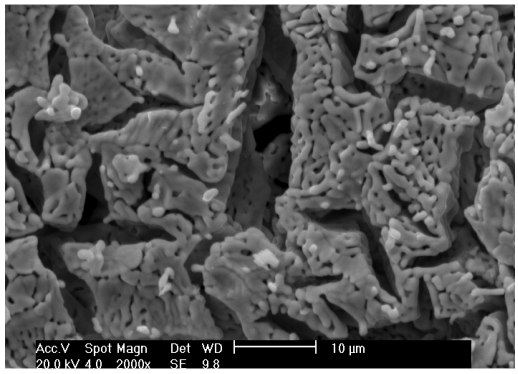

Figure 2: SEM image of $MgWO_4$ powder calcined at 1000℃ for 2h.

References

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