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Effect of annealing at different time interval on the structure, morphology and optical properties of $\text{MgAl}_2\text{O}_4:0.1\% \text{Mn}^{2+}$ nanophosphors

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In this study, manganese doped magnesium aluminate nanopowders ($\text{MgAl}_2\text{O}_4:0.1\% \text{Mn}^{2+}$) were prepared by citrate sol-gel. The effect of annealing period/time (AP) at a fixed annealing temperature (800 oC) and dopant concentration (0.1% Mn^{2+}) on the structure, particle morphology and photoluminescence properties of the nanopowders were investigated. X-ray powder diffraction (XRD) results showed that the crystalline quality and crystallite sizes of the powders were not influenced by varying the AP. Doping with 0.1% Mn^{2+} did not influence the crystal structure of the un-doped material. The scanning electron microscope (SEM) images suggested that doping and AP does not influence the particle morphology of the nanopowders. Transition electron microscopy (TEM) image suggested that the crystallite sizes were in the nanoscale. Photoluminescence (PL) results showed two emission peaks located at around 413 and 655 nm respectively. The 413 nm emission peak is attributed to the defects level within the un-doped material. On the other hand, the 655 nm emission peak is attributed to the ($4T_1 \rightarrow 6A_1$) transitions of Mn^{2+} . The CIE coordinates results showed that the emission colour change from bluish to the violet region when increasing AP.

Apply to be considered for a student award (Yes / No)?

yes

Level for award (Hons, MSc, PhD, N/A)?

Msc

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