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Annealing-Driven Structural and Optical Properties in BaAl₂O₄/MgAl₂O₄:Tb³⁺ Mixed-Phase Nanophosphors Prepared by Citrate Sol-Gel Method

In this study the mixed phases BaAl2O4/MgAl2O4: 0.1 Tb3+ (BM:0.1% Tb3+) nanophosphors were prepared via the citrate sol-gel method. The structural and optical properties were investigated by varying the annealing period from 1 hour to 5 hours, while keeping the annealing temperature at 1000°c and the doping concentration of 0.1% Tb3+ constant. The phase quantification of the X-ray diffraction (XRD) indicated that the mixed phases are composed of the hexagonal BaAl2O4 and cubic MgAl2O4 crystal structures. The Scanning Electron Microscope (SEM) results showed that AP influenced the morphology of the prepared samples, and the Energy dispersive X-ray spectroscopy (EDS) confirmed the expected elemental composition of Ba, Mg, Al, O and Tb3+ . Transmission Electron Microscope (TEM) confirmed the particle size of the prepared sample is in nanoscale range. The effects of the annealing period were observed on Photoluminescence (PL) results showed multiple emission peaks which were attributed to BaAl2O4 and MgAl2O4 Tb3+ transitions.

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