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The effect of different annealing period intervals on BaAl₂O₄:0.2% Ce³⁺ nano-phosphor' structure, morphology and luminescent properties synthesized by citrate sol-gel method.

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Cerium-doped Barium Aluminate (BaAl₂O₄:0.2%Ce³⁺) nano-powders were prepared by citrate sol-gel method to overcome the flickering luminescence in signage and displays by offsetting dark duration with persistent luminescence. The effects of annealing period (AP) at a constant temperature of 900 °C and dopant concentration of 0.2% Ce³⁺ on the structure, particle morphology and photoluminescent properties of nano-powders were investigated. The X-ray powder diffraction (XRD) patterns showed that the 0.2% Ce³⁺ dopant did not have a major influence on the crystalline structure of the host BaAl₂O₄. The crystalline quality and size of the nano-powders were influenced by varying the AP. The scanning electron microscope (SEM) together with the energy dispersive spectra (EDS) images revealed the increase in AP affects the morphology of the prepared phosphor. There is a presence of hexagonal platelets with well-developed faces that dominate the morphology of the doped samples. The emission peaks at 427 nm, 538 nm and 727 nm are attributed to band-gap defects in the host material at $\lambda_{ex} = 299$ nm. The emission peaks at 481 nm, 549 nm and 612 nm are attributed to the 5d¹f emission of Ce³⁺. The commission internationale de l'éclairage (CIE) results showed there is a slight change in the emission color of 0.2% Ce³⁺ doped BaAl₂O₄ when varying the AP.

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