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Sol-gel synthesis and Characterization of Structural and Luminescence Properties of ZnAl_2O_4 singly doped with Mn^{2+} , Cr^{2+} , or Pb^{2+} powder phosphors

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Abstract content
 (Max 300 words)

Pure and ultrafine cubic ZnAl_2O_4 singly doped with Mn, Cr or Pb ions were prepared at a low temperature below 80 °C by a sol-gel process. The catalyst volume in a solution and dopant (Mn, Cr, and Pb) concentrations were varied. The gels and heat-treated powder samples were characterized by thermogravimetric analysis (TGA), fourier transform infrared analysis (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM), electron diffraction spectroscopy (EDS) and photoluminescence (PL). The TGA confirmed that the minimum annealing temperature to obtain pure and single phase ZnAl_2O_4 must be above 400 °C in order to remove organic residues. The XRD data revealed that all the heat-treated samples were cubic crystalline structures and the estimated particle sizes were in the range of 20-50 nm in diameter. The surface morphology of the phosphors was influenced by the dopant concentration and catalyst volume in the solution. EDS confirm the presence of the expected elements. The position of the emission peak in the visible domain was consistent with the well known emission evident with the type of dopant incorporated.

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Level for award
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PhD

Main supervisor (name and email)
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