

# SAIP2012



UNIVERSITEIT VAN PRETORIA  
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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**

Tuesday 10 Jul 2012 at 17:30 (02h00')

### **Abstract :**

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.

### **Award :**

Yes

### **Level :**

PhD

### **Supervisor :**

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### **Paper :**

Yes

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