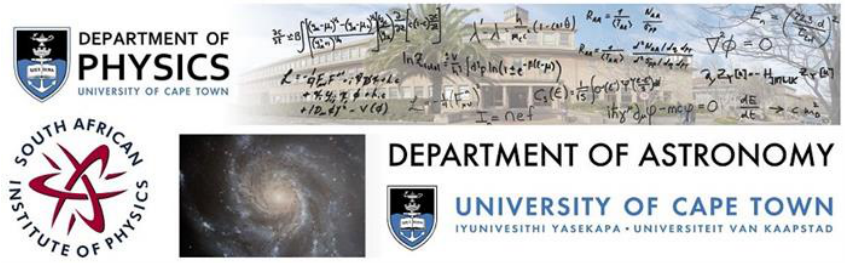

Contribution ID: **293** Type: **Poster Presentation**

Sol-gel synthesis of Zn₂SiO₄:Mn²⁺ phosphors and the effect of rare-earth ions co-doping on their photoluminescence

Tuesday, 5 July 2016 16:10 (1h 50m)

Abstract content
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The present study reports on the synthesis, structure and optical properties of manganese (Mn2+) doped zinc silicate (Zn2SiO4). Zn2SiO4:Mn2+ phosphors with doping concentration of Mn2+ ions ranging from 0.015 to 0.09 mol% were prepared by a sol-gel method. The prepared powder phosphors were characterized using X-ray Diffractometer (XRD), Field-Emission Scanning Electron Microscopy (FESEM) coupled with Energy Dispersive spectroscopy (EDS) and Photoluminescence (PL) techniques. Samples annealed at 600 oC were amorphous and when annealed at 1000 oC showed an XRD pattern matching the α-phase structure of Zn2SiO4. A network of spherical (but faceted) agglomerated nanoparticles was observed from un-doped and Mn2+ doped Zn2SiO4 phosphors. The PL spectra recorded from as-prepared Zn2SiO4:Mn2+ phosphors showed a broad emission band at ˜ 520 nm under UV excitation light. This is a typical emission of Mn2+ in Zn2SiO4 and maybe assigned to the electronic transition 4T1(4G) ⟶6A1(6S). Zn2SiO4:Mn2+ phosphors were then co-doped with Eu3+ and Dy3+ rare-earth ions and phosphors co-doped with Eu3+ showed emission peak at ˜590 nm and an intense red emission at ˜615 nm resulting from Eu3+ ion transitions 5D0 ⟶ 7F2 and 5D0 ⟶ 7F3, respectively. In addition, Dy3+ co-doped Zn2SiO4:Mn2+ phosphors showed a multi-peak emission with an intense emission at ˜571 nm corresponding to 4F9/2 ⟶ 6H13/2 transition. Furthermore, the PL decay of Zn2SiO4:Mn2+,Eu3+,Dy3+ phosphor was analyzed and described to be bi-exponential.

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