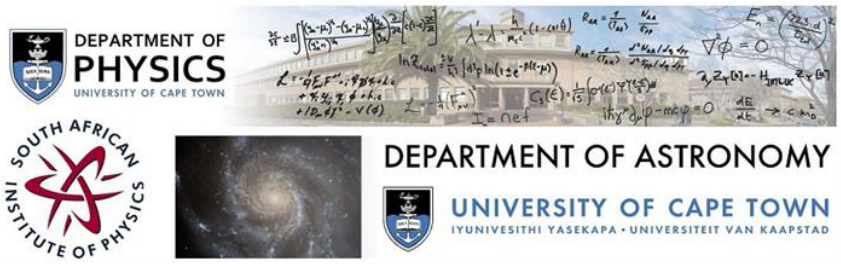

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Combustion synthesis and characterization of Eu3+ doped Ba5(PO4)3OH phosphors

Tuesday, 5 July 2016 14:40 (20 minutes)

Abstract content
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Barium orthophosphate or Ba3(PO4)2 is known to be a good host for rare earth dopant ions to prepare light emitting materials or phosphors [1]. In this study Ba5(PO4)3OH was doped with europium (Eu3+), by using the combustion method, resulting in a phosphor material that emitted red light when excited with ultraviolet radiation. The following characterization techniques: X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy, and photoluminescence (PL) spectroscopy were used to determine the structure, morphology, chemical composition and luminescent properties of the Ba5(PO4)3OH:Eu3+ phosphor powders with different concentrations of Eu3+. The XRD data exhibited characteristic diffraction patterns of the hexagonal phase of Ba5(PO4)3OH referenced in the standard JCPDS card number 00-001-0811, while the SEM results confirmed the formation of needle-like particles with diameter approximately equal to 100 nm. The red PL emission was attributed to transitions of the Eu3+ ions. The PL intensity of the Ba5(PO4)3OH:Eu3+ phosphors was shown to improve when the concentration of Eu3+ was increased from 0.1 to 3 mol% and the intensity was quenched for concentrations higher than 3 mol% due to the concentration quenching effects. This material was evaluated for possible applications in photodynamic therapy or PDT.

[1] M. Cheng, H. Junhui, Material Letters, 2012, 70, 101-104

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