Contribution ID: **112** Type: **Poster Presentation**

Cathodoluminescence degradation of Bi doped SrO phosphor powder

Thursday, 28 June 2018 15:00 (2 hours)

Luminescence from Bi ions can be useful in obtaining blue to red emitting phosphors using different hosts when excited by ultraviolet light due to efficient conversion to longer wavelengths. The alkali-earth oxide phosphor SrO:Bi offers a potential low-cost alternative to lanthanide-based blue phosphors. SrO powder doped with 0.2 mol% Bi was synthesized by the sol-gel combustion method and annealed at 1100℃ in air for 2 h, since these conditions were found to optimize its photoluminescence (PL) intensity. The structure of the powder was confirmed as face-centred cubic using X-ray diffraction. An electron beam of energy 2 keV and beam current 6.2 μA produced blue cathodoluminescence (CL) centred around 445 nm. Auger electron spectroscopy (AES) was employed to analyze the surface chemical composition of the powder after pumping to a vacuum pressure of 2.6×10^{−8} Torr and confirmed the presence of all major elements, namely Sr and O, but Bi was not observed due to its low concentration. C and Cl were also detected and attributed to adventitious impurity species on the surface. By simultaneous monitoring of the CL and AES peak-to-peak heights over time for 22 h the CL degradation of the phosphor was investigated. The CL intensity had slightly reduced after irradiation of about 50 C/cm² and stabilized thereafter, while most of the C was removed from the surface during this process. The degradation was also evaluated in an O₂ environment by back-filling the vacuum system with O₂ to a pressure of 1.0×10^{−7} Torr. The CL intensity had reduced slightly more and at a higher rate in the O₂ atmosphere, due to the reaction of O₂ with the adventitious C to form volatile compounds on the surface of the irradiated sample. A new less luminescent surface layer may have formed after the removal of C, which caused the CL intensity to decrease slightly more than in the case of the vacuum. The degradation, however was only around 20%. Except for the initial degradation, the blue emitting Bi doped SrO powder was found to be stable under electron bombardment in the base vacuum and O₂ environments, which makes it suitable for use in lighting and display applications.

Please confirm that you
have carefully read the
abstract submission instructions
under the menu item
”Call for Abstracts”
(Yes / No)

Yes

Consideration for
student awards
Choose one option
from those below.
N/A
Hons
MSc
PhD

MSc

Supervisor details
If not a student, type N/A.
Student abstract submision
requires supervisor permission:
please give their name,
institution and email address.

H. C. Swart
Department of Physics, Box 339, University of the Free State, Bloemfontein 9300, South Africa
E-mail address: SwartHC@ufs.ac.za

Primary author: Mr ABDELREHMAN, Mogahid (University of the Free State)

Co-authors: Dr YOUSIF, Abdelrhman (University of Khartoum); Dr SEED AHMED, Hassan (assistant Professor); Prof. SWART, Hendrik (University of the Free State); Prof. KROON, R. E. (University of the Free State)

Presenter: Mr ABDELREHMAN, Mogahid (University of the Free State)

Session Classification: Poster Session 2

Track Classification: Track A - Physics of Condensed Matter and Materials