

Concentration effect of Tm^{3+} on cathodoluminescence properties of $\text{SiO}_2:\text{Tm}^{3+}$ and $\text{SiO}_2:\text{Ho}^{3+}, \text{Tm}^{3+}$ systems

M.S. Dhlamini, G.H. Mhlongo, H.C. Swart, O.M. Ntwaeaborwa, K.T. Hillie

ABSTRACT:

Cathodoluminescence (CL) properties of SiO_2 powders activated with thulium (Tm^{3+}) and holmium (Ho^{3+}) ions prepared by a sol-gel process were investigated. Different molar concentrations of Tm^{3+} co-doped with Ho^{3+} were studied. The 460 nm peak was monitored and the influence of the beam energy and concentration of Tm^{3+} ions on the emission properties of this peak was also monitored. The peculiar behavior whereby the 460 nm emission peak decreases and the increase in the 705 and 865 nm peaks with the increase in the concentration of Tm^{3+} ions is reported. The relationship between the accelerating beam voltage and the CL intensity of the blue emission peak (460 nm peak) is established. Morphology, particle size and optical properties were characterized with Scanning electron microscopy (SEM), UV/VIS Lambda 750 S spectrometer and Auger electron spectroscopy (AES) equipped with Ocean Optics S2000, respectively.