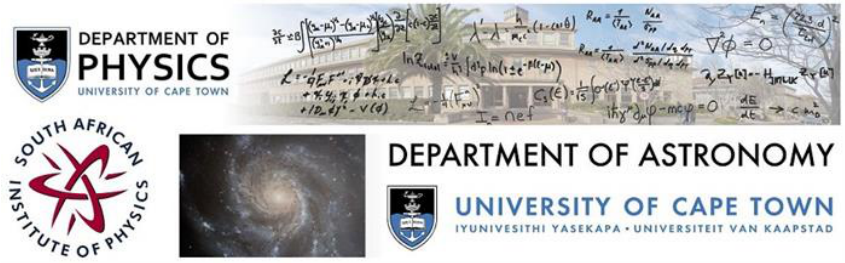

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The effects of Cd2+ concentration on the structure, optical and luminescence properties of MgAl2O4:x% Cd2+ nanophosphor prepared by sol-gel method

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

Abstract content
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Cadmium doped magnesium aluminate (MgAl2O4:x% Cd2+) powders with different cadmium concentrations were prepared by the sol-gel method. Energy dispersive x-ray spectroscopy (EDS) analysis confirmed the presence of the expected elements (Mg, Al, O and Cd). The x-ray diffraction (XRD) analysis revealed that the powders crystallized into the cubic spinel structure. Cd2+ doping influenced crystallinity of the powder samples. The crystallite size and particle morphology were not affected by variation in the Cd2+ concentration. Ultraviolet-visible spectroscopy (UV-vis) measurements revealed that the band gap of the MgAl2O4 was influenced by Cd2+ doping. Un-doped and Cd2+-doped MgAl2O4 nanophosphor exhibit the violet emission at 392 nm. There was no evidence on the emission peak shift, which suggests that all emissions originated from the defects within the host material. Increasing the Cd2+ concentration up-to 0.88 mol% lead to luminescence intensity enhancement, while further increase of Cd2+ concentration lead to concentration quenching. The critical energy transfer distance (Rc) between the neighbouring donors and acceptors was found to be 5.21 Å, suggesting that the multipole-multipole interaction (M-MI) is the major cause of concentration quenching. CIE colour coordinates confirmed non-tuneable violet emission whose intensity was dependent on the Cd2+ concentration.

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