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Luminescent properties of $Y_2O_3:Bi^{3+}$

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Abstract :

The luminescent properties of $Y_2-xO_3:Bi_x=0.002$ were investigated and the fluorescence spectra show that the luminescence is stimulated by the emission from two types of centres. These two types of centres were associated with the substitution of the Bi^{3+} ion for the Y^{3+} ion in two different sites in the crystal lattice of Y_2O_3 (with point symmetries C_2 and S_6 1,2,3,4). The emission of Bi^{3+} in the S_6 site causes blue luminescence with maxima at 360 nm and 407 nm and in the C_2 site it gives green luminescence with the maximum at 495 nm. Both these emissions is related to the $3P_1-1S_0$ transition^{1,3,4,5} in Bi^{3+} . X-ray photoelectron spectroscopy (XPS) indicate that the O^{2-} , Y^{3+} and Bi^{3+} ions occupy more than one coordination environment. This proves the two different sites in the $Y_2-xO_3:Bi_x=0.002$ structure. The diffuse reflectance was measured for Y_2O_3 and $Y_2O_3:Bi$ and there was no change in the band gap when 0.2 % mol of Bi is doped in the Y_2O_3 host. References⁽¹⁾L.G. Jacobsohn, M.W. Blair, S.C. Tornga, L.O. Brown, B.L. Bennett, R.E. Muenchausen, Applied physics. 2008, 104,124303. ⁽²⁾F. Real, B. Ordejon, V. Vallet, J. Flament, J. Schamps, Chemical physics. 2009, 131,194501.⁽³⁾O. M. Bordun. Applied spectroscopy. 2002, 69,1.⁽⁴⁾G. Ju, Y. Hu, L. Chen, X. Wang, Z. Mu, H. Wu, F. Kang. Electrochemical society. 2011, 158,294.⁽⁵⁾X. Y. Huang, X. H. Ji, Q. Y. Zhang. The American ceramic society. 2011, 94, 833.

Award :

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Paper :

Yes

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