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Luminescence in $\text{Ba}_{3-3x/2}(\text{VO}_4)_2:\text{xEu}$ ($0 \leq x \leq 0.3$) phosphors

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The luminescence performance of a material can be enhanced significantly by the suitable selection of host material. Since the white light-emitting diodes (WLEDs) gaining much more attention. Generation of the white light by combining an ultraviolet (UV) LED and appropriate phosphors is most desirable. Hence, it is essential to develop efficient phosphors to convert the near-UV pump light with a range of 300-400 nm into the visible wavelength. In order to fabricate excellent WLEDs, the excitation wavelength of the red phosphors should match the emission of the near UV-LEDs (350-410 nm) or blue LEDs (440-470 nm). Therefore, the phosphor materials play an important role in WLEDs. Most vanadates exhibit intense broadband emission from 400 nm to 700 nm under UV excitation because of tetrahedral VO_4 with T_d symmetry. The broadband emission spectra of vanadate phosphors are due to the charge transfer (CT) of an electron from the oxygen $2p$ orbital to the vacant $3d$ orbital of V^{5+} in tetrahedral VO_4 with T_d symmetry. The luminescence is attributed to the ${}^3T_2 \rightarrow 1A_1$ and ${}^3T_1 \rightarrow 1A_1$ transitions. The preparation and photoluminescent properties of the palmierite-type structure orthovanadate, $\text{Ba}_{3-3x/2}(\text{VO}_4)_2:\text{xEu}$ ($0 \leq x \leq 0.3$) are reported. X-ray powder diffraction (XRD) of the annealed sample indicates that rhombohedral $\text{Ba}_3\text{V}_2\text{O}_8$ with small amount of EuVO_4 coexistence. The solution combustion reaction products exhibit almost spherical like structures. It is observed that the particle size become larger with an increase in temperature. The photoluminescence properties of these phosphors were investigated under near-UV light excitation wavelengths. $\text{Ba}_{3-3x/2}(\text{VO}_4)_2:\text{xEu}$ ($0 \leq x \leq 0.3$) phosphors emit green light with the maximum wavelength at 493 nm by the excitation at 360 nm, due to the charge transfer transitions of VO_4^{3-} . In the $\text{Ba}_{3-3x/2}(\text{VO}_4)_2:\text{xEu}$ ($0 \leq x \leq 0.3$) system, the luminescence intensity of VO_4^{3-} decreases with increasing the annealing temperature and reaches maximum at 1250 °C. On the other hand, red emission of Eu^{3+} ions caused by the electric dipole transition of $5D_1 \rightarrow 7F_2$ increases gradually. The parameters for the synthesis of these phosphors including their annealing temperature and concentration of Eu^{3+} ions have also been optimized. The results indicate that $\text{Ba}_{3-3x/2}(\text{VO}_4)_2:\text{xEu}$ ($0 \leq x \leq 0.3$) phosphors can be served as a potential red emitting phosphor candidate for LEDs.

Biography

K N Shinde has completed his PhD at the age of 30 years from R.T.M. Nagpur University, Nagpur, India and postdoctoral studies from Nanotechnology and Advanced Materials Engineering, Sejong University, Seoul, South Korea. At present, He is working as an assistant professor and director of R & D cell at N.S. Science and Arts College, Bhadrawati, India. He has published more than 40 papers in reputed journals and serving as an editorial/reviewer of international journals. His research interests are synthesis of nanocrystalline materials and exploring novel materials and study their PL and TL properties. Recently he published a book on "Phosphate Phosphors for Solid State Lighting" with International Publication Springer series in material science.

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Complexation of 2-mercaptoimidazol with some barium salts conductometrically in various solvent at different temperatures

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The complexation reaction between 2-mercaptoimidazol (MI) ligand with BaCl_2 and $\text{Ba}(\text{NO}_3)_2$ were studied conductometrically in Ethanol, aqueous methanol and water at four different temperatures (293.15 K, 298.15 K, 303.15 K and 308.15 K). Limiting molar conductance, the formation constants, Gibbs free energy, Gibbs free energy of activation and thermodynamic parameters different complexes were determined.

Biography

Elsayed T Helmy has completed his PhD at the age of 27 years from Mansoura University and postdoctoral studies from Mansoura University Chemistry Department. He is a Lecturer of chemistry, a faculty of Science. He has published more than 10 papers.

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