OMICS Group Conferences
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2nd International Conference on
Nanotek and Expo

December 3-5, 2012 DoubleTree by Hilton Philadelphia Center City, USA

Recent development in nanophosphors for plasma display panels

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Red, blue and green phosphors used in PDPs are key materials to improve the performance of PDPs such as brightness, cost-effectiveness and stability. $BaMgAl_{10}O_{17}:Eu^{2+}$ (BAM) is an important blue-emitting phosphor for plasma display panel (PDP) because it can efficiently absorb the vacuum ultraviolet (VUV) light coming from the resonance radiation line of Xe atoms (147 nm) and from the excited state of molecular Xe (172 nm). Five systems of varied diameters viz. 62 nm, 85 nm, 115 nm, 160 nm and 450 nm of $BaMgAl_{10}O_{17}:Eu^{2+}$ nanorods are prepared. The blue-shift and enhanced photoluminescence are observed, and found to be highly dependent on the size of diameter of $BaMgAl_{10}O_{17}:Eu^{2+}$ nanostructures. The enhancement in emission intensity of codoped blue nanophosphor is demonstrated by energy transfer from defect states created by the Er^{3+}/Nd^{3+} ions to the Eu^{2+} in the $BaMgAl_{10}O_{17}$. The VUV photoluminescence emission characteristic of $BaMgAl_{10}O_{17}:Eu^{2+}$, Mn^{2+} are also studied. The results indicate that there exit energy transfer from Eu^{2+} to Mn^{2+} in the $BaMgAl_{10}O_{17}:Eu^{2+}$ co-doped with Mn^{2+}. More interestingly, the Mn^{2+} luminescence could be switched ON and OFF with the conversion of $Eu^{2+} \leftrightarrow Eu^{3+}$. Quantum confined Tb^{3+} ion doped in YBO_3 green-luminescent nanocrystal yield enhancement in luminescence as compared to Tb^{3+} ion doped in YBO_3 bulk phosphor. Improved color-purity in nano-size $YBO_3:Eu^{3+}$ red-emitting phosphor has been also observed.

Biography

Raghvendra Singh Yadav received his Ph.D. degree in Physics in the year 2011 from Physics Department, University of Allahabad, India. Currently, he is working as Scientist on "Quantum cutter and sensitizer based nanophosphors for plasma display panels and mercury-free fluorescent lamps" at Nanotechnology Application Centre, University of Allahabad, Allahabad, India. His scientific interest is focused on nanophosphors for LEDs, Displays, lamps, luminescent Switches, radiation sensors, Photovoltaic and Biomedical applications. He has published more than 30 papers in international peer reviewed journals and also he has worked as reviewers of various international journals. He is also working as a member of Editorial Board of International Journals, namely (i) Materials Sciences and Applications (Scientific Research Publishing, USA),(ii) Journal of Modern Physics (Scientific Research Publishing, USA), (iii) Journal of Biomaterials and Nanobiotechnology (Scientific Research Publishing, USA), (iv) Journal of Spectroscopy& Dynamics (SimplexAcademic Publishers, India) and (v) Journal of Chemical Engineering and Materials Science (JCEMS) (Academic Journals, Lagos).

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