Electronic Supplementary Material (ESI) for RSC Advances

Supplementary Information

Selective Reduction of Visible Upconversion Emissions Induced by Bi^{3+} in Tm^{3+}/Yb^{3+}-doped $Y_{0.89-x}Bi_xVO_4$ Microcrystals

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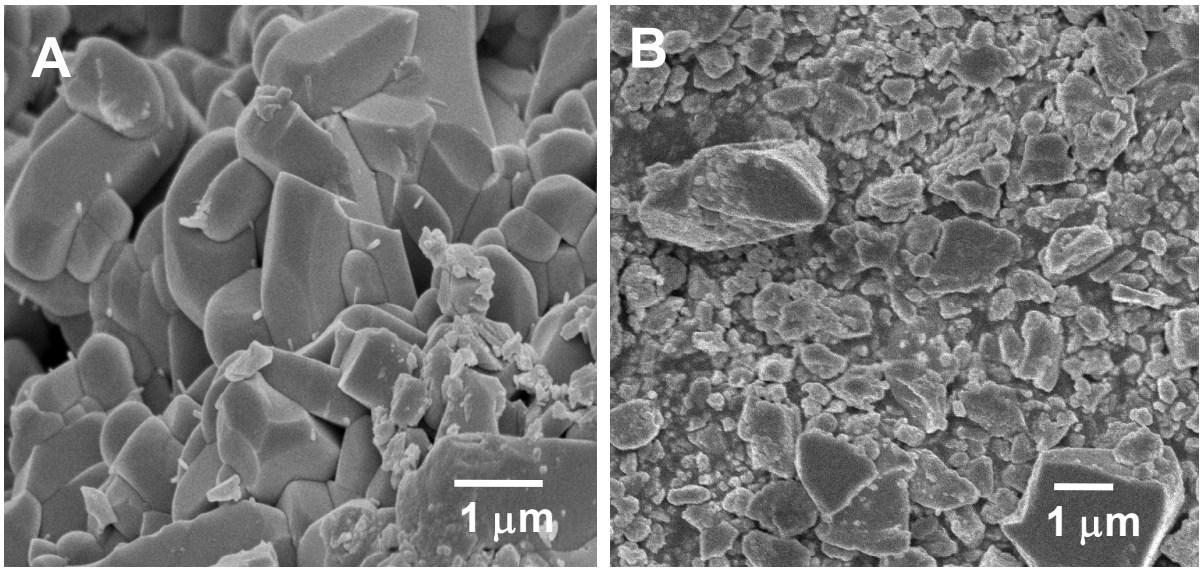

Fig. S1 SEM images of Tm(0.01)Yb(0.1)-doped $Y0._{89-x}Bi_xVO_4$ microcrystals with x = 0 (A) and x = 0.89 (B).

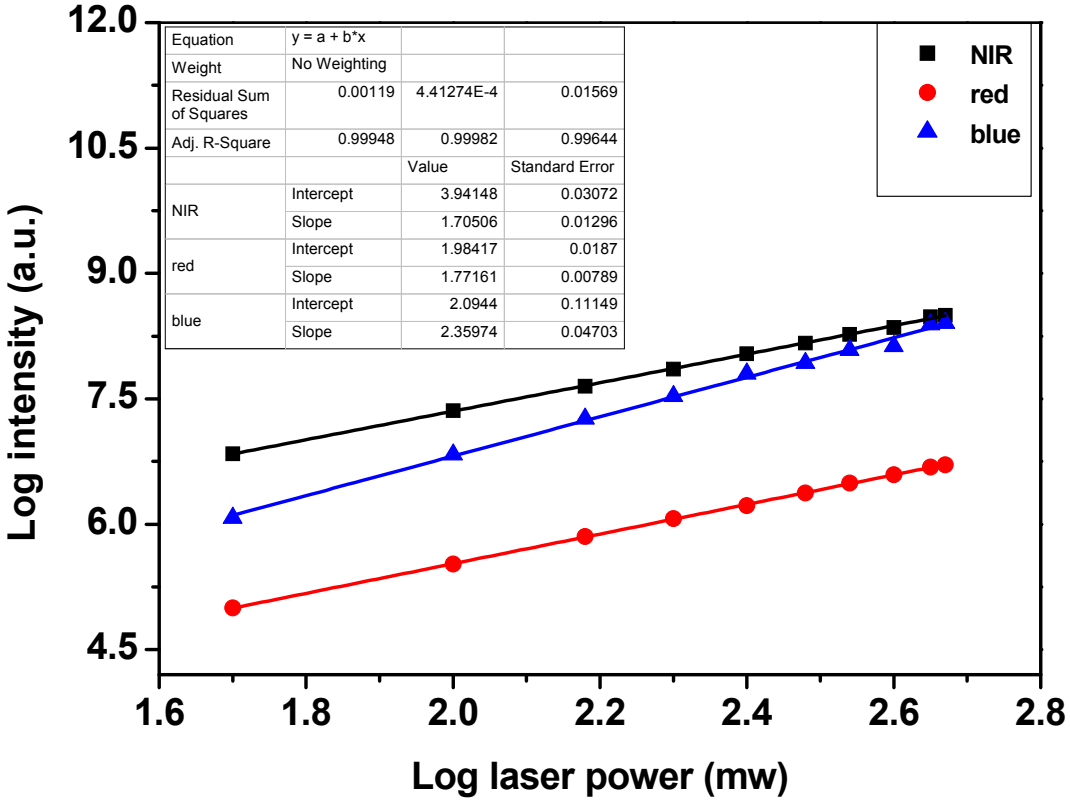

Figure S2. Graph showing the logarithmic plot of upconversion intensity verses laser power. The obtained slope results are shown in the inset.

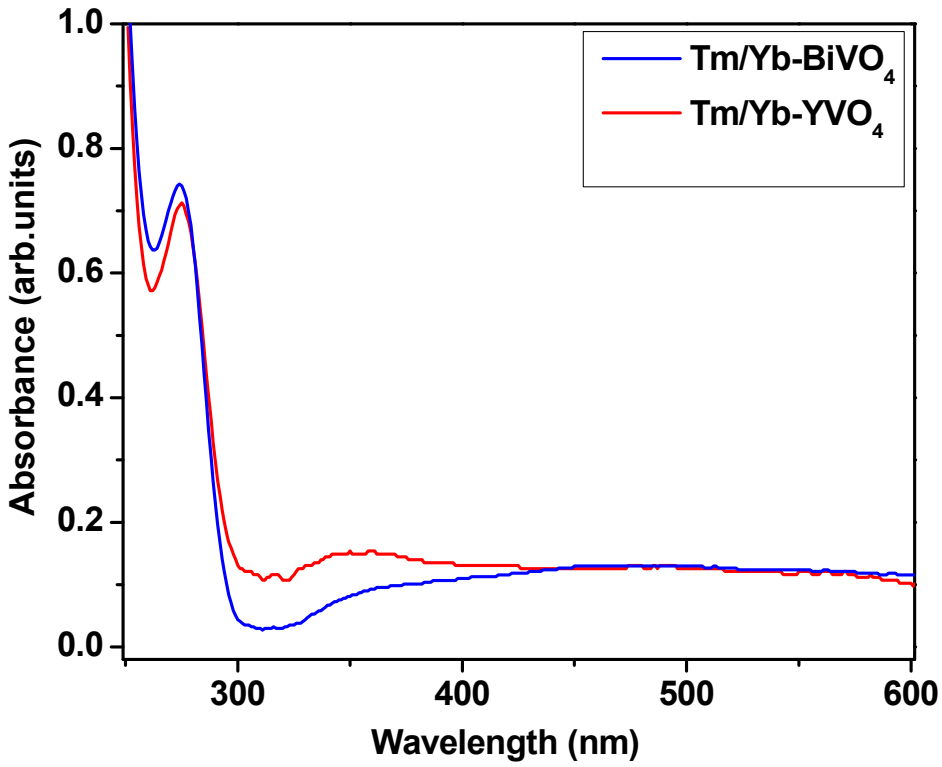

Fig. S3 UV-Vis absorbance spectra of Tm(1%)Yb(10%)-doped YVO_4 and $BiVO_4$ nanocrystals. The strong absorption near 280 nm is due to VO_4^{3-} group.

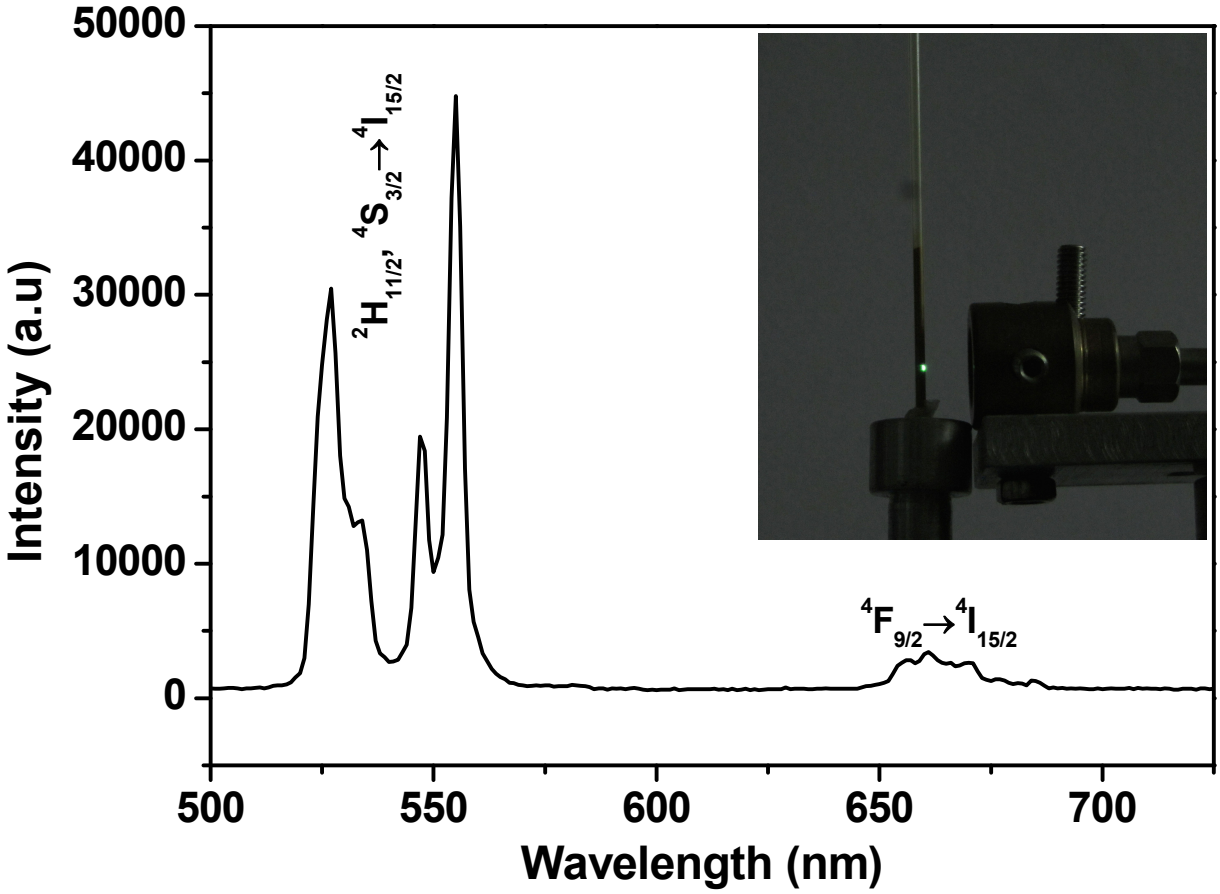

Fig. S4 Upconversion emission spectrum showing the strong emissions from Er/Yb-doped $BiVO_4$ microcrystals. Inset shows the digital image of the green emission upon exciting with 980 nm diode laser (laser mount is also shown).

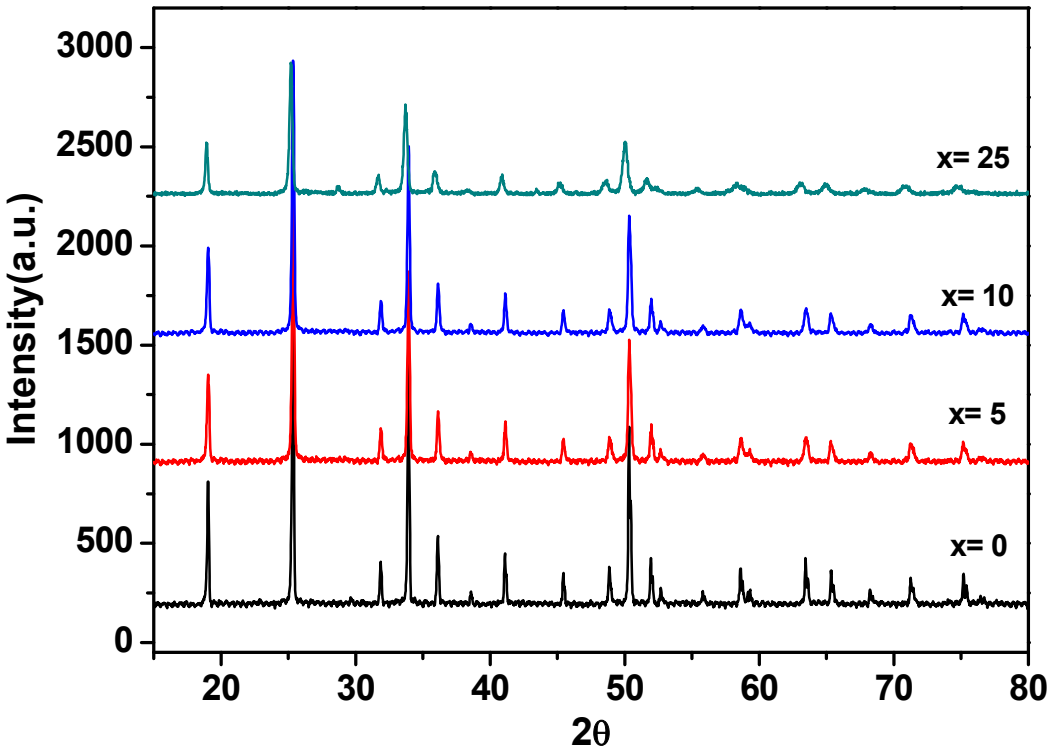

Fig. S5 XRD patterns of Tm^{3+}(0.01)-doped $Yb_{0.89-x}Bi_xVO_4$ microcrystals suggesting there is no phase separation upon Bi^{3+} doping upto 25% Bi^{3+} doping.

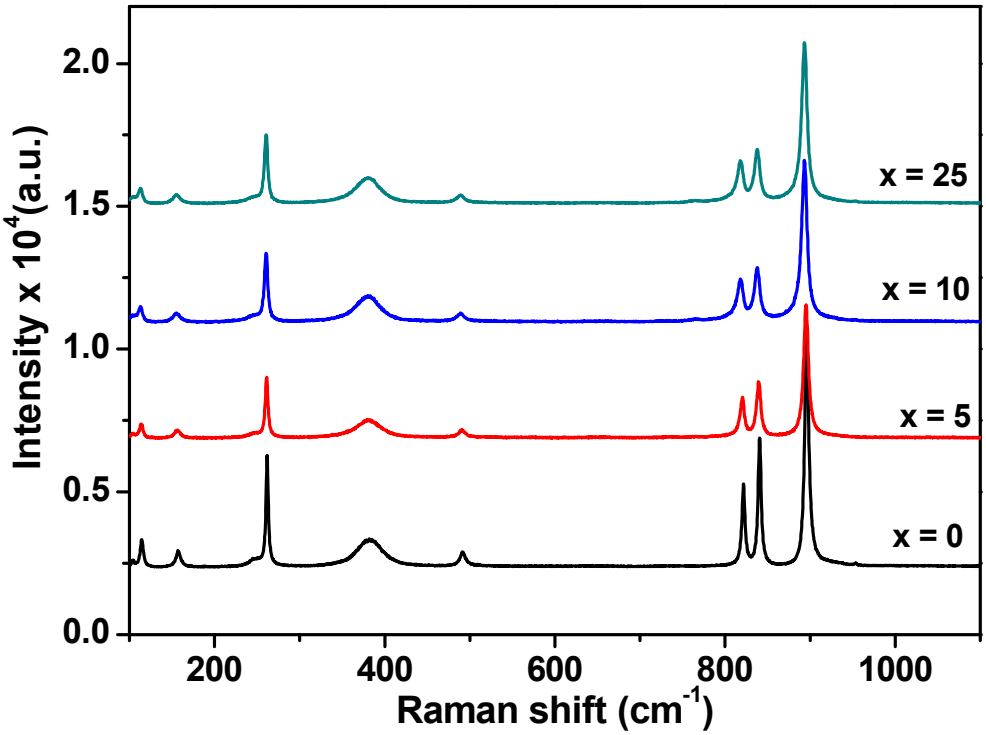

Fig. S6 Raman spectra of Tm^{3+}(0.01)-doped $Yb_{0.89-x}Bi_xVO_4$ microcrystals indicating there is no phase separation upon Bi^{3+} doping upto 25% Bi^{3+} doping.

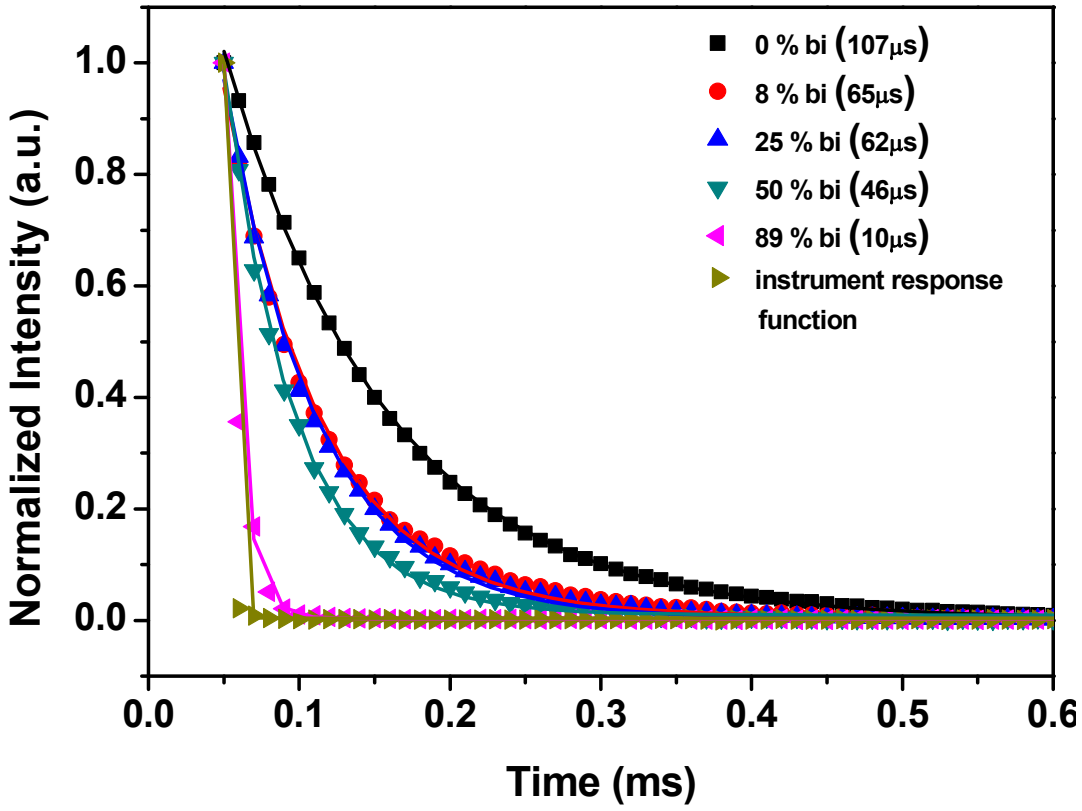

Fig. S7 Decay curves of $^1G_4$ level (475 nm) of Tm^{3+} ions in Tm(0.01)Yb(0.1)-doped $Y0_{89-x}Bi_xVO_4$ microcrystals (x = 0 to 89).

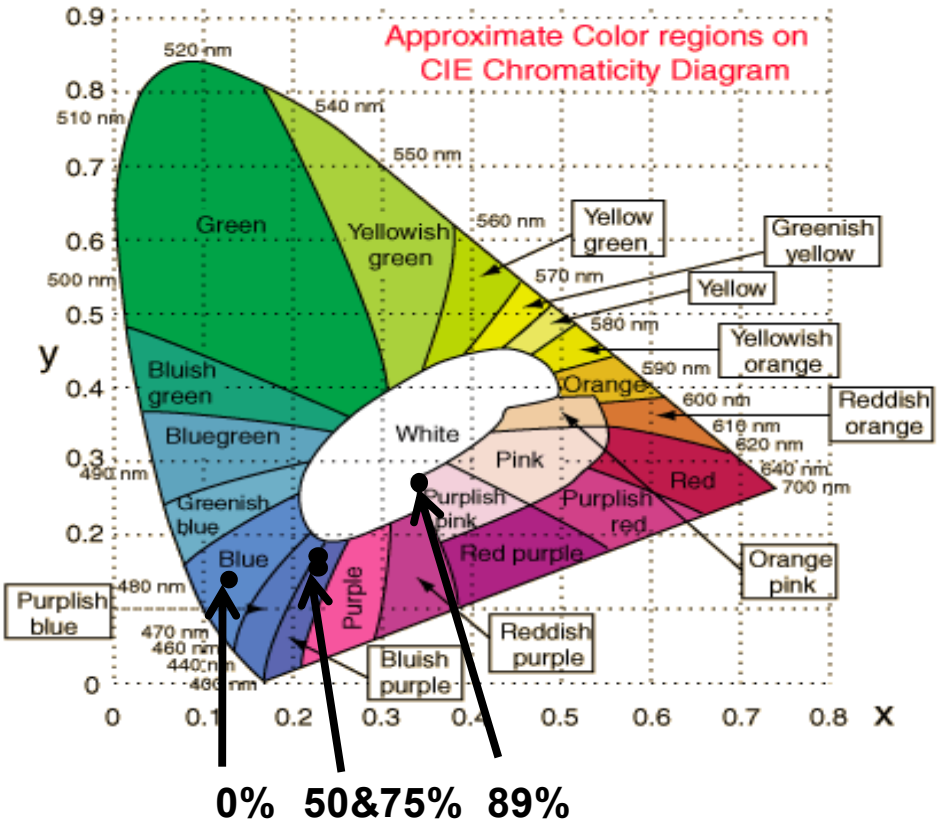

Fig. S8 The CIE color coordinate diagram indicating the positions of the co-ordinates calculated for Tm(1%)Yb(10%)-doped $Y_{89\%-x}Bi_xVO_4$ (x = 0, 50, 75 and 89%) nanocrystals and the corresponding colours the human eye perceives. For clarity, the coordinate positions for only few samples are shown.