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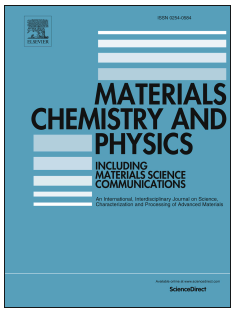


Morphological and Luminescence Studies on $KGdF_4:Yb^{3+}/Tb^{3+}$ Up-Conversion Nanophosphors

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**Figure Captions**

**Fig. 1.** Morphological Analysis

**(a)** XRD Analysis of un-doped $KGdF_4$ and doped $KGdF_4$:$Yb^{3+}$(x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples. Data peaks of standard JCPDS 27-0697 are also given for reference

**(b)** TEM Image of $KGdF_4$:$Yb^{3+}$ (20%)/$Tb^{3+}$ (3%) sample

**Fig. 2.** Optimization of $Tb^{3+}$: Emission Spectra recorded under 384nm excitation

**Fig. 3.** UC Spectra of $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples under 980nm excitation. Inset pictures show the actual photographs of intense green luminescence from the as prepared samples

**Fig. 4.** UC Spectra of $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples under varying powers of 980nm CW laser source

**Fig. 5.** Power Dependence of $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples: log I vs log P graph recorded for $^5D_4 \rightarrow {}^7F_5$ transition of $Tb^{3+}$ ions in the lattice under 980nm excitation

**Fig. 6.** Schematic Energy Level Diagram for the energy transfer processes between $Yb^{3+}$ and $Tb^{3+}$ ions during up-conversion process

**Fig. 7.** Decay Kinetics along with the function fitting for $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples

**Fig. 8.** Excitation and Emission Spectra:

**(a)** Excitation Spectra at 545nm emission wavelength for $KGdF_4$:$Yb^{3+}$ (10%)/$Tb^{3+}$ (3%)

**(b)** UV Emission Spectra under 292nm excitation for $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples

**Fig. 9.** CIE Chromaticity Diagram for NIR UC studies on $KGdF_4$:$Yb^{3+}$ (x=5, 10, 15 and 20%)/$Tb^{3+}$ (3%) samples