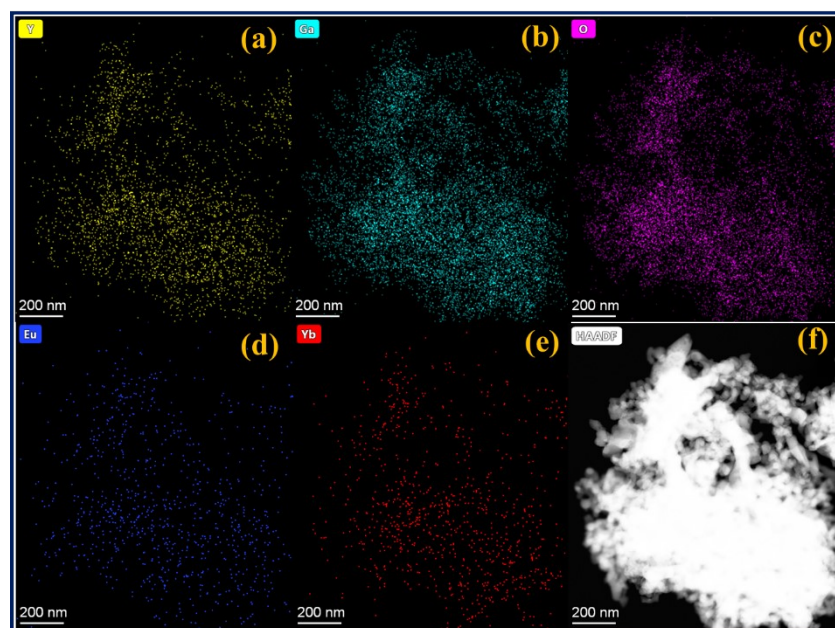


## Strategy to probe multimodal light emissions from $\text{Eu}^{3+}/\text{Yb}^{3+}$ activated garnet nanophosphor for LED device and solar cell applications

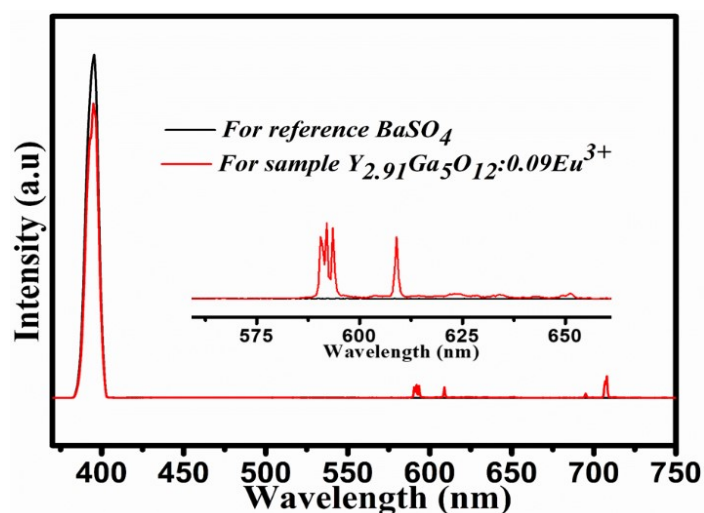
Neeraj Kumar Mishra, Minarul I. Sarkar, and Kaushal Kumar

*Optical Materials & Bio-imaging Research Laboratory, Department of Physics, Indian Institute of Technology (Indian School of Mines), Dhanabad-826004, India.*

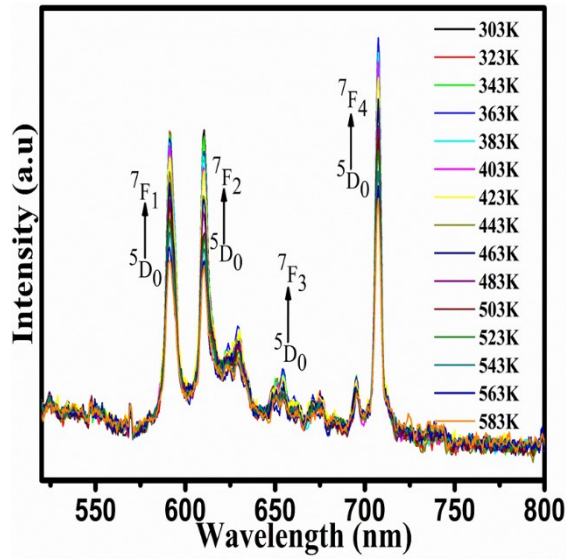
### Supplementary material



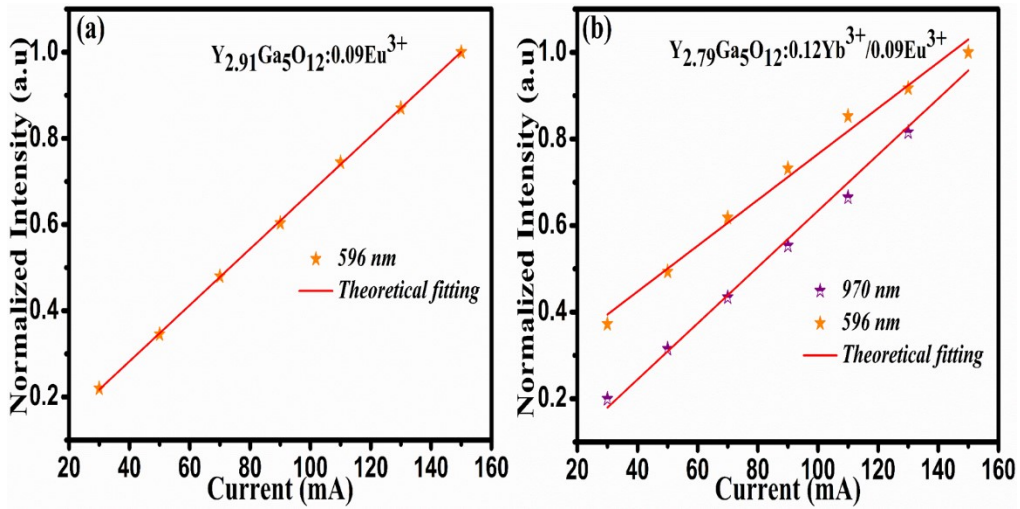
**Figure S. 1(a-e)** EDX elemental mapping of Y, Ga, O, Eu, Yb, respectively of sample  $\text{Y}_3\text{Ga}_5\text{O}_{12}$  activated with  $0.12\text{Yb}^{3+}/0.09\text{Eu}^{3+}$ .



**Figure S. 2** Emission spectra of sample  $\text{Y}_{2.91}\text{Ga}_5\text{O}_{12}:0.09\text{Eu}^{3+}$  and reference sample under 393 nm excitation, recorded using integrating sphere.



**Figure S. 3** Emission spectra of  $Y_{2.79}Ga_5O_{12}:0.12Yb^{3+}/0.09Eu^{3+}$  sample with the function of temperature recorded using 980 nm laser excitation.



**Figure S. 4 (a)** Variation of intensity of emission band 596 nm of  $Y_{2.91}Ga_5O_{12}:0.09Eu^{3+}$  sample with the applied forward current **(b)** Variation of intensity of emission bands 596 nm and 970 nm of  $Y_{2.79}Ga_5O_{12}:0.12Yb^{3+}/0.09Eu^{3+}$  sample with the applied forward current.