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Unraveling site-specific energy transfer driven tunable emission characteristics of Eu^{3+} & Tb^{3+} co-doped $Ca_{10}(PO_4)_6F_2$ phosphors

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Instrumentation

X-Ray diffraction (XRD)

We have used Proto powder X-ray diffractometer (Canada) to characterise the prepared compounds. CuKα (λ= 1.5406 and 1.5444 Å) monochromatic radiation has been used as X-ray radiation source. All the diffraction patterns were collected within the 2θ range of 20-90 with a step width of 0.02 and scan rate of 5s.

Fourier-transform infrared spectroscopy (FTIR) study

A Bruker Platinum ATR FTIR spectrometer in the spectral range 2000-500 cm^{-1} has been used to record all the FTIR spectra.

Photoluminescence study (PL)

An Edinburgh CD-920 spectrometer (from Edinburgh Analytical Instruments, UK)with M 300 monochromator has been used to record the PL emission spectra of all the samples. The data acquisition and analysis were carried with the help of F-900 software provided by Edinburgh Analytical Instruments. A Xenon flash with a frequency of 100 Hz has been used as excitation source. For each of the emission and excitation spectrum a minimum of five scans has been taken to minimize the peak intensity fluctuation and to maximize S/N ratio. To perform the lifetime study for the compounds we have used the well established Time-correlated single-photon counting (TCSPC) technique.

X-ray fluorescence (XRF): An ATI-micro XRF instrument is used to record the XRF spectrum.

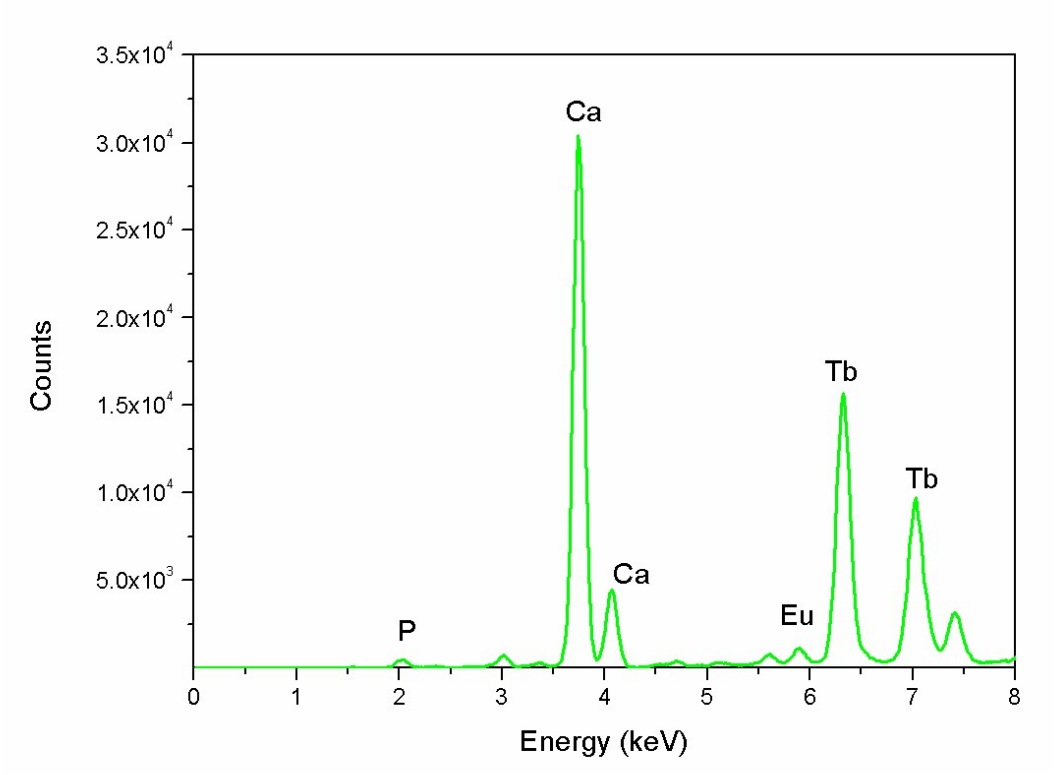

Figure S1: XRF spectra of $Eu_{0.1}Tb_{0.5}$:CPF

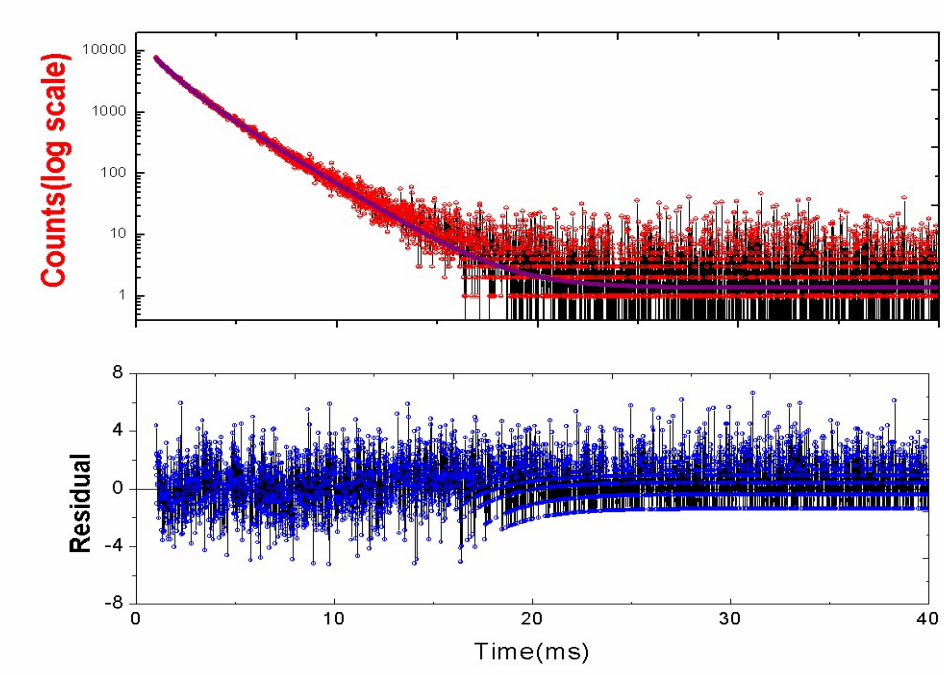

Figure S2: Photoluminescence decay profile at λ_{ex}= 230 nm and λ_{em}= 547 nm for $Eu_{0.3}$-$Tb_{0.5}$: CFP

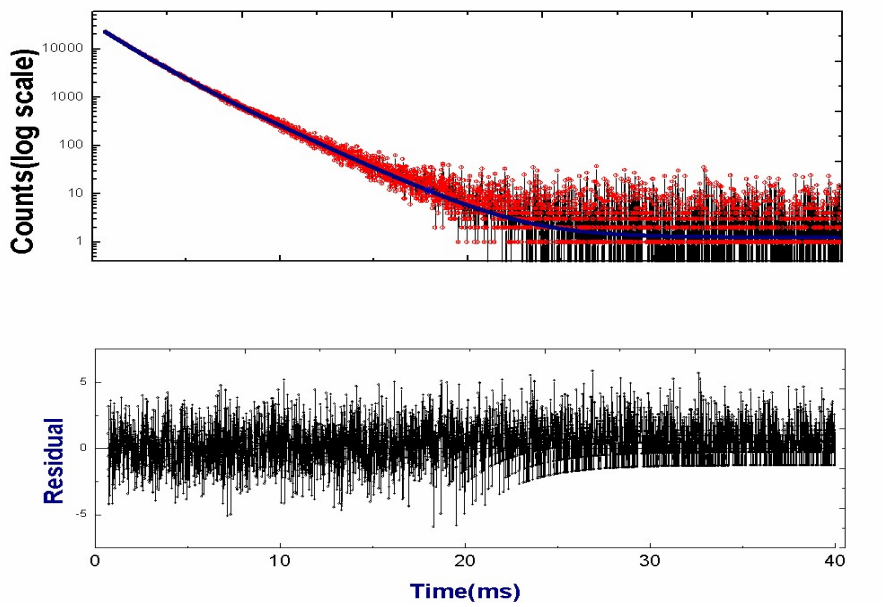

Figure S3: Photoluminescence decay profile at λ_{ex}= 230 nm and λ_{em}= 620 nm for $Eu_{0.3}$-$Tb_{0.5}$: CFP

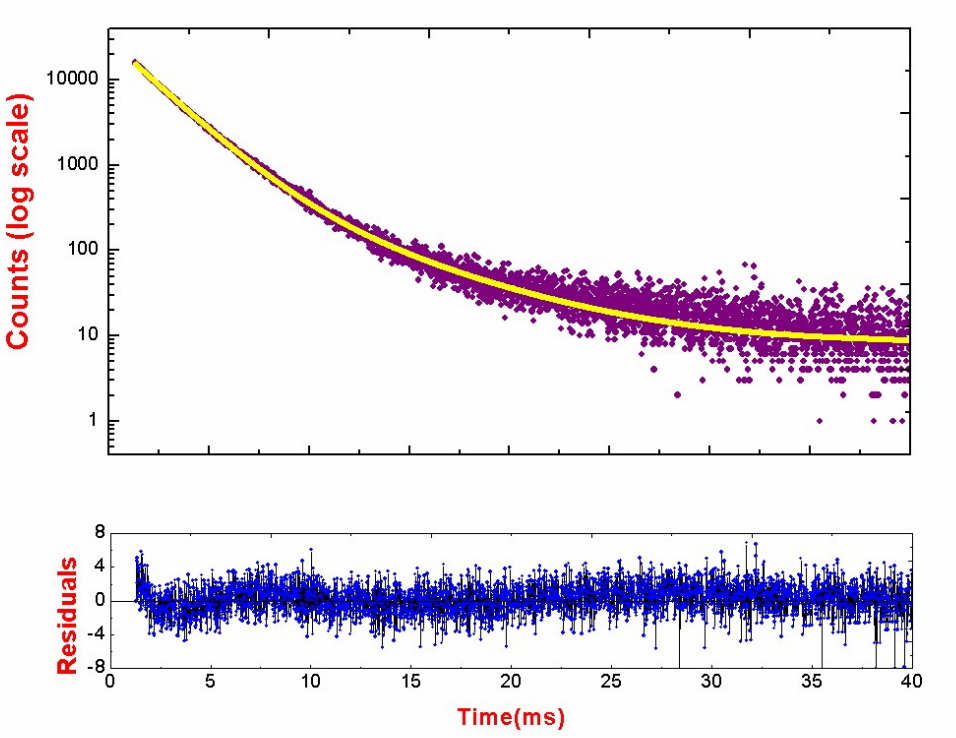

Figure S4: Photoluminescence decay profile at λ_{ex}= 230 nm and λ_{em}= 547 nm for $Eu_{0.5}$-$Tb_{0.3}$: CFP

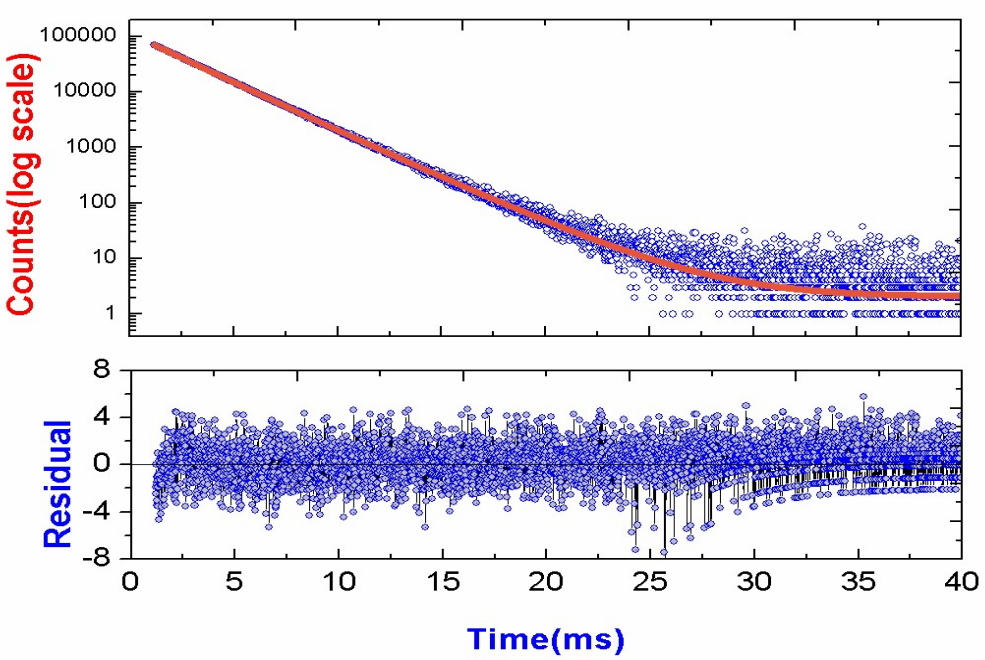

Figure S5: Photoluminescence decay profile at λ_{ex}= 230 nm and λ_{em}= 620 nm for $Eu_{0.5}$-$Tb_{0.3}$: CFP