Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

Ligand sensitized strong luminescence from Eu^{3+}-doped $LiYF_4$ nanocrystals: A photon downshifting strategy to increase solar to current conversion efficiency

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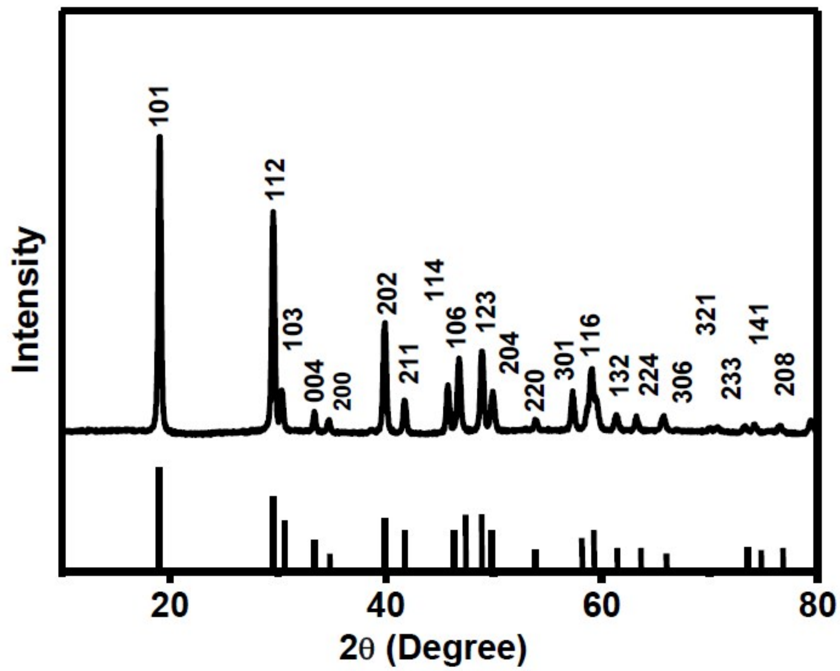

Fig. S1 XRD patterns of bare Eu^{3+} doped $LiYF_4$ nanocrystals along with standard pattern.

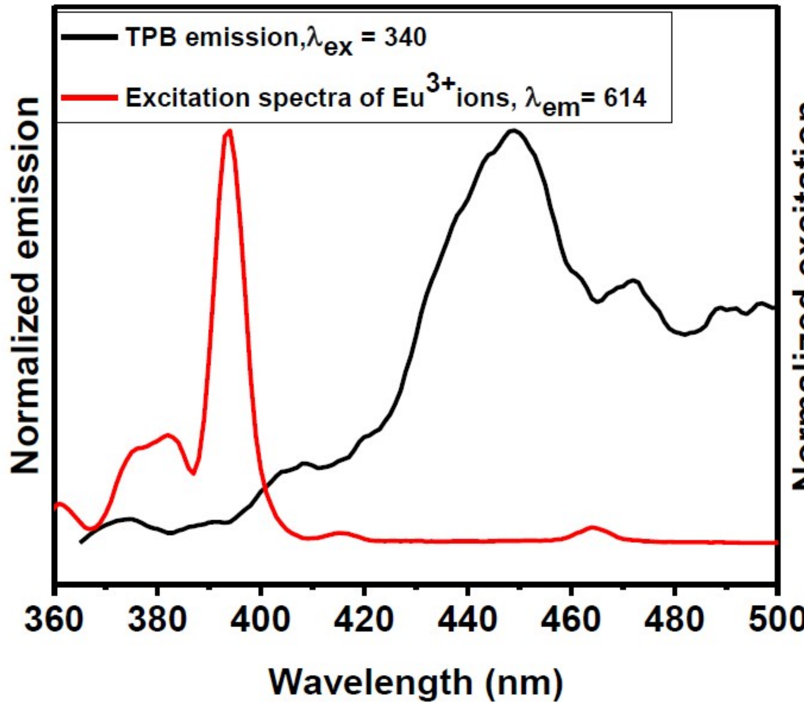

Fig. S2. Overlap between the emission spectrum of the TPB and the excitation spectrum of the Eu^{3+}-doped $LiYF_4$ NCs.

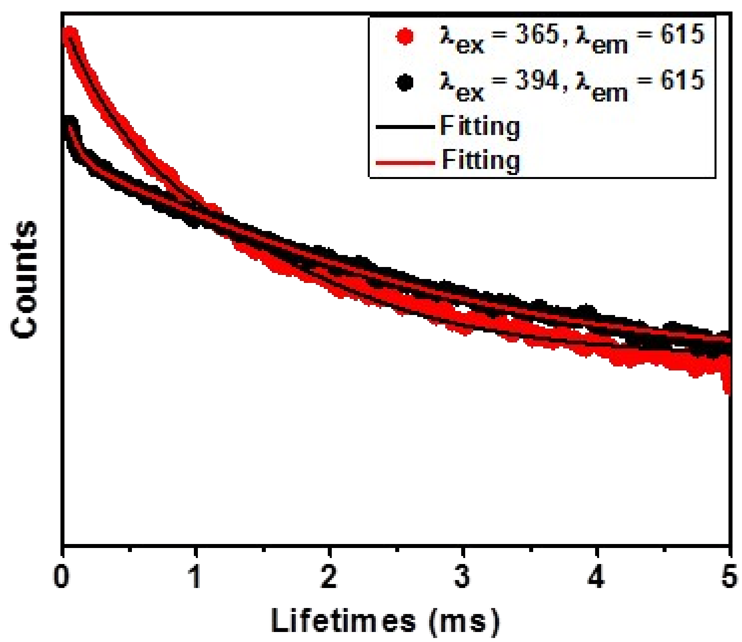

Fig. S3. The lifetime of TPB capped Eu^{3+}-doped $LiYF_4$ NCs, by exciting the nanocrystals at λ_{ex} = 394 nm and λ_{ex} = 365 nm and monitoring the emission at λ_{em} = 615 nm.

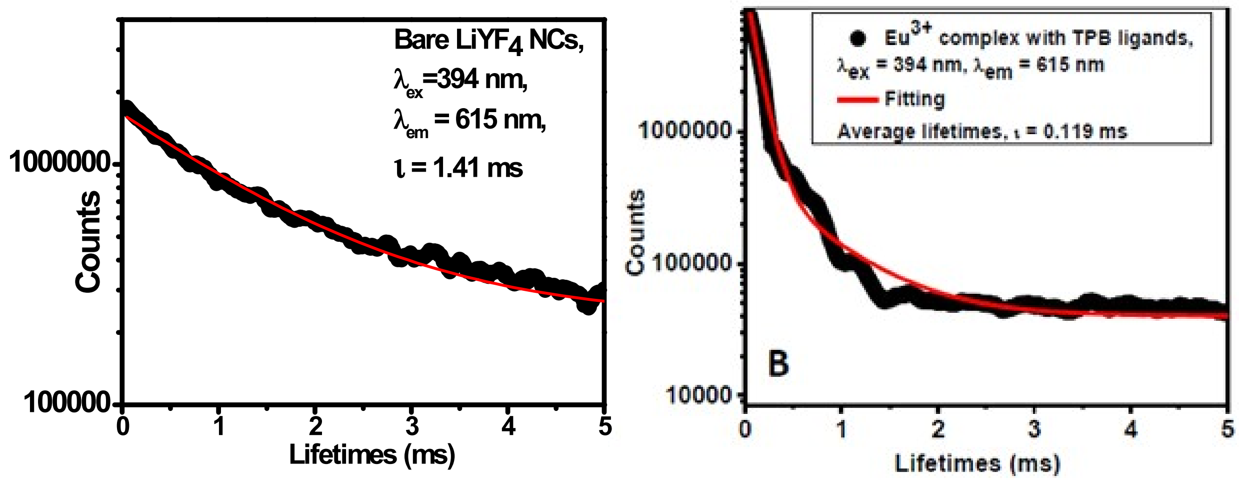

Fig. S4. The lifetime of (A) bare Eu^{3+}-doped $LiYF_4$ NCs and (B) Eu^{3+}-TPB complex by exciting the nanocrystals at λ_{ex} = 394 nm and monitoring the emission at λ_{em} = 615 nm.

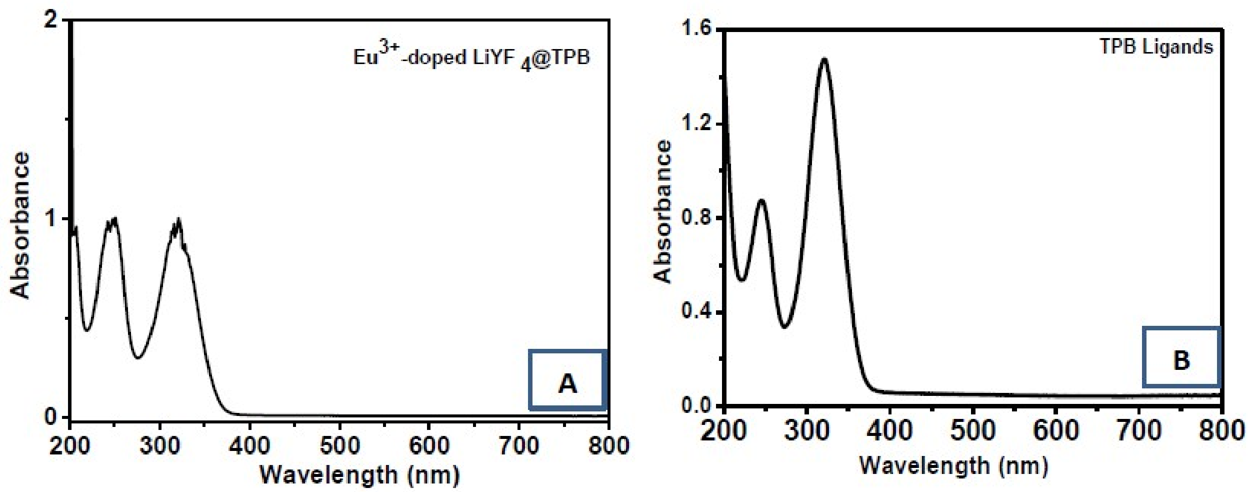

Fig. S5. The absorbance spectra of (A) TPB capped Eu^{3+}-doped $LiYF_4$ NCs in water (0.1 wt%). (B) TPB ligands (1 X 10^{-5} M).

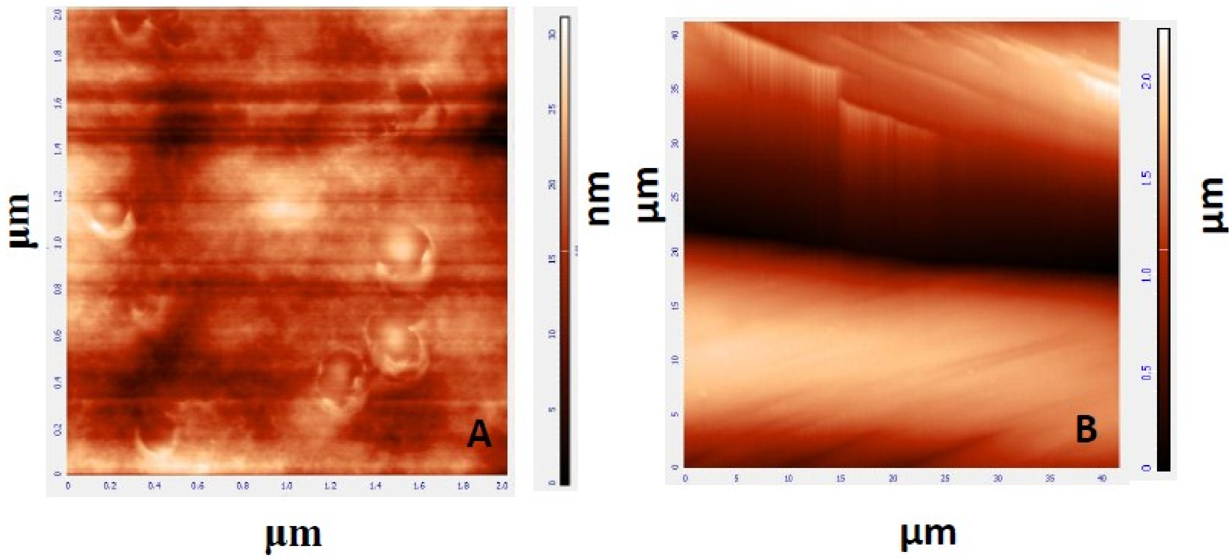

Fig. S6. AFM image of the EVA film of TPB capped Eu^{3+}-doped $LiYF_4$ nanocrystals (A) and thickness of the film (B)

Quantum Yield Calculation

The quantum yield was determined by comparing the luminescence with quinine-sulphate. The quantum yield of TPB capped Eu^{3+}-doped $LiYF_4$NCs and bare Eu^{3+}-doped $LiYF_4$ NCs were calculated from the following equation- $Q_{sample} = Q_{ref}\ (A/A_{ref})\ (I_{ref}/I)\ (n^2/n^2_{ref})$ where, Q_{sample} and Q_{ref} are the quantum yields of the nanocrystals and quinine-sulphate respectively, A is the absorbance, I is the integrated area of photoluminescence spectra, and n is the refractive index of the solution. The quantum yield of Quinine sulphate as the reference is 0.546. The quantum yield ofEu^{3+} doped TPB capped and bare NCs were estimated by comparing the integrated emission spectra of the aqueous dispersion with that of Quinine sulphate solution. The sample and the reference have the identical optical density at the excitation wavelength. The calculated quantum yield was about 5% for Eu^{3+}-doped $LiYF_4$NCs and 31 % TPB capped Eu^{3+}-doped $LiYF_4$NCs.