Electronic Supplementary Material (ESI) for Dalton Transactions.

Efficient and ultra-thermally stable Eu^{3+} and Sm^{3+} activated narrow band red/deep red emitting phosphors and their versatile applications

Priyadarshini Pradhan, Savita Priya, Marikumar Rajendran, Kasturi Singh and Sivakumar Vaidyanathan*

Department of Chemistry, National Institute of Technology, Rourkela, India.

* To whom correspondence should be addressed. Email: vsiva@nitrkl.ac.in (V. Sivakumar)

Tel: +91-661-2462654;

Characterization

Data of Powder X-ray diffraction were obtained from the Rigaku ULTIMA IV, Japan (radiative source: Co-Kα1, producing the X-ray). Rietveld refinement for the composition was done by JANA 2006 taking the step width as 0.01. Diamond software was utilized for the representation of the formed crystal structure. The Scanning Electron Microscopy (SEM) images were obtained from JEOL JSM 6480LV. The FT-IR (Fourier transform infrared spectroscopy) was recorded by PerkinElmer Spectrum Version 10.4.00 for the range 400-4000 cm^{-1}. The data of excitation and emission spectra of photoluminescence, lifetime analysis and quantum yield were recorded by Edinburg Spectrofluorometer FS–5 instrument, having a pulsed xenon lamp as the excitation source and with the SC – 10 modules and SC – 30 integrating sphere modules. The signals were acquired with a photomultiplier. A temperature controller equipped spectrometer (Edinburgh FS5) was used for the temperature-dependent photoluminescence data. CIE color coordinates were determined from the emission spectra of the synthesized phosphors via MATLAB software. All the characterization procedures were performed at room temperature.

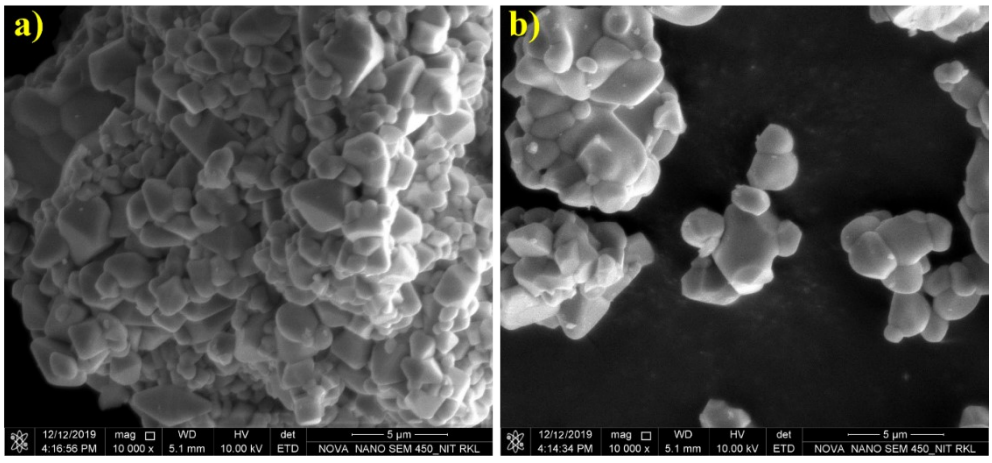

Fig. S1 SEM image of the (a) NYW and (b) NYW: 1.8 Eu^{3+} phosphors.

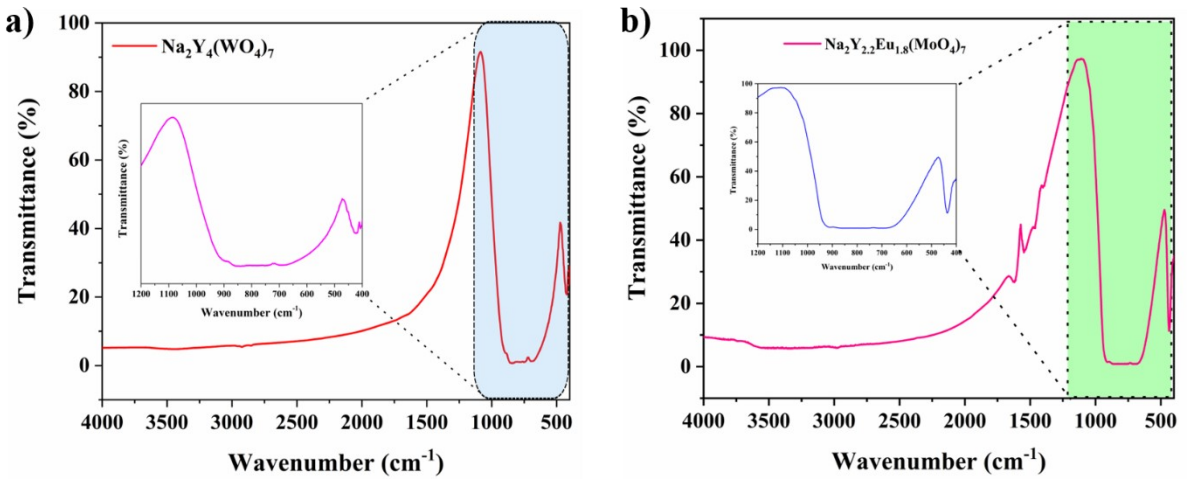

Fig. S2 FT-IR spectra of (a) NYW and (b) NYM phosphor.

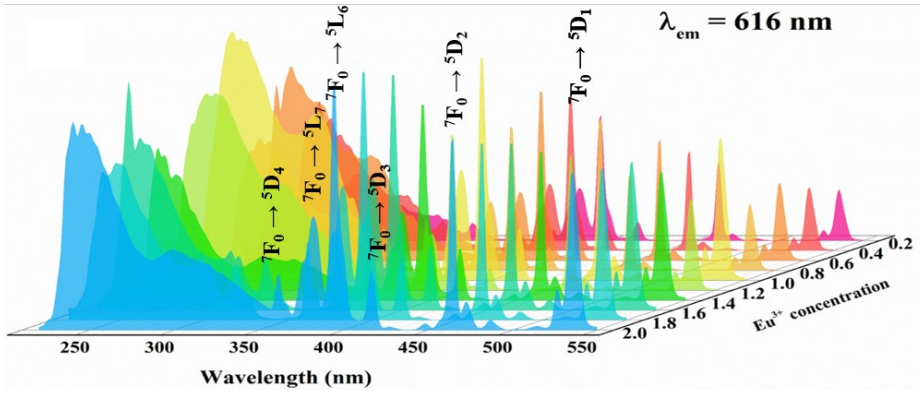

Fig. S3 PLE spectra of the $Na_2Y_{4-x}(WO_4)_7$: x Eu^{3+} phosphors.

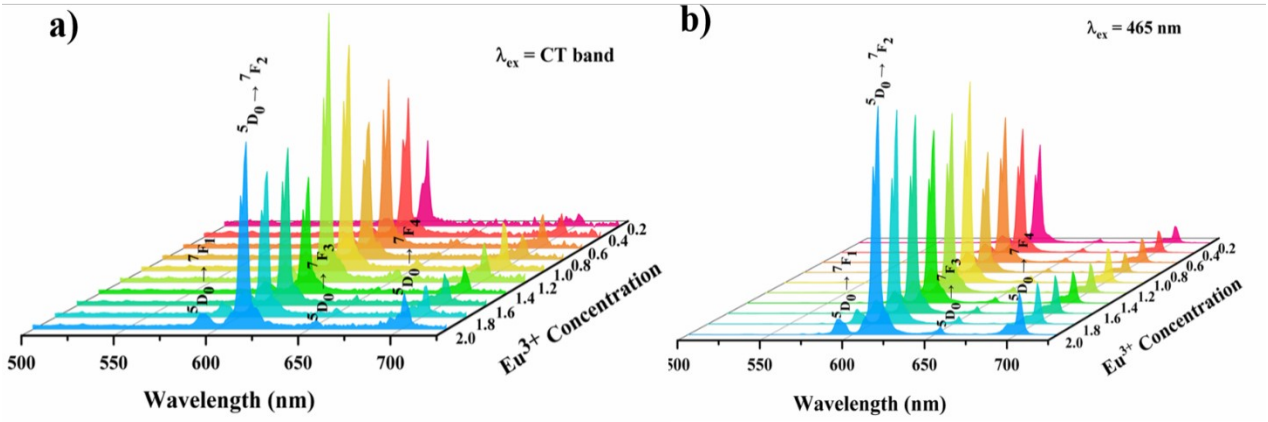

Fig. S4 PL spectra of the $Na_2Y_{4-x}(WO_4)_7$: x Eu^{3+} phosphors under excitation at (a) CT band and (b) 465 nm.

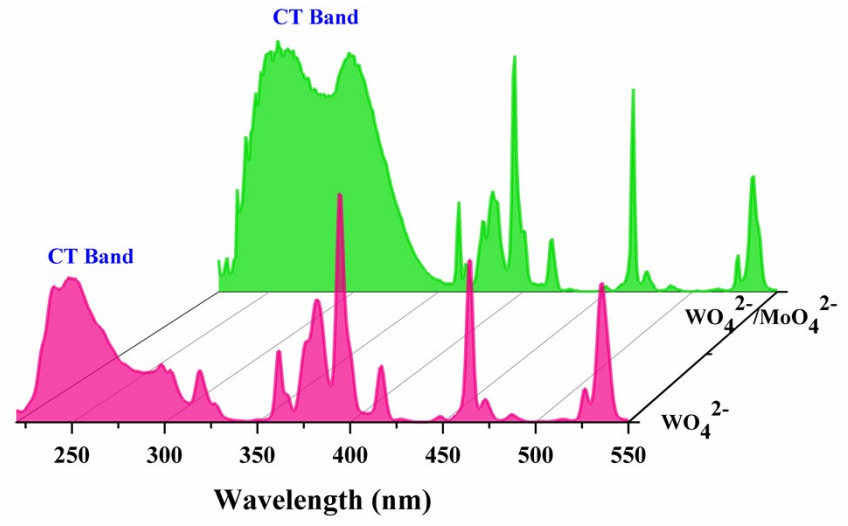

Fig. S5 Comparision of CT band between solid solution phosphor and parent phosphor.

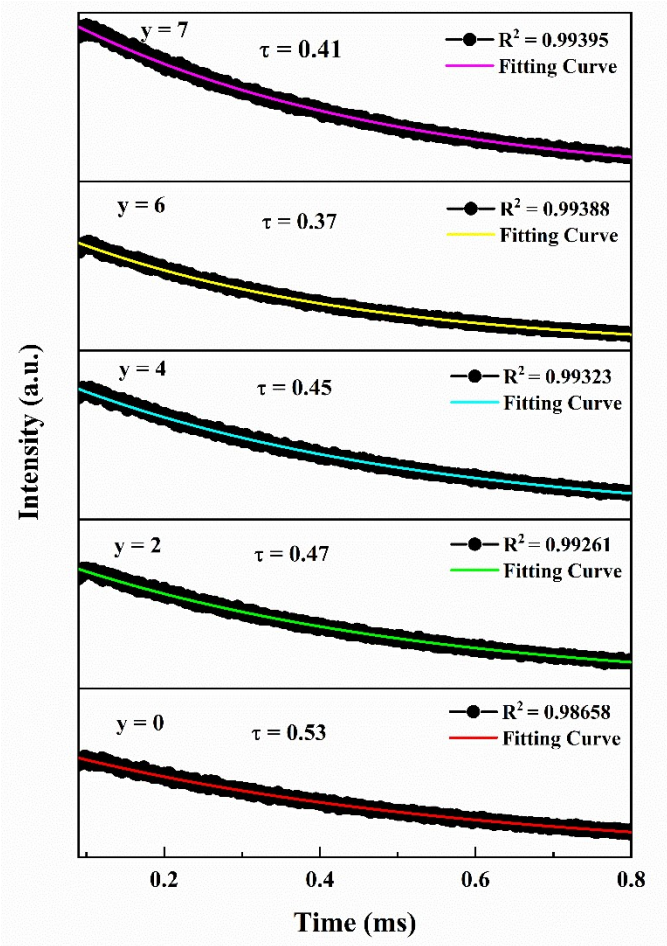

Fig. S6 Luminescence decay curve of solid Solution phosphor at λ_{ex} = 395 nm.

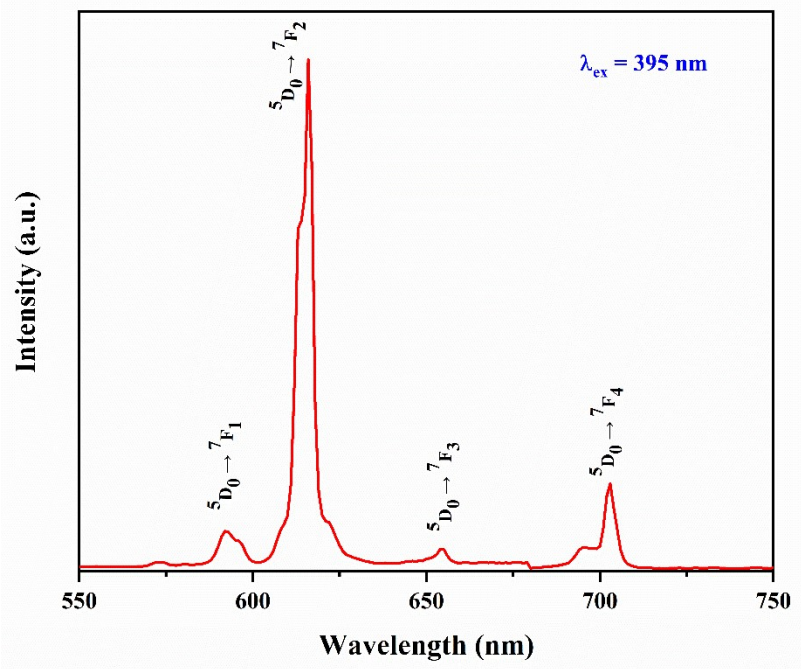

Fig. S7 Fingerprint (on glass slide) emission spectra (at λ_{ex} = 395 nm).