Electronic Supporting Information

Enhanced visible and near infrared emissions via Ce^{3+} to Ln^{3+} energy transfer in Ln^{3+}-doped CeF_3 nanocrystals (Ln=Nd and Sm)†

Tuhin Samanta [a], Shyam Sarkar [a], Venkata. N. K. B. Adusumalli[a] , Athma E. Praveen[a] and Venkataramanan Mahalingam [a]*

[a] Department of Chemical Sciences, Indian Institute of Science Education and Research (IISER), Kolkata, Mohanpur, West Bengal 741252, India.

Table 1: Fractional co-ordinates and lattice parameters used in the VESTA program are given below.

Lattice parameter are, a=7.139, b=7.139, c= 7.266, α=90º, β=90º and λ=120º

Atom	Level	x	y	z	g	B
F	2a	0.000000	0.000000	0.250000	1.000	1
F	6f	0.333333	0666667	0.186200	1.000	1
Ce	4d	0.338400	0.000000	0.250000	1.000	1
F	12g	0.356800	0.316500	0.083333	1.000	1

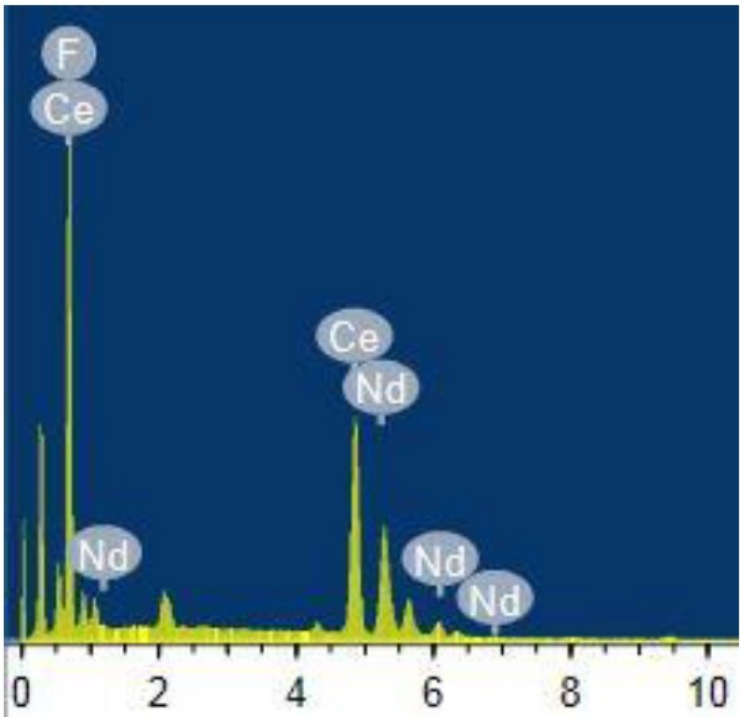

Fig. S1. EDAX spectrum of Nd^{3+} doped CeF_3 nanocrystals confirms the presence of elements Nd^{3+}, Ce^{3+} and F^-**.**

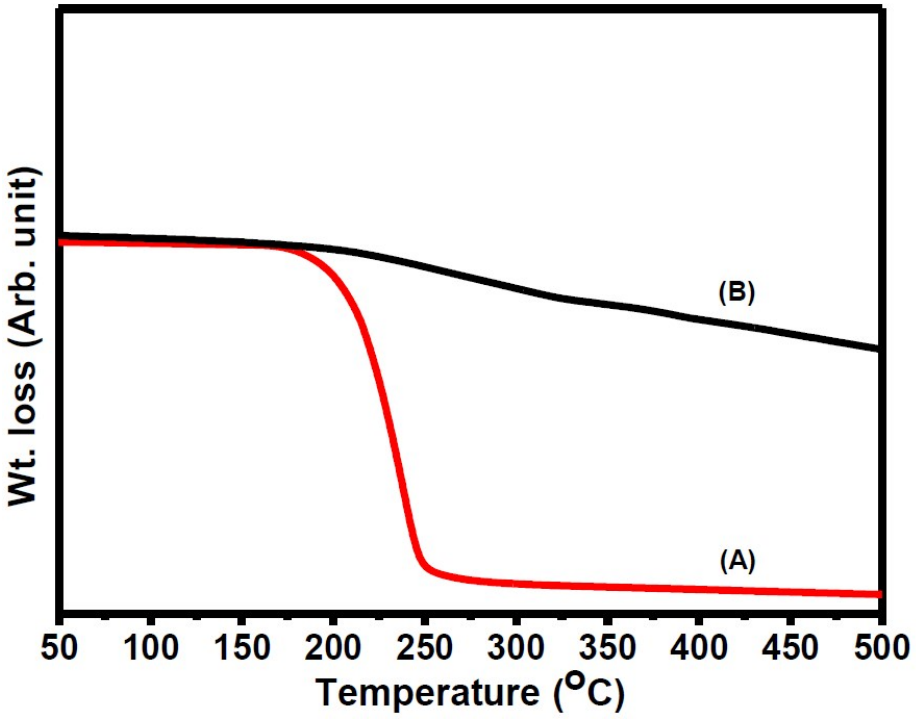

Fig. S2. TGA results for free PVP (A) and citrate capped Nd^{3+}-doped CeF_3 nanocrystals (B).

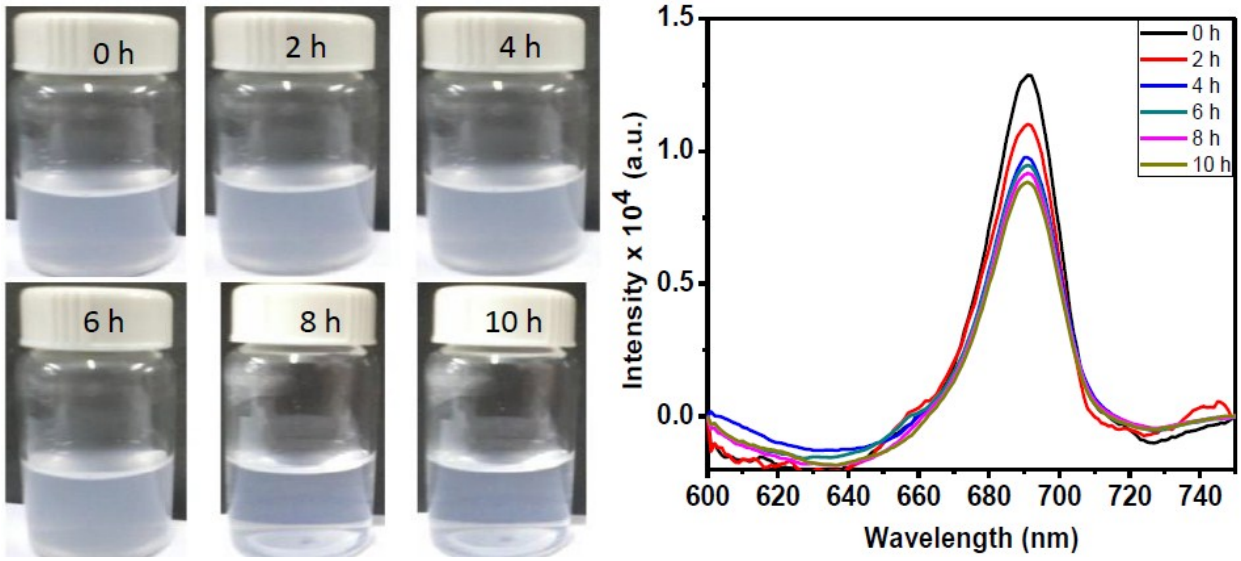

Fig. S3. Digital images of Nd^{3+} doped CeF_3 nanocrystals dispersed in water and measured at different time intervals along with the corresponding photoluminescence spectra (right side).

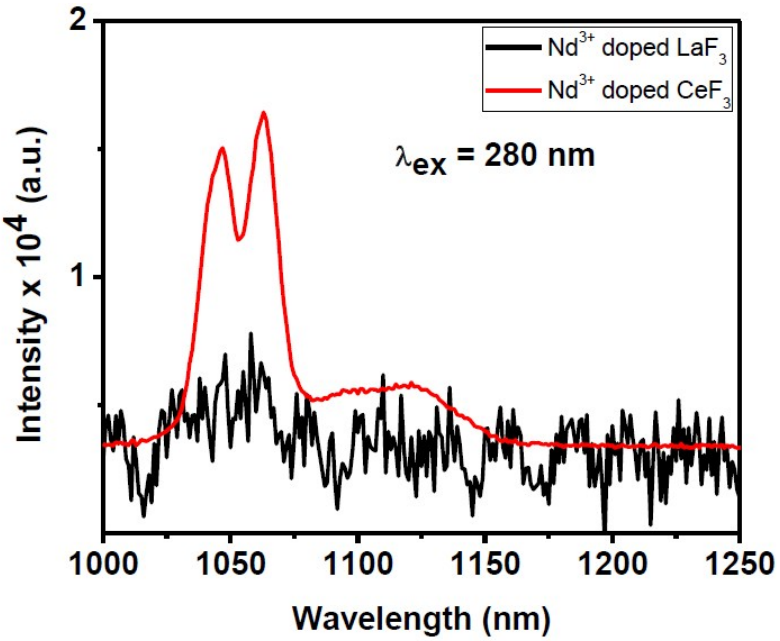

Fig. S4. Emission spectra of Nd^{3+} doped LaF_3 and Nd^{3+} doped CeF_3 nanocrystals, upon excitation at 280 nm in water.

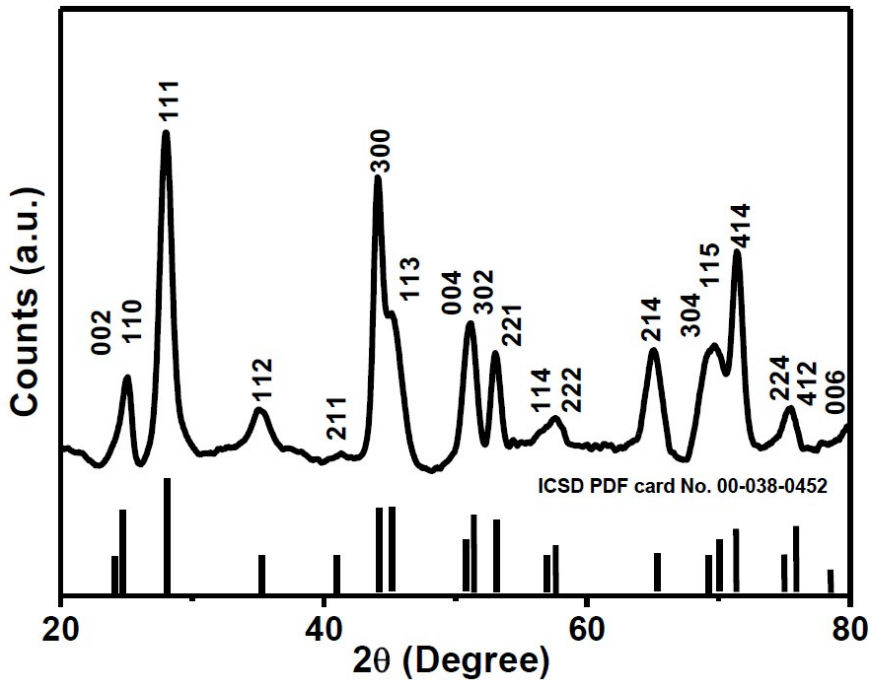

Fig. S5. Powder XRD patterns of (a) Sm^{3+}-doped CeF_3 nanocrystals and (b) standard XRD pattern of hexagonal CeF_3 crystals (ICSD PDF Card No-00-038-0452).

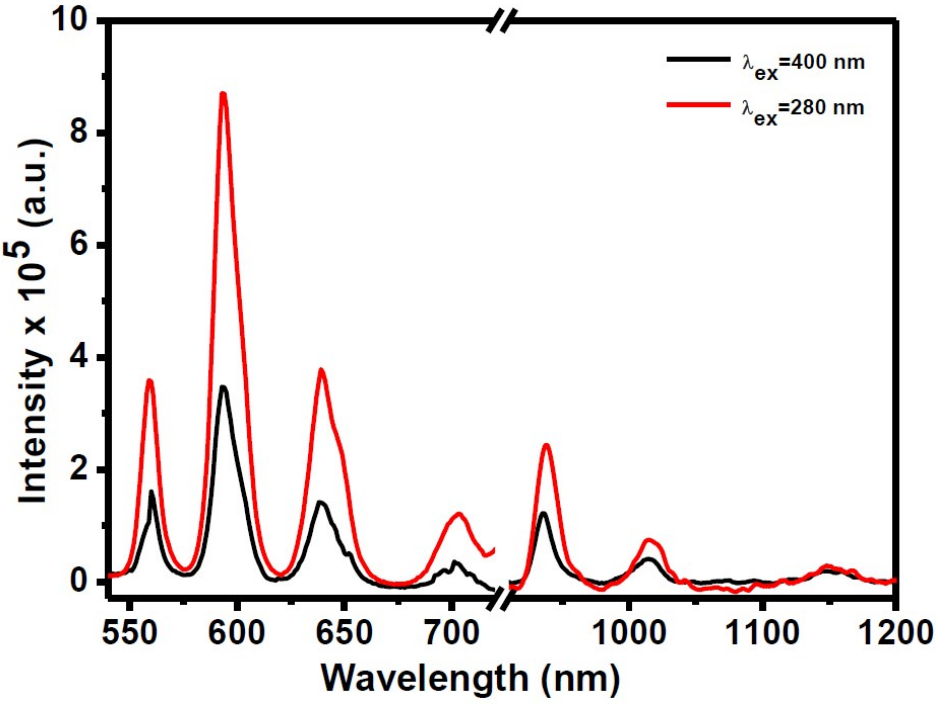

Fig. S6. PL spectra collected from Sm^{3+}-doped CeF_3 nanocrystals via Ce^{3+} ions excitation (280 nm) and direct excitation (400 nm).

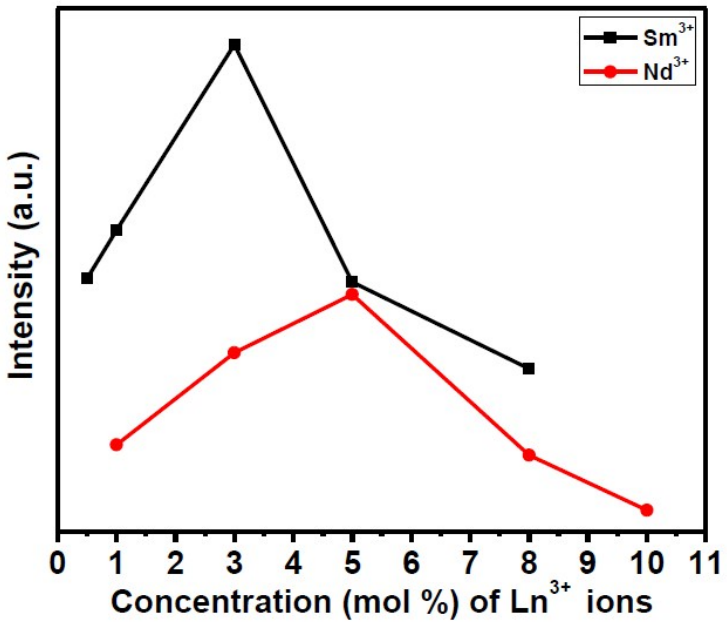

Fig. S7. Plot of dopant (Sm^{3+} and Nd^{3+} ions) concentrations verses the emission intensity of Nd^{3+} and Sm^{3+} individually doped in CeF_3 nanocrystals.

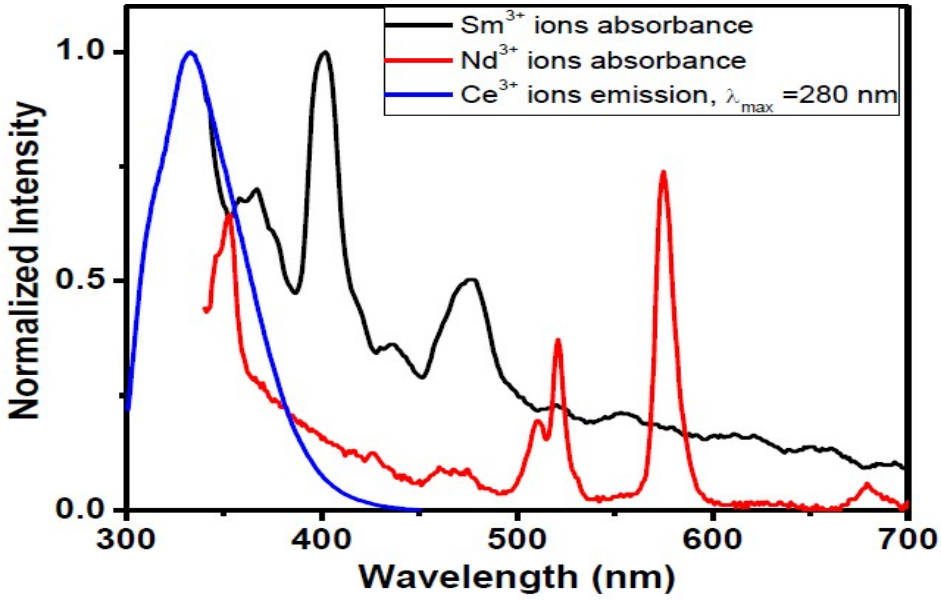

Fig. S8. Comparison of the emission spectrum of Nd^{3+}-doped CeF_3 nanocrystals with that of the absorbance spectra of Sm^{3+} and Nd^{3+} ions.

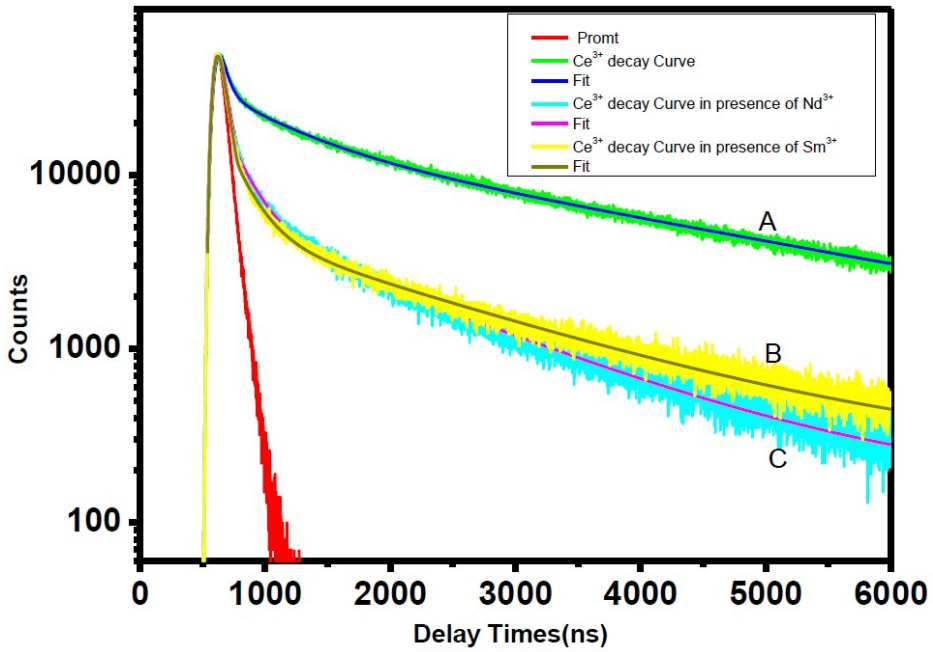

Fig. S9. Lifetime decay curves of Ce^{3+} ions in CeF_3 nanocrystals (A), Nd^{3+} doped CeF_3 nanocrystals (B) and Sm^{3+} doped CeF_3 nanocrystals (C) collected using Time-Correlated Single Photon counting spectroscopy. The nanocrystals were excited at 290 nm and the emission was monitored at 330 nm.

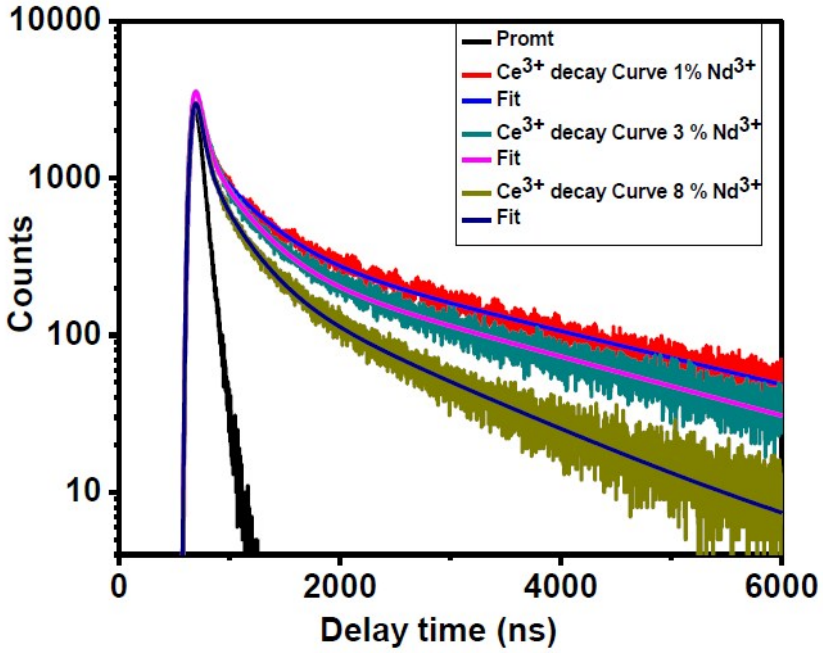

Fig. S10. Lifetimes decay curves of Ce^{3+} emission in Nd^{3+}-doped CeF_3 nanocrystals upon excitation at 280 nm.

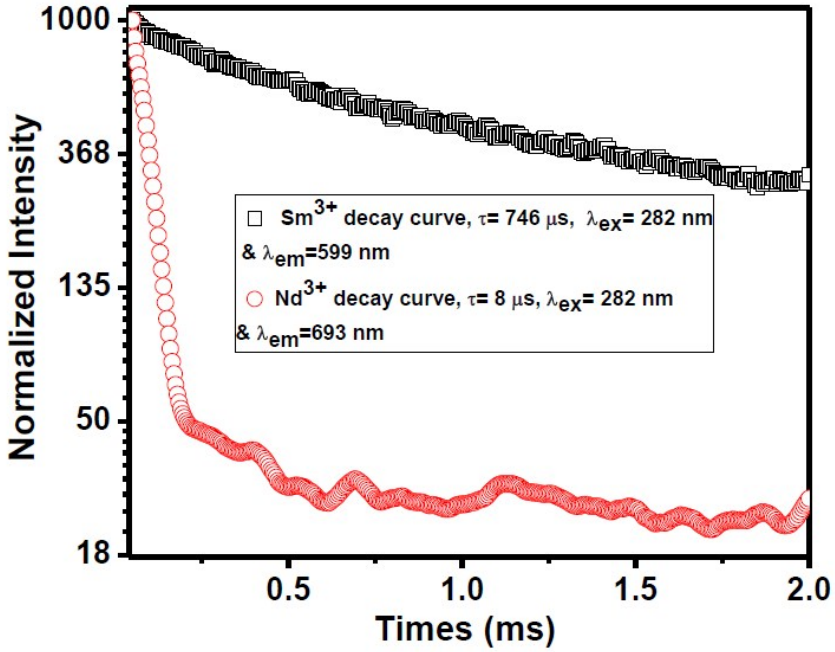

Fig. S11. Lifetimes decay curves of Sm^{3+} and Nd^{3+} ions in CeF_3 nanocrystals upon excitation at 280 nm. The monitored and emission wavelengths are 599 nm and 693 nm, respectively.