

**Supporting information**

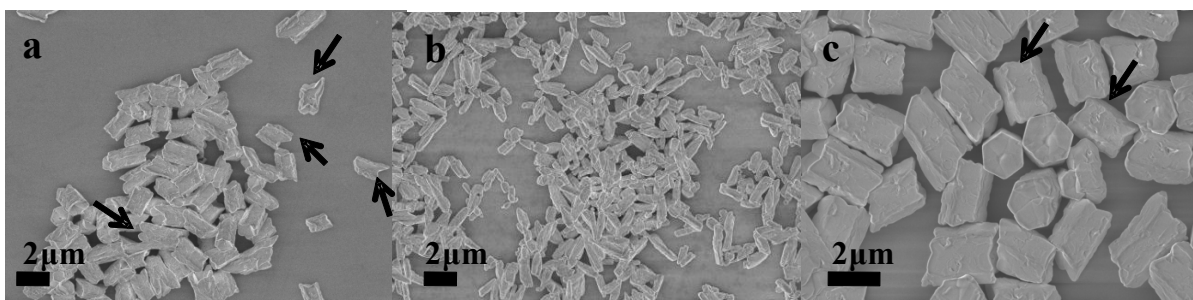
**Static and dynamic photoluminescence and photocatalytic properties of uniform,  
monodispersed up/down-converting, highly luminescent, lanthanide-ion-doped  $\beta$ -NaYF<sub>4</sub>  
phosphor microcrystals with controlled multiform morphologies**

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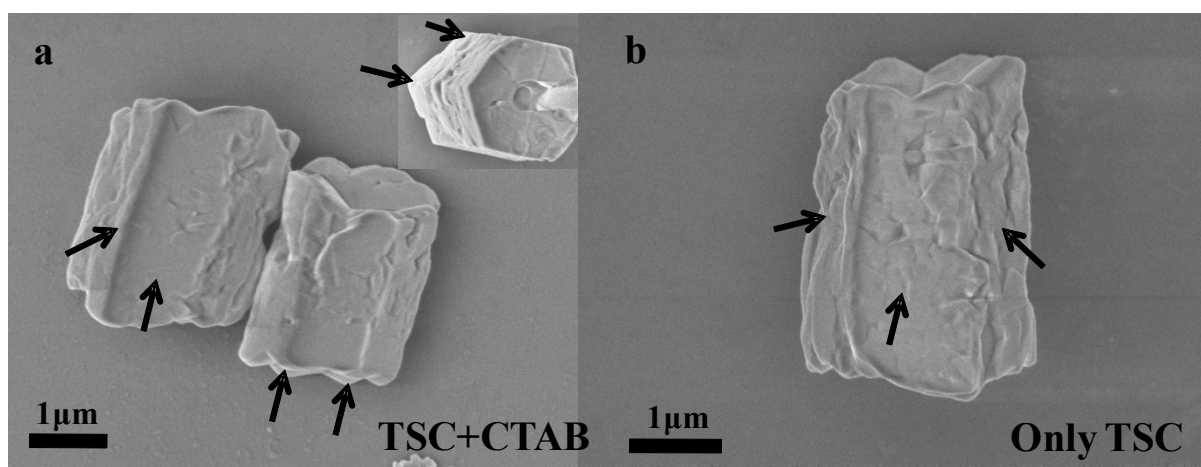
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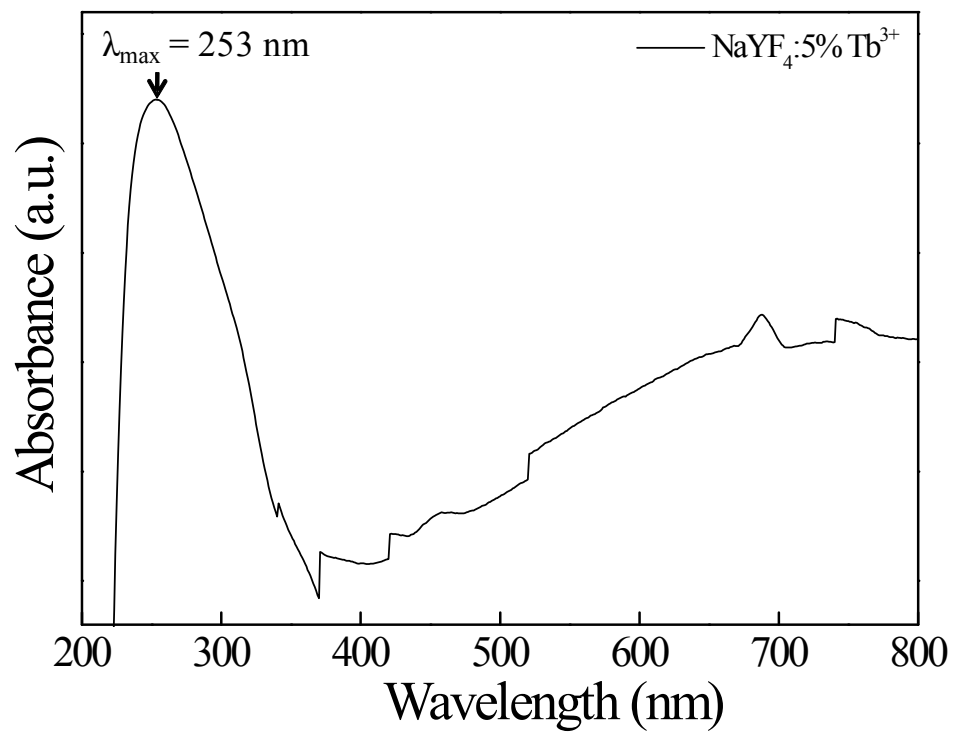
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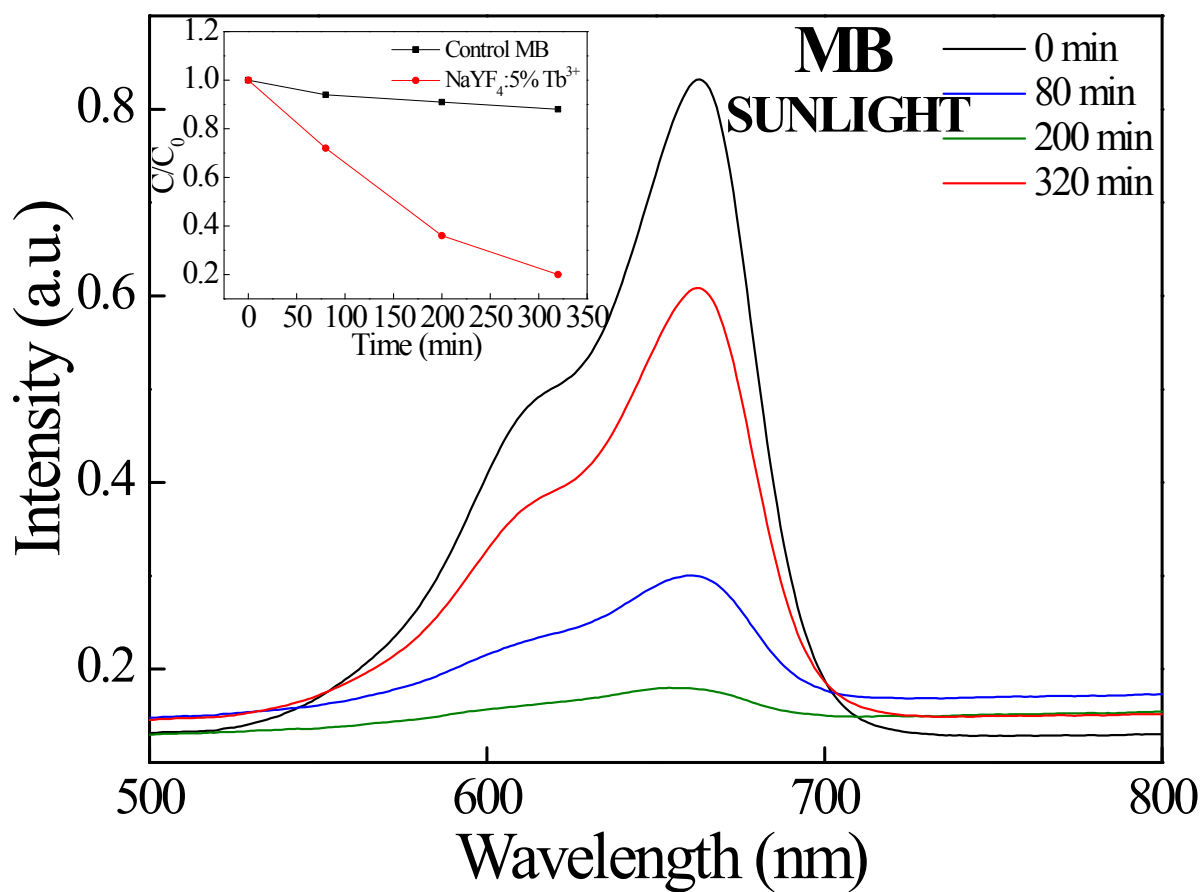
**Figure S1.A:** FESEM imaged of  $\beta$ -NaYF<sub>4</sub>:5 % Tb<sup>3+</sup> crystals prepared using only (a) trisodium citrate, (b) only CTAB and (c) trisodium citrate together with CTAB.



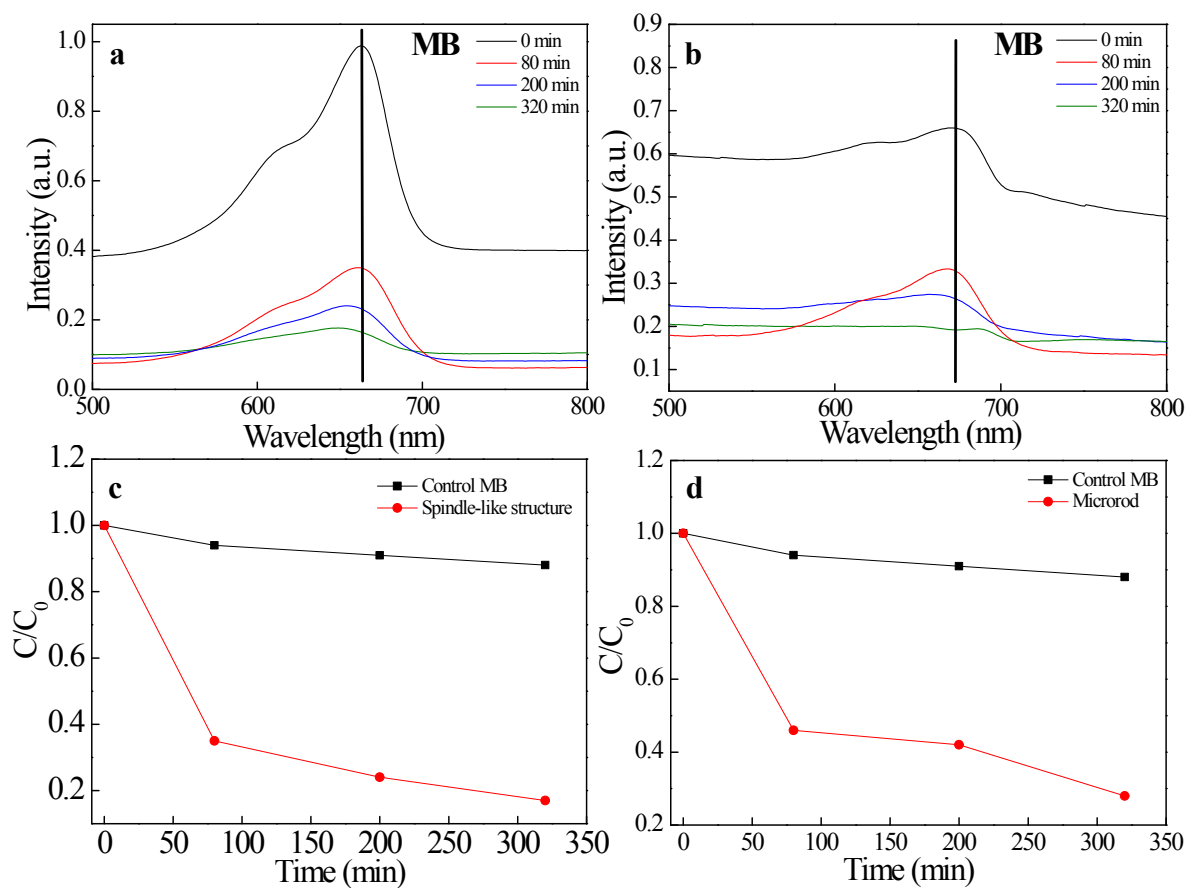
**Figure S1.B:** Magnified FESEM images of  $\beta$ -NaYF<sub>4</sub>:5 % Tb<sup>3+</sup> crystals prepared using (a) trisodium citrate and CTAB both and (b) only trisodium citrate. Arrows indicating well define, smooth and sharp edges of prismatic side planes formed in presence of both trisodium citrate and CTAB in converse to relatively less smooth and sharp prismatic side plane, when prepared using only trisodium citrate.



**Figure S2:** UV-visible absorption spectra of  $\beta$ -NaYF<sub>4</sub>:5 % Tb<sup>3+</sup>.



**Figure S3:** Photocatalytic degradation of MB in presence of  $\beta$ -NaYF<sub>4</sub>:5 % Tb<sup>3+</sup> under solar light irradiation. Inset showing corresponding plot of  $(C/C_0)$  vs. time.



**Figure S4:** Photocatalytic degradation of MB in presence of  $\beta$ -NaYF<sub>4</sub>:5% Tb<sup>3+</sup> with (a) spindle-like structure, and (b) microrods under irradiation of 400 W mercury lamp for 320 min. Plots of dye concentrations ( $C/C_0$ ) vs. time for (c) spindle-like structure and (d) microrods.