Electronic Supporting Information

Facile crystallization control of $LaF_3/LaPO_4$:Ce, Tb nanocrystals in a microfluidic reactor using microwave irradiation

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The residence time in microcapillary could be calculated by the driving-speed, the diameter and length of microcapillary as the following formula:

$$t = \frac{\pi (\frac{D}{2})^2 l}{2v} \quad (1)$$

Where D as the diameter of microcapillary (300 μm), *l* as the length of microcapillary (cm), *v* as the drive-speed of syringe push pump (ml/min), t as the residence time in microcapillary (s).

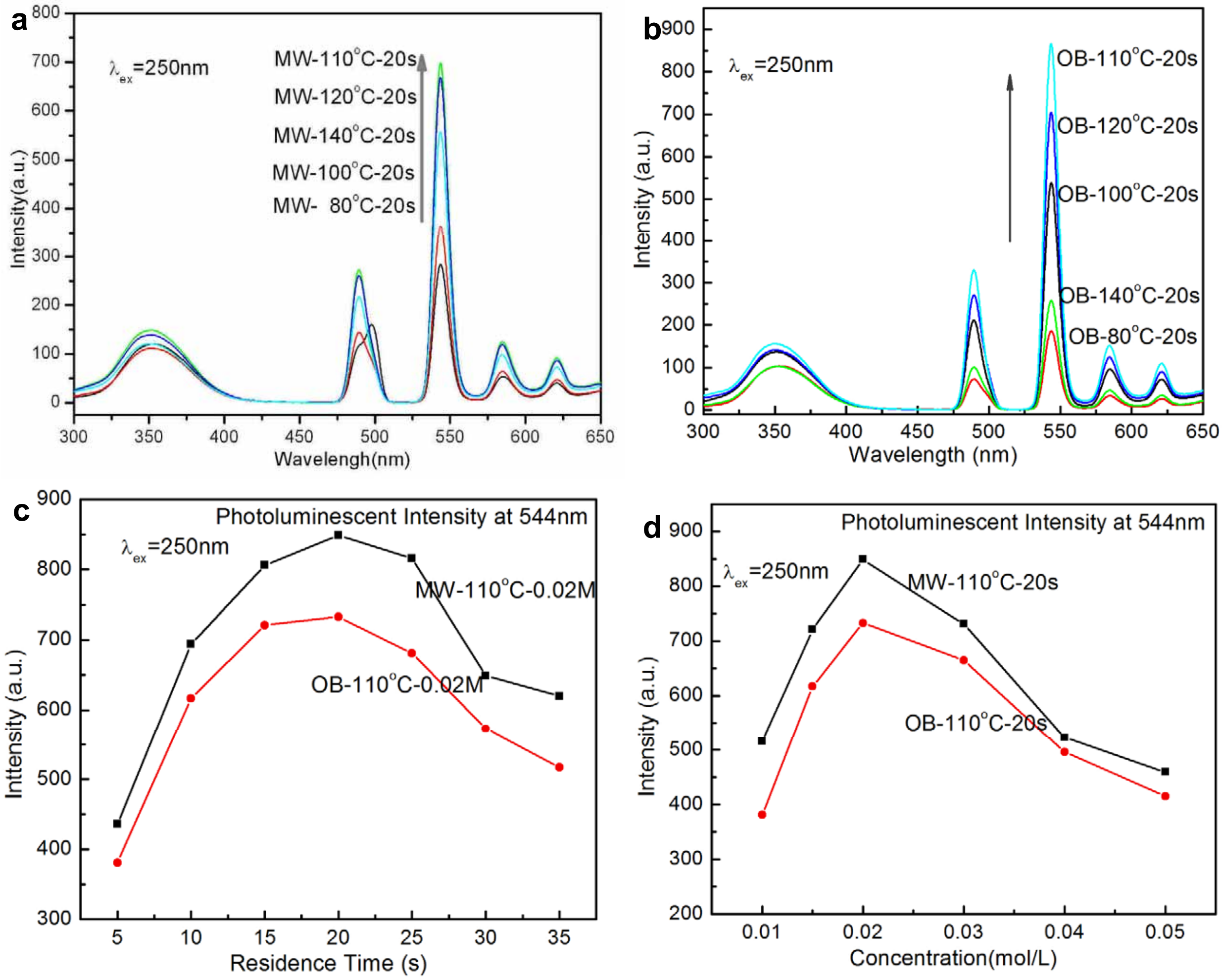

Figure S1. Optimal parameters of LaF_3:Ce, Tb NCs. a) the influence from reactor temperature in MW system to the luminescent intensity of NCs solution; b) the influence from reactor temperature in OB system to the luminescent intensity of NCs solution; c) effect of residence time to the luminescent intensity of NCs solution; d) effect of ions concentrations to the luminescent intensity of NCs solution.

The optimal conditions in preparation of $LaPO_4$:Ce, Tb NCs were obtained by the same way and as expected, the same with those of LaF_3:Ce, Tb NCs.

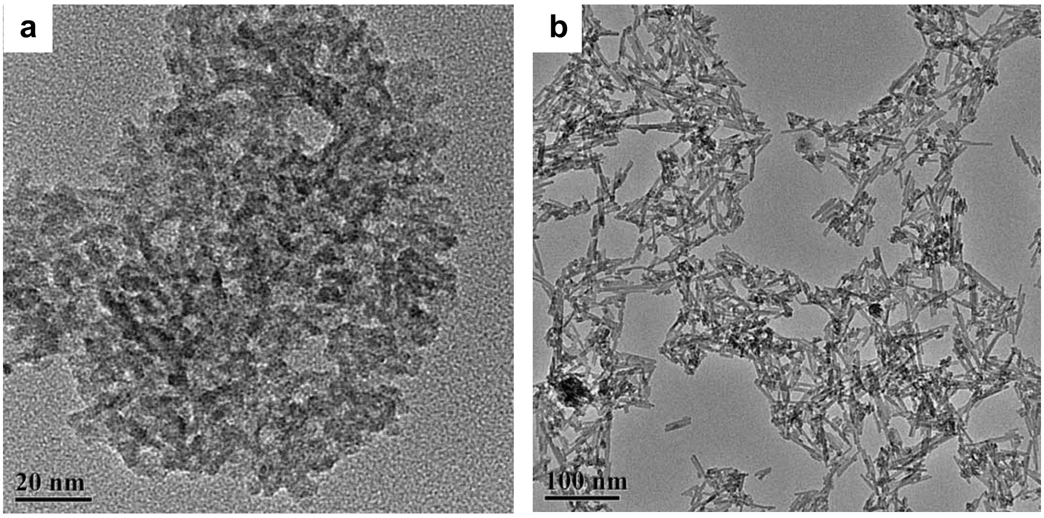

Figure S2. TEM images of LaF_3:Ce,Tb NCs and $LaPO_4$:Ce,Tb NCs from conventional reaction in 100 ml beakers reacted for 30 min at 110 ^{o}C in oilbath.

The LaF_3:Ce,Tb NCs in image (a) aggregated seriously and the definite shape of NCs was uncertain. The $LaPO_4$:Ce,Tb NCs in image (b) also had aggregation. What's more, the size and shape of NCs are various. The TEM images of samples from beaker reaction confirmed the advantages of microfluidic reactor, such as high surface area of the reaction vessel, fast temperature-tuning ability and so on, which improved the rate of the crystallization and controlled the progress precisely.

The beaker reaction for NCs in microwave irradiation has been done with obvious precipitation in a short time. The phenomenon confirms the beaker reaction can hardly control the nucleation and growth stages in crystallization.

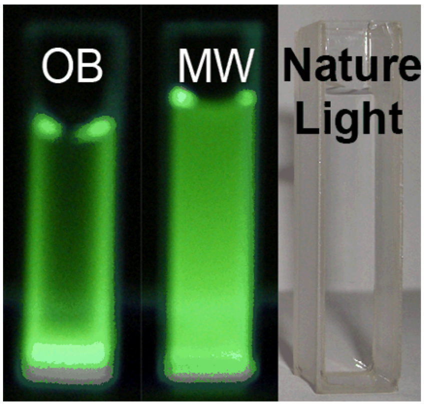

Figure. S3. Chromophotographs (under irradiation of a 254 nm UV lamp) of dispersion of LaF_3: Ce, Tb nanoparticles in de-ionized water solution

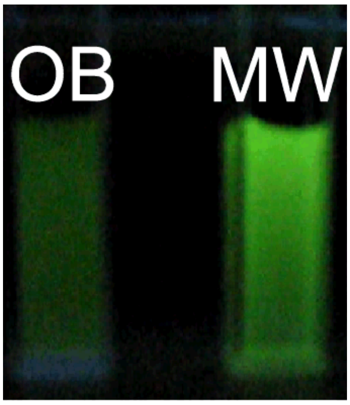

Figure. S4. Chromophotographs (under irradiation of a 254 nm UV lamp) of dispersion of $LaPO_4$: Ce, Tb nanoparticles in de-ionized water solution