

## Electronic Supplementary Information:

### A Dual-Mode Luminescent Probe of Co-Assembled Down-Conversion CdTe and Up-Conversion NaYF<sub>4</sub>:Yb,Tm(Er) Nanoparticle

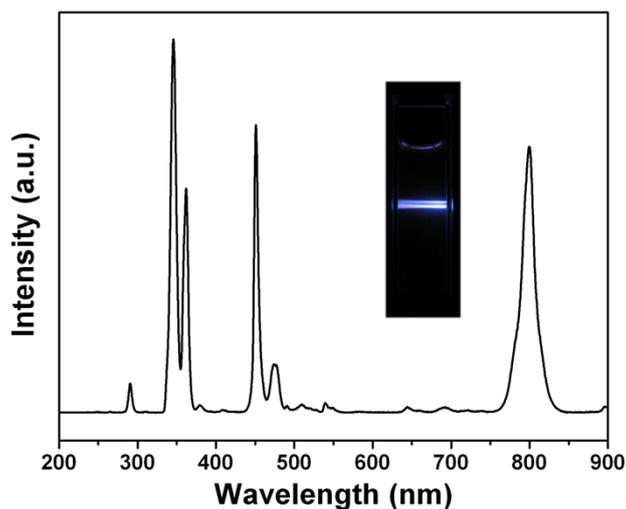
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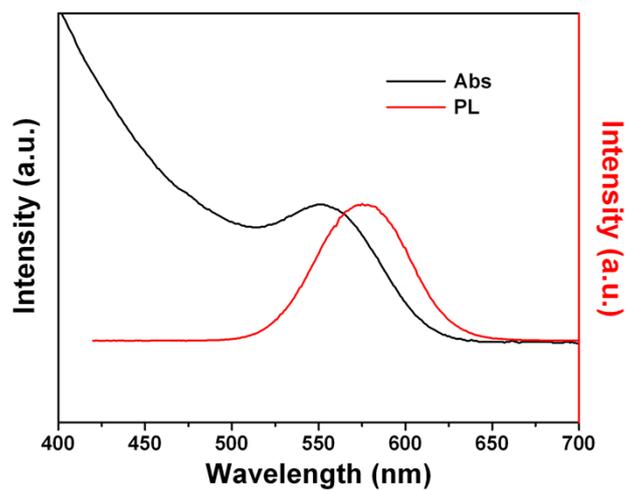
Key Laboratory of Automobile Materials, Ministry of Education, College of Materials Science and Engineering, Jilin University, Changchun 130022, P. R. China.

First Hospital of Jilin University, Changchun 130021, P. R. China.

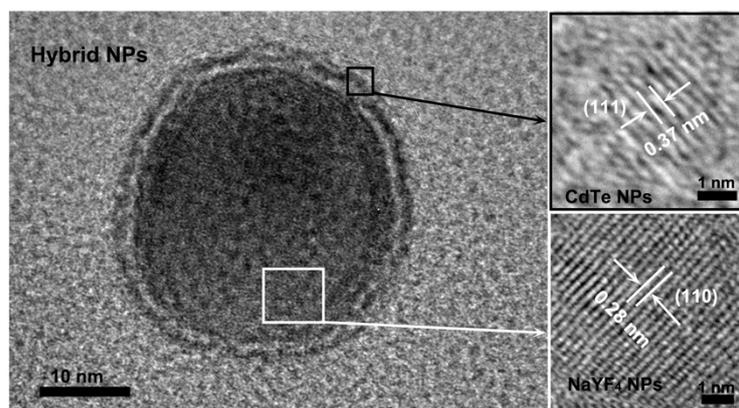
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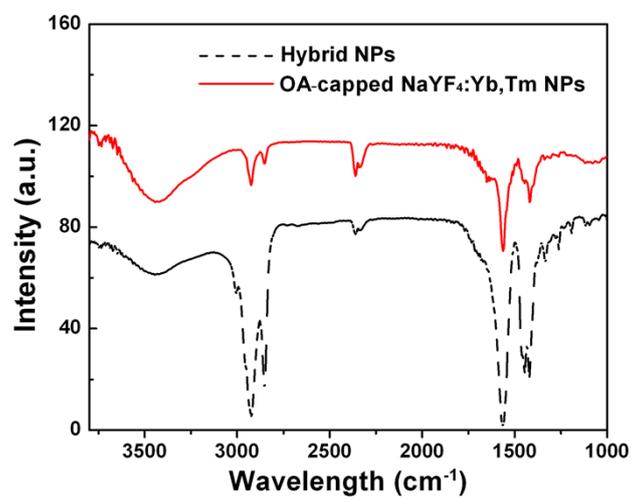
**Figure S1.** Up-conversion emission spectrum of OA-capped NaYF<sub>4</sub>:Yb,Tm NPs that are excited by a 980 nm diode laser with the power of 1 W. Inset: the luminescent image of NaYF<sub>4</sub>:Yb,Tm NPs.



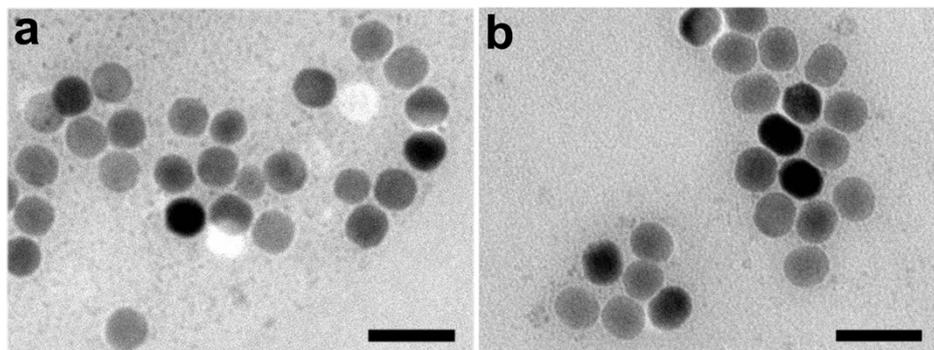
**Figure S2.** Absorption (black) and emission (red) spectra of 3.3 nm CdTe NPs. The excitation wavelength is 400 nm. The emission peak position is 578 nm.



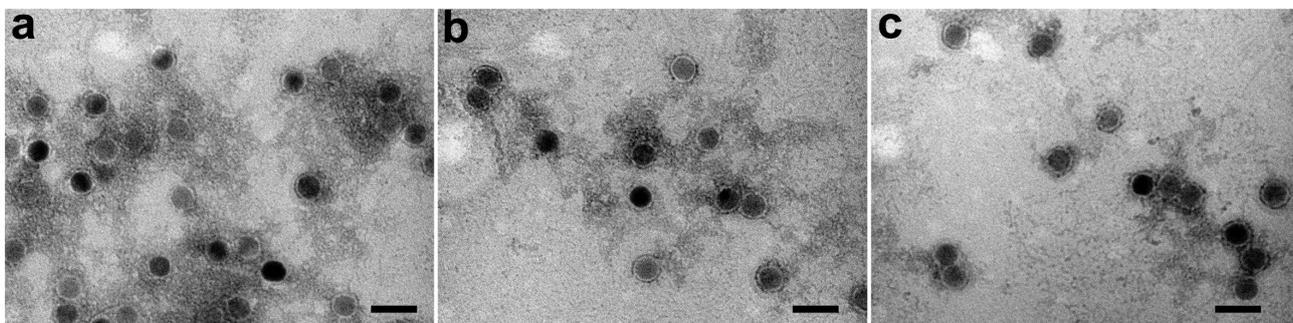
**Figure S3.** TEM image of one amplified CdTe-NaYF<sub>4</sub>:Yb,Tm hybrid NP, and high-resolution TEM images of CdTe and NaYF<sub>4</sub>:Yb,Tm.



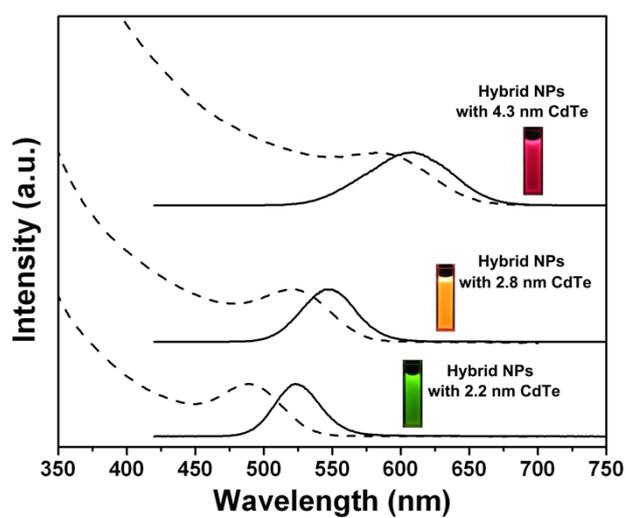
**Figure S4.** Comparison of the FTIR spectra of CdTe-NaYF<sub>4</sub>:Yb,Tm hybrid NPs (black) with OA-capped NaYF<sub>4</sub>:Yb,Tm NPs (red).



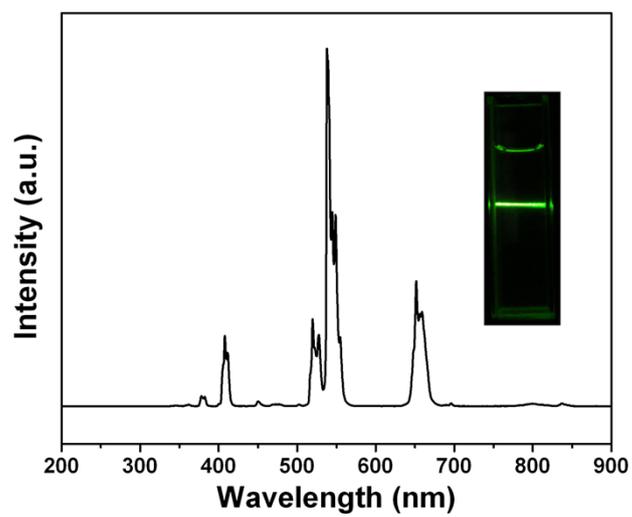
**Figure S5.** TEM images of the products that are prepared by removing excessive Cd-MPA complexes before fabrication (a), and decreasing the concentration of CdTe NPs to 1/10 (b). The scale bar is 50 nm.



**Figure S6.** TEM images of co-assembled hybrid NPs composed of 20 nm NaYF<sub>4</sub>:Yb,Tm NPs, and 2.2 (a), 2.8 (b), and 4.3 (c) nm CdTe NPs. The scale bar is 50 nm.



**Figure S7.** Absorption (dot) and emission (solid) spectra of the hybrid NPs that are fabricated from 2.2, 2.8, and 4.3 nm CdTe NPs. Insets: the luminescent images of the hybrid NPs. The excitation wavelength is 400 nm.



**Figure S8.** Up-conversion emission spectrum of OA-capped  $\text{NaYF}_4:\text{Yb,Er}$  NPs that are excited by a 980 nm diode laser. Inset: the luminescent image of  $\text{NaYF}_4:\text{Yb,Er}$  NPs.