

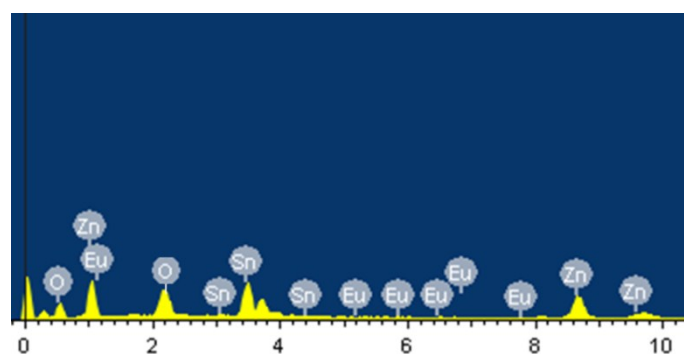
## Supporting Information

### Five-nanometer $\text{ZnSn}_2\text{O}_4$ : Cr, Eu ultra-small nanoparticles as new near infrared-emitting persistent luminescent nanoprobes for cellular and deep tissue imaging at 800 nm

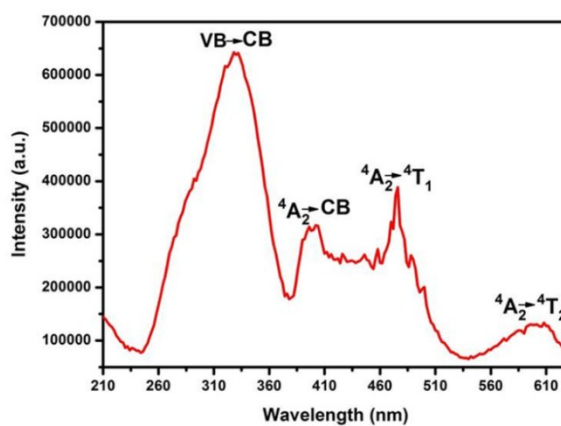
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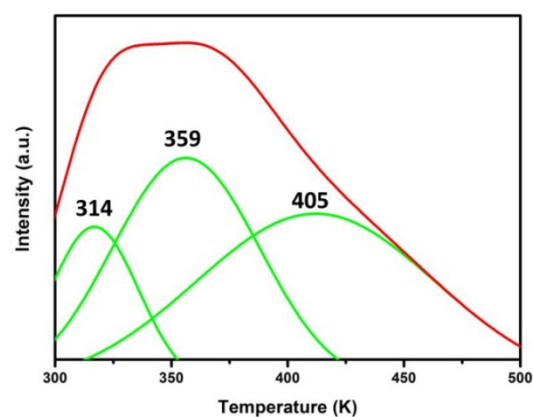
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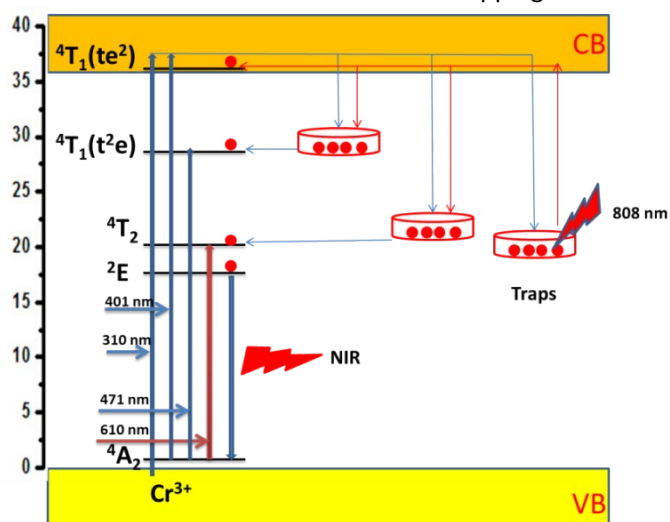
**Fig. S1** EDS spectrum of the ZSO.



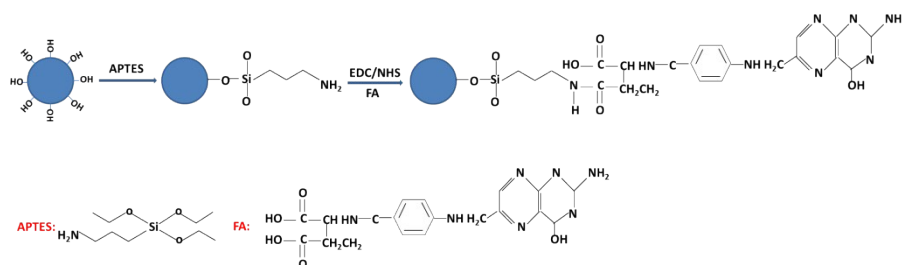
**Fig. S2.** Excitation spectra of the ZSO.



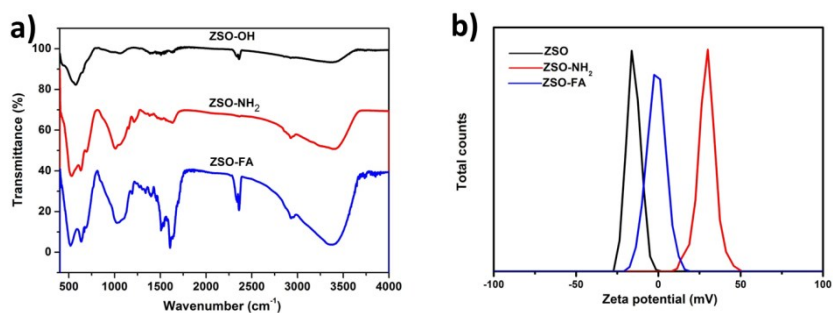
**Fig. S3** Thermo-luminescent curves of the ZSO 5 min after stopping the excitation.



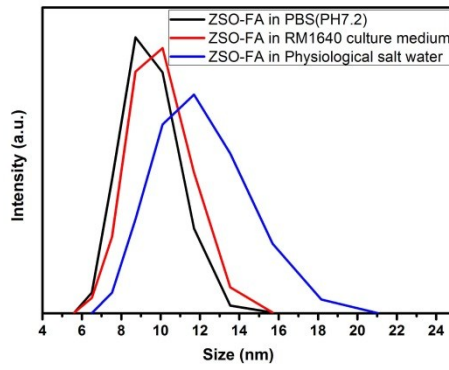
**Fig. S4.** Schematic representation of the persistent NIR luminescent mechanism of the ZSO.



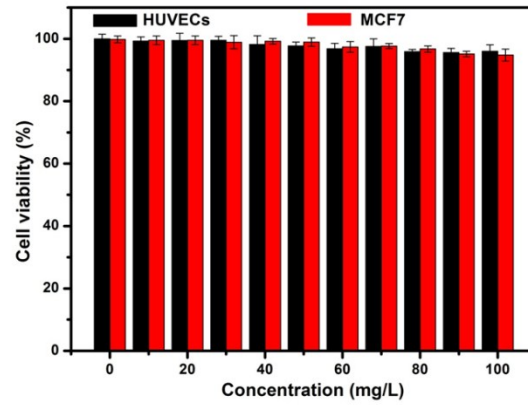
**Fig. S5.** The bio-functional process of ZSO with APTES and FA.



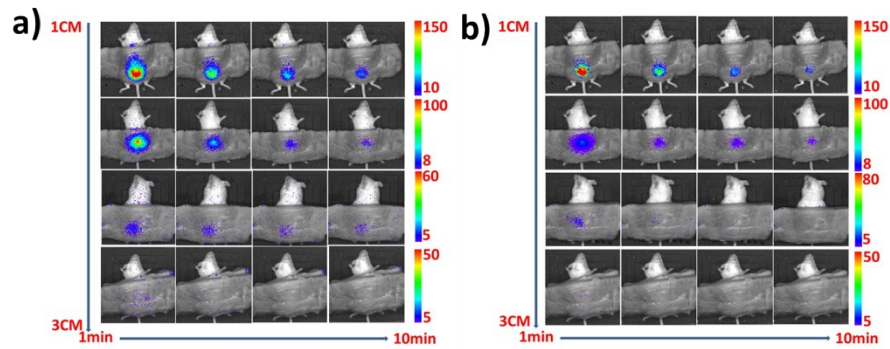
**Fig. S6** (a) FTIR spectra of ZSO, ZSO-NH<sub>2</sub> and ZSO-FA. (b) ZETA of ZSO, ZSO-NH<sub>2</sub> and ZSO-FA.



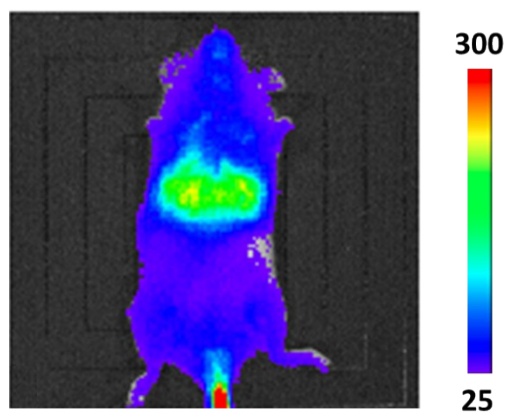
**Fig. S7** The hydrodynamic diameter analysis of ZSO-FA in physiological conditions (PH7.2 PBS, physiological salt water and RM1640 culture medium)



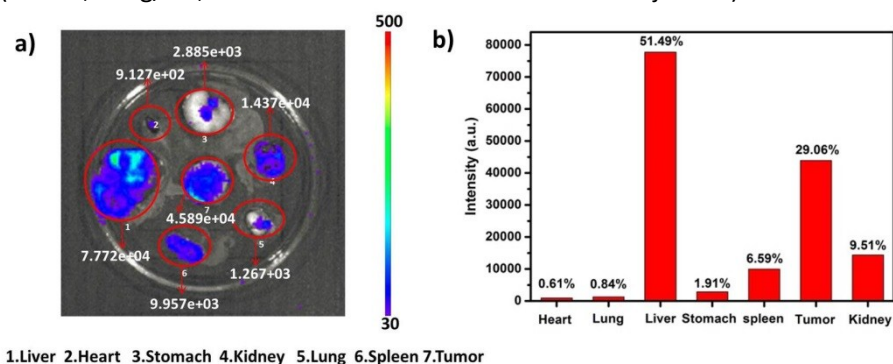
**Fig. S8** MTT of ZSO-FA with HUVECs and MCF7 cells.



**Fig. S9.** (a) Comparative different deep pork tissue (1, 2, 2.5, and 3 cm) *in vivo* imaging of ZSO (0.1 mL, 1 mg/mL) with in situ excitation at 650 nm for 5 min. (b) Comparative different deep pork tissue (1, 2, 2.5, and 3 cm) *in vivo* imaging of ZSO with in situ excitation at 808 nm for 1 min.



**Fig. S10.** In vivo luminescent images of H22 tumor-bearing mice after intravenous injection of ZSO-NH<sub>2</sub> (0.2 mL, 1 mg/mL, 5 min excitation with 254 nm before injection).



**Figure S11.** (a) NIR luminescent images of different organs from an anatomical tumor mouse at 24 h post intravenous injection of ZSO-FA (0.2 mL, 1 mg/mL) after 650 nm light excitation for 5 min: 1 liver, 2 heart, 3 stomach, 4 kidney, 5 lung, 6 spleen, and 7 tumor. (b) In vivo biodistribution in tumor-bearing athymic mice at 24 h post-injection of ZSO-FA nanoparticles.