

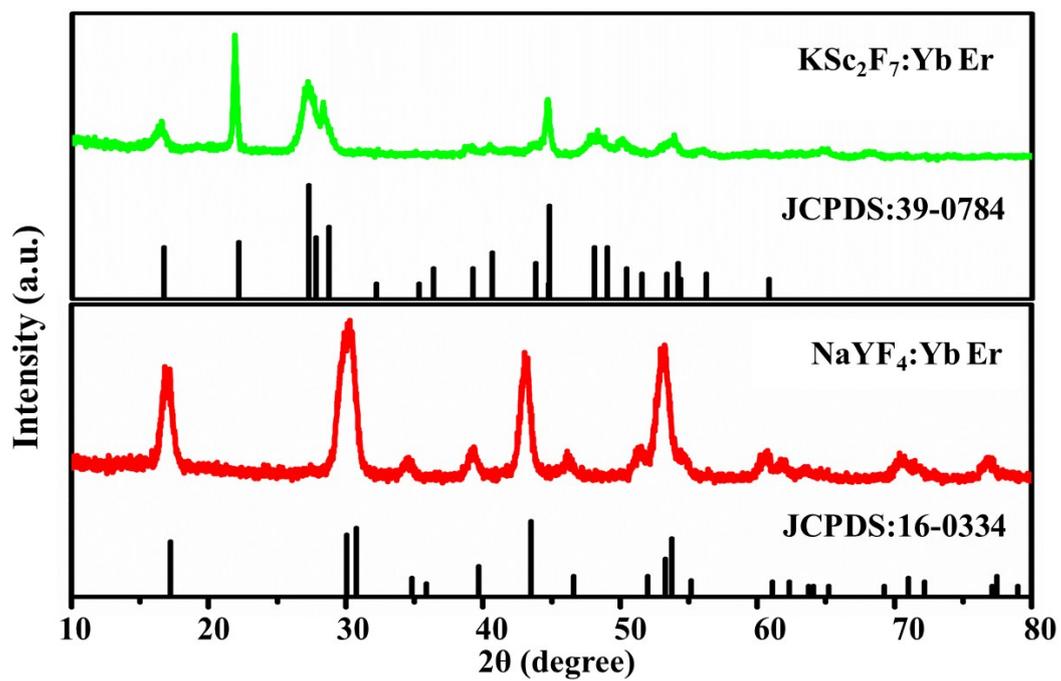
## Supplementary Information

### **A high performance Sc-based nanoprobe for through-skull fluorescence imaging of brain vessel beyond 1500 nm**

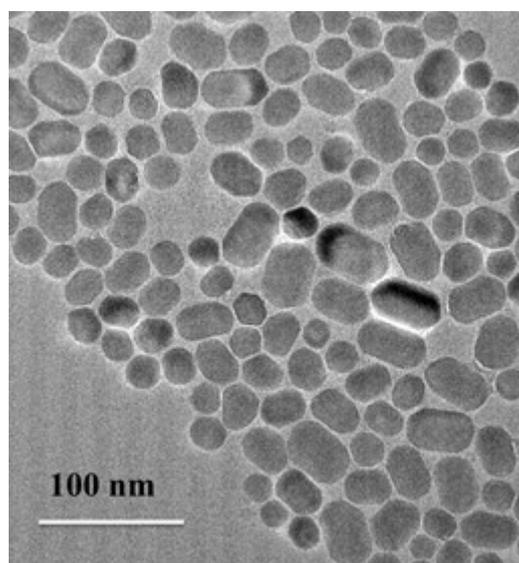
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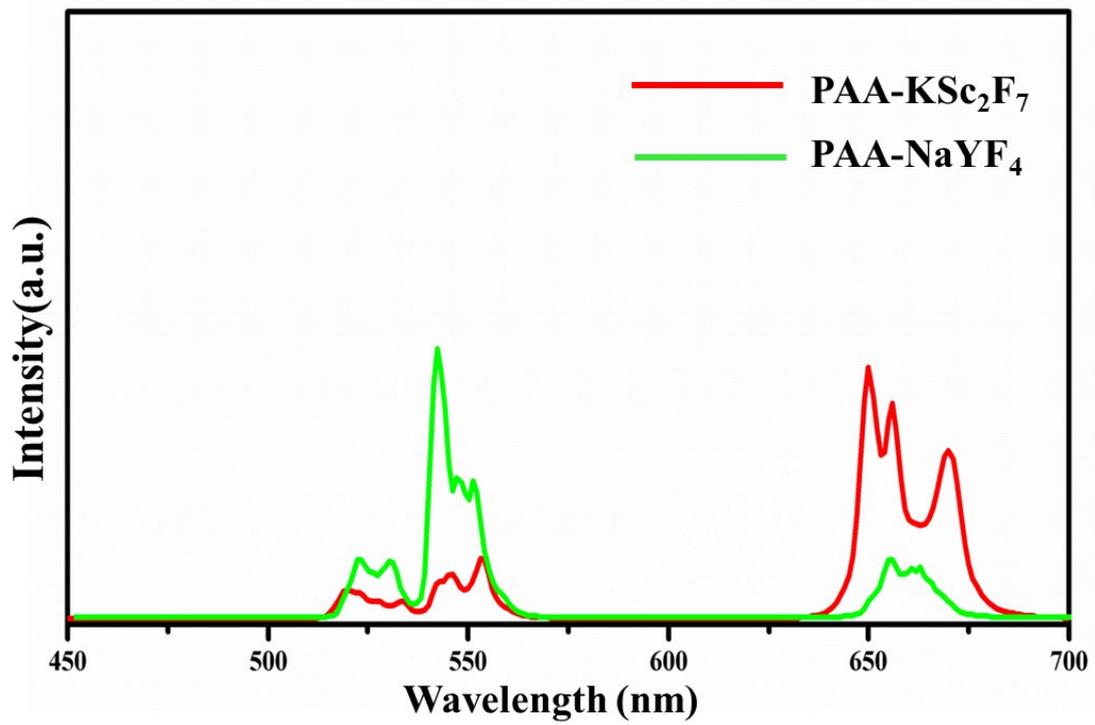
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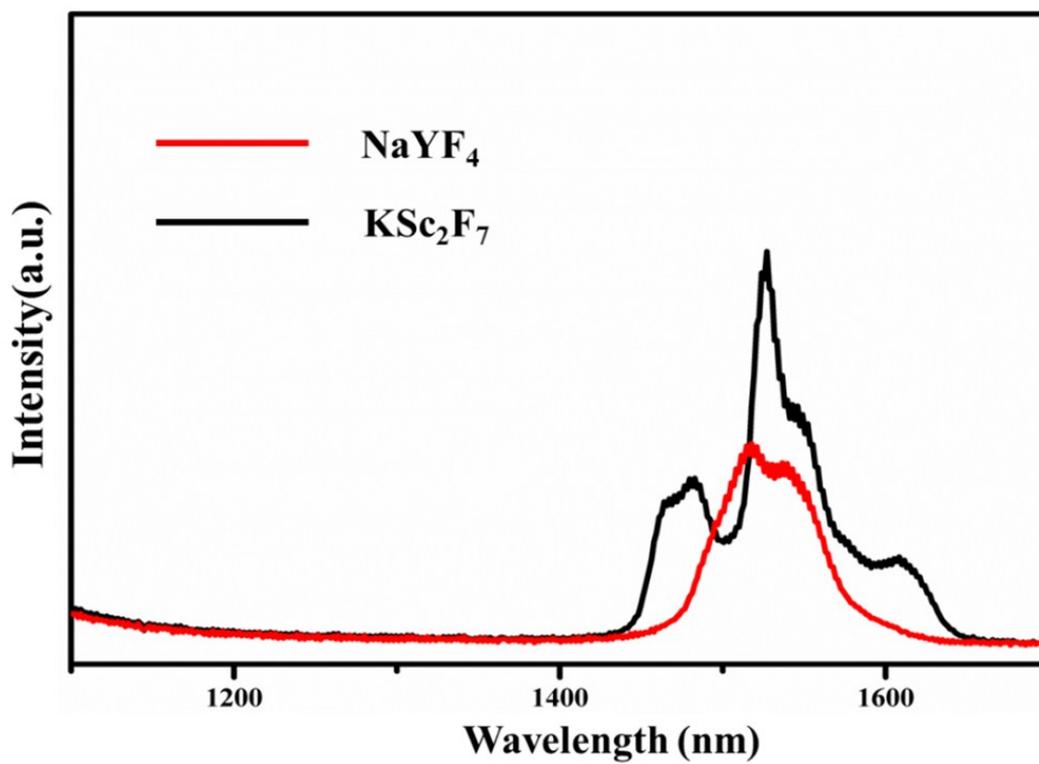
**Figure S1.** XRD patterns of hexagonal phase  $\text{NaYF}_4$  nanocrystals (red curve) and orthorhombic phase- $\text{KSc}_2\text{F}_7$  nanocrystals (green curve)



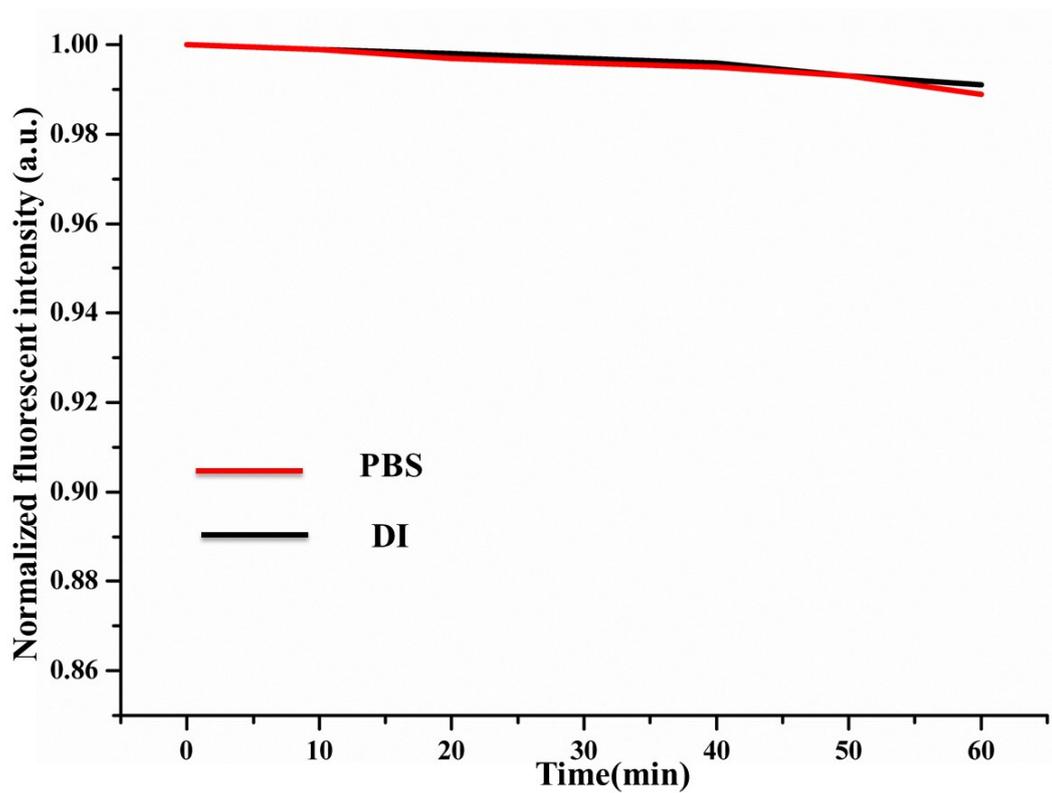
**Figure S2.** TEM image of hexagonal phase NaYF<sub>4</sub> nanocrystals



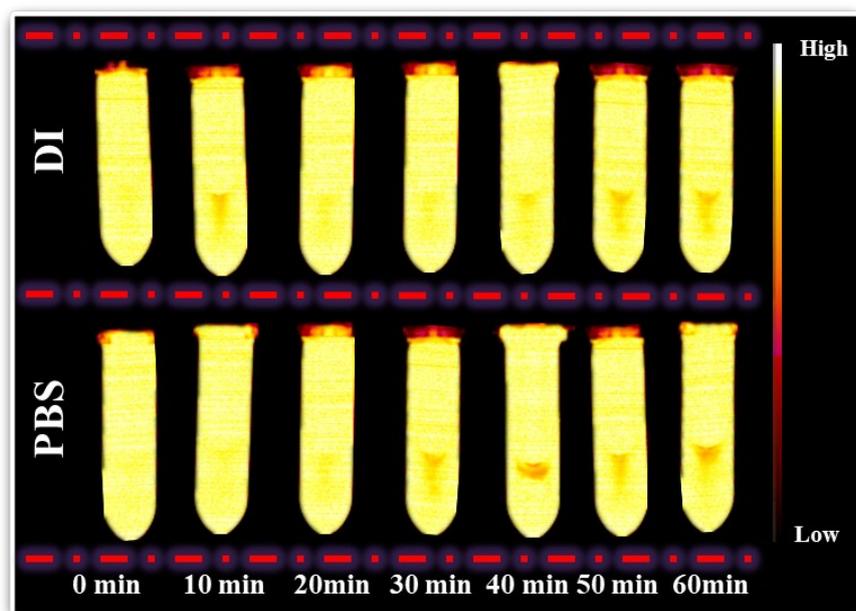
**Figure S3.** Upconversion spectra of PAA-KSc<sub>2</sub>F<sub>7</sub> and PAA-NaYF<sub>4</sub> nanocrystals under the excitation of 980 nm laser.



**Figure S4.** Downconversion spectra of PAA- $\text{KSc}_2\text{F}_7$  and PAA- $\text{NaYF}_4$  nanocrystals under the excitation of 980 nm laser.



**Figure S5.** Photo-stability curve of PAA-KSc<sub>2</sub>F<sub>7</sub> nanocrystals in water and PBS under continuous 980 nm laser irradiation with a power density of 0.6 W cm<sup>-2</sup>.



**Figure S6.** The *in vitro* phantom imaging of PAA-KSc<sub>2</sub>F<sub>7</sub> nanocrystals in water and PBS under 980 nm laser excitation at different time points. The fluorescence signal was collected by using the *in vivo* NIR-II bioimaging system.