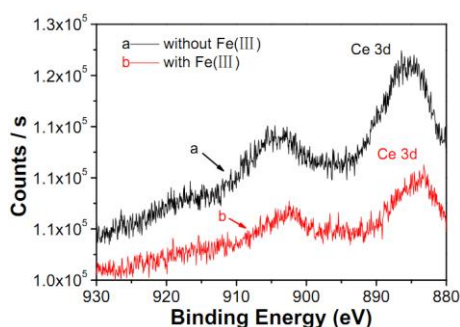
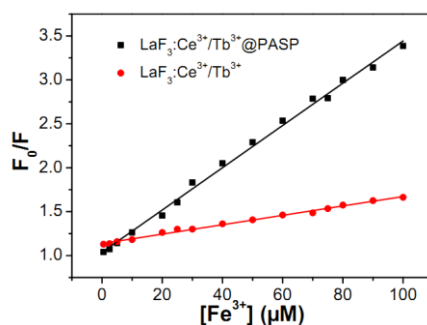


# Synthesis and Sensing Application of Highly Luminescent and Water Stable Polyaspartate Functionalized LaF<sub>3</sub> Nanocrystals

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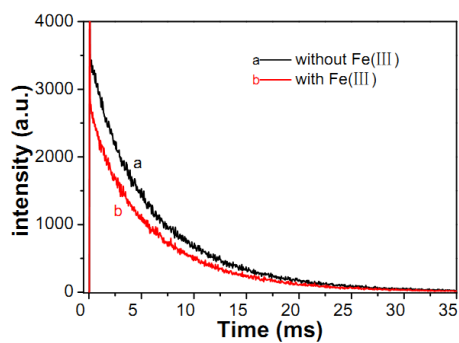


**Figure S1.** XPS Ce 3d photoemission spectra for LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup>@PASP NPs in the absence (a) and presence (b) of Fe<sup>3+</sup> ions, respectively. The results indicate that the Ce<sup>3+</sup> is not oxidized by Fe<sup>3+</sup>, and thus the luminescence quenching is not caused by the oxidation of Ce<sup>3+</sup> by the addition of Fe<sup>3+</sup>.



**Figure S2.** Plot of the luminescence intensity ratio ( $F_0/F$ ) of LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup>@PASP and LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup> colloidal solution (2.4 μg/mL) to the concentration of Fe<sup>3+</sup>, respectively.  $F_0$  and  $F$  are the relative luminescence intensity in the absence and presence of Fe<sup>3+</sup>, respectively. pH = 5.

As shown in Fig. S2, at pH = 5, the luminescence of LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup> nanoparticles without PASP coating was slightly quenched by Fe<sup>3+</sup> ions, which can be attributed to the luminescence absorption by coloured Fe<sup>3+</sup> ions. However, for the PASP coated LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup> nanoparticles, the luminescence was dramatically quenched by the addition of Fe<sup>3+</sup> ions. In this case, the Fe<sup>3+</sup> ions were drawn to the surface of the NPs due to the enriched carboxylic groups and amino groups in the PASP layer, and thus the energy transfer from excited state Ce<sup>3+</sup> to Fe<sup>3+</sup> became easier. These results suggest that the luminescence quenching is mainly ascribed to the excitation state quenching of Ce<sup>3+</sup> ions by Fe<sup>3+</sup> ions and slightly due to the inner filter effect.



**Figure S3.** Photoluminescence decay of the LaF<sub>3</sub>:Ce<sup>3+</sup>/Tb<sup>3+</sup>@PASP NPs aqueous solution before (a) and after (b) the addition of  $3 \times 10^{-5}$  mol/L of Fe<sup>3+</sup> ions.  $\lambda_{em}/\lambda_{ex} = 545$  nm/254 nm. From Figure S3, it is clear that the lifetime of the luminescence shortened after the addition of Fe<sup>3+</sup> ions.