

Supporting Information

**Enhanced upconversion fluorescence probe of single
NaYF₄:Yb³⁺/Er³⁺/Zn²⁺ nanoparticle for copper ion detection**

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Supporting Figures

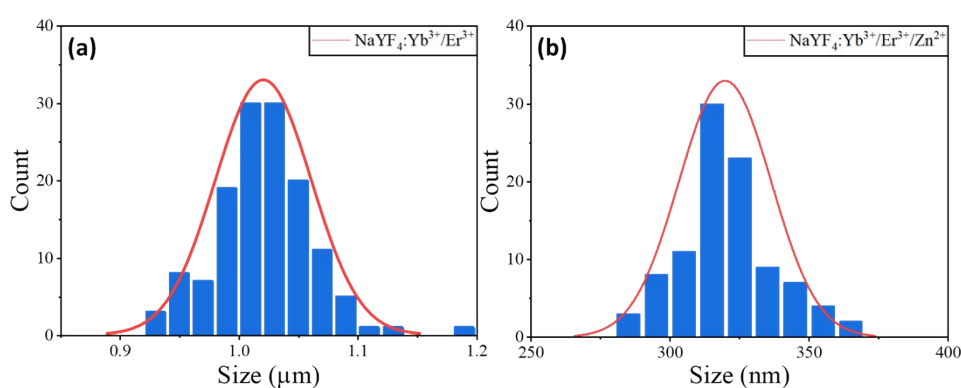


Figure S1 (a) The size distribution of NaYF₄:Yb³⁺/Er³⁺ microdisks, (b) the size distribution of NaYF₄:Yb³⁺/Er³⁺/Zn²⁺ nanoparticles.

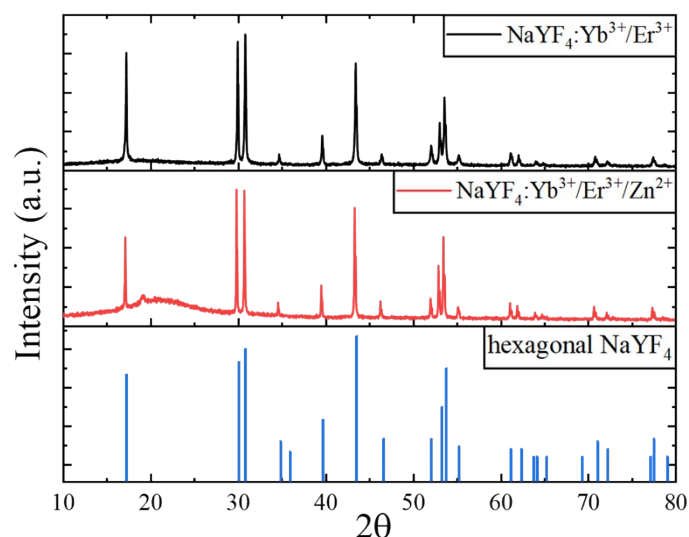


Figure S2 XRD spectra of NaYF₄:Yb³⁺/Er³⁺ microdisks and NaYF₄:Yb³⁺/Er³⁺/Zn²⁺ nanoparticles

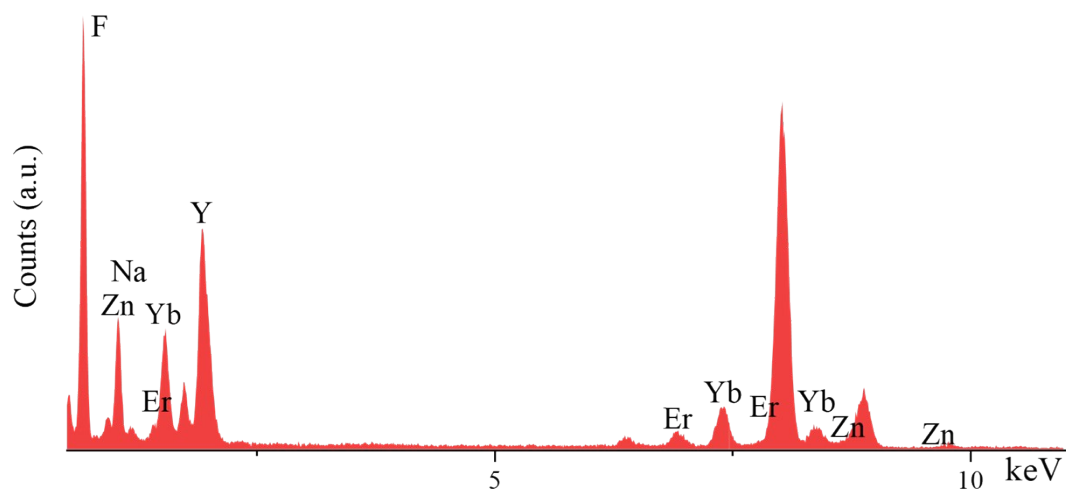


Figure S3 Energy dispersive spectrum of the NaYF₄:Yb³⁺/Er³⁺/Zn²⁺ nanoparticles.

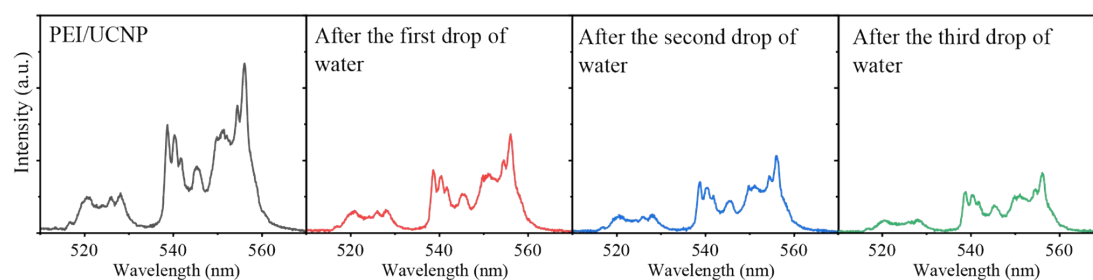


Figure S4 Emission spectra of the single particle fluorescence probe before and after dropping water solvent onto the particle.

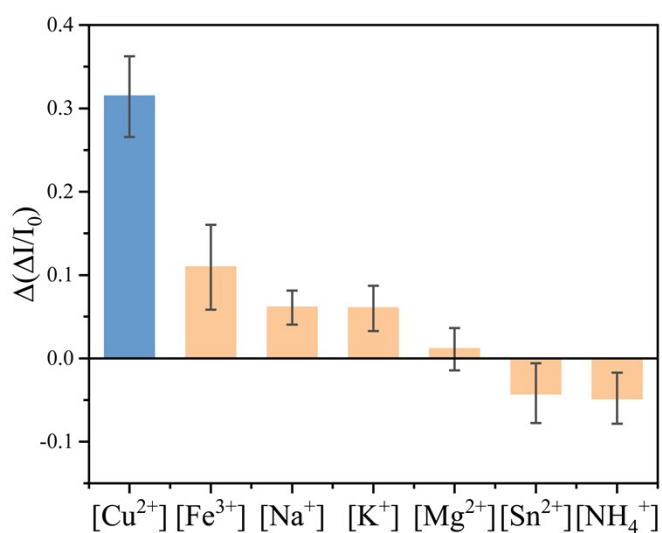


Figure S5 Fluorescence quenching of the single particle probe with 60nM copper ion solution and 600nM other ions (Fe³⁺, Na⁺, K⁺, Mg²⁺, Sn²⁺, NH₄⁺) solution.

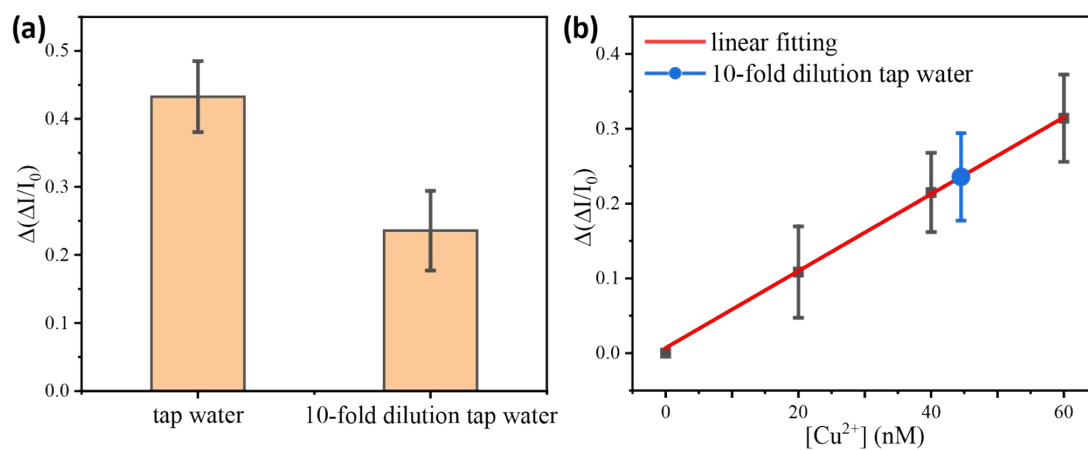


Figure S6 (a) Fluorescence quenching of the single particle probe with tap water and ten-fold dilution tap water, (b) the degree of fluorescence quenching with the diluted tap water marked on the fitted data plot (from Figure 5b) and the concentration of Cu^{2+} in the tap water was estimated to be 0.3-0.6 μ M.