

Supporting Information for:

**Rapid, Selective, and Ultrasensitive Fluorescence Ratio-metric
Detection of Sulfide Ions Using Dual-Emitting BSA-Erbium (III)-
modulated Gold-Silver Bimetallic Nanoclusters**

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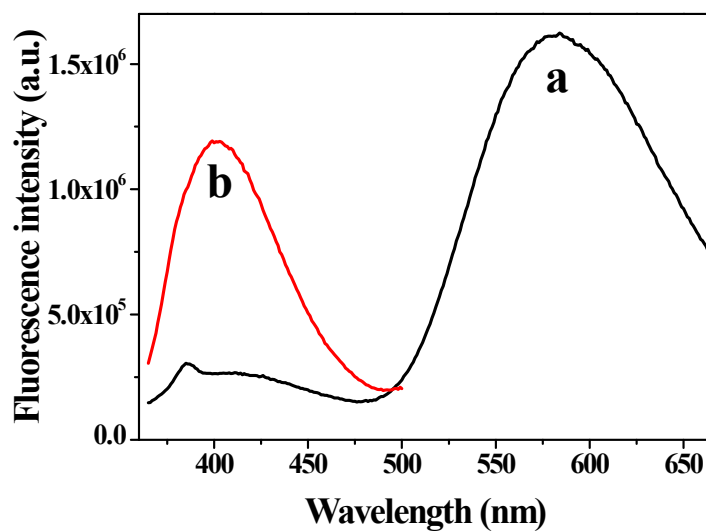


Figure S1 Fluorescence spectra ($\lambda_{\text{ex}} = 340$ nm) of BSA-Er/Au/Ag-NCs (a), BSA-Er complexes (b)

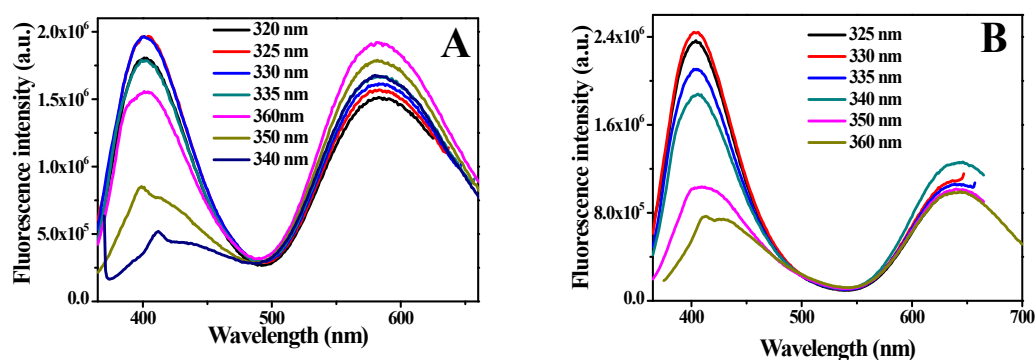


Figure S2 FL spectra of the BSA-Er/Au/Ag-NCs (left), BSA-Er/Au-NCs (right) at different excitation wavelengths from 320 to 360 nm, both the excitation and emission slit widths were 5 nm.

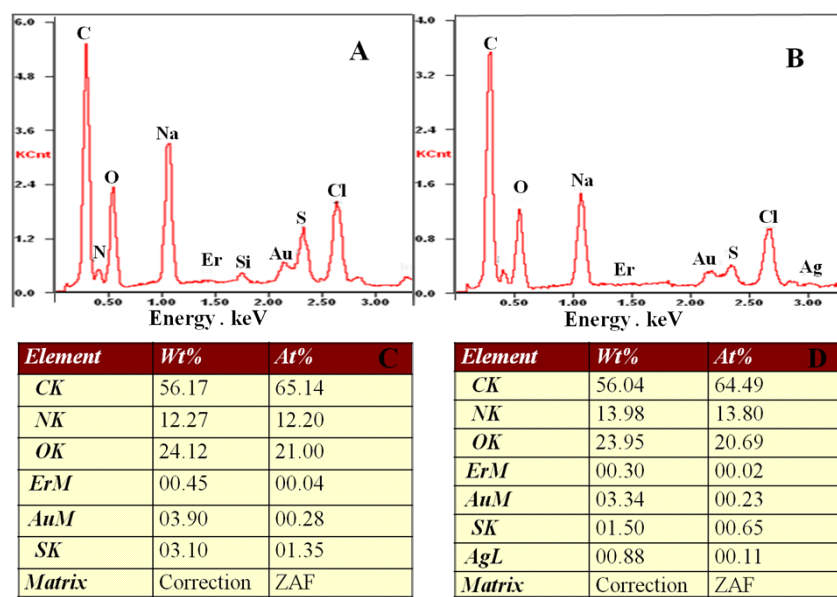


Figure S3 EDS of BSA-Er/Au-NCs (A) and BSA-Er/Au/Ag-NCs (B); the element concentrations of Er, Au and Ag images of the BSA-Er/Au-NCs (C) and BSA-Er/Au/Ag-NCs (D).

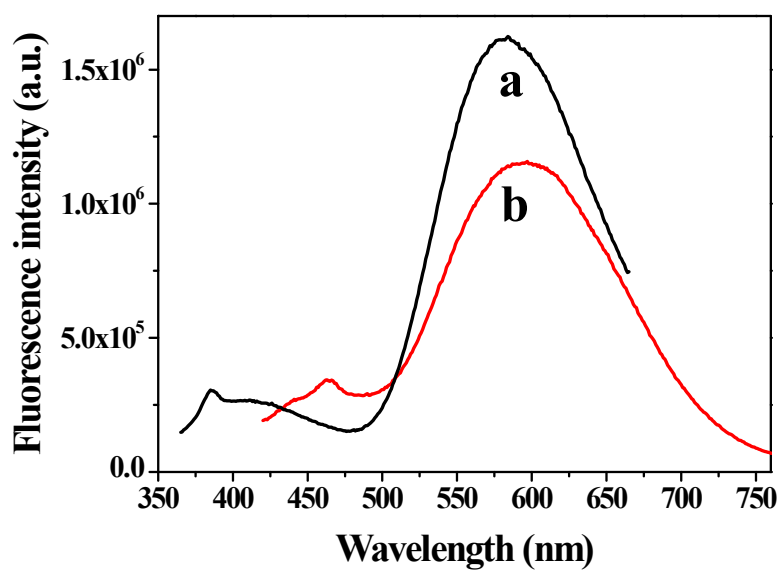


Figure S4 Fluorescence spectra of BSA-Er/Au/Ag-NCs at excitation wavelength of 340 nm, at excitation wavelength of 400 nm (b).

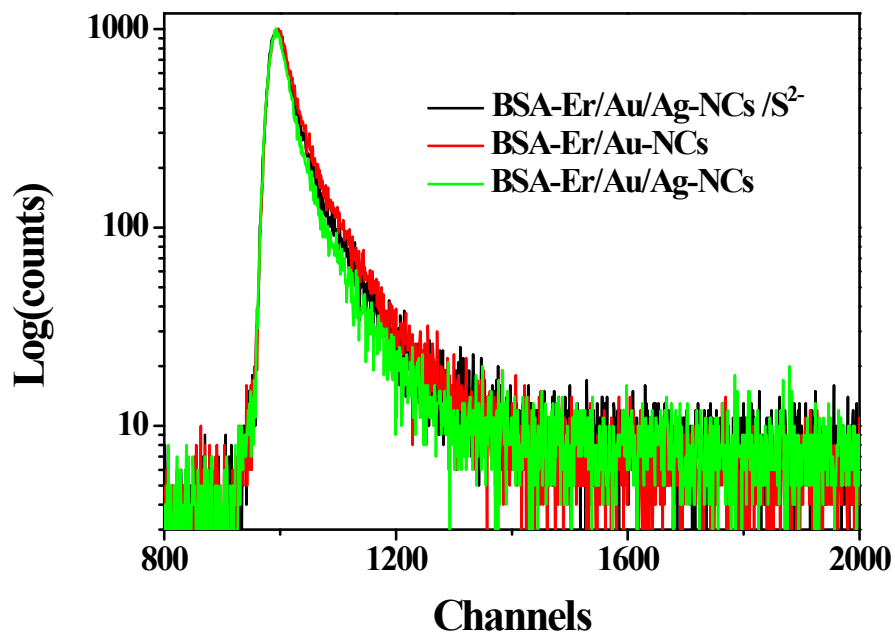


Figure S5 Decay curves of luminescence lifetime of BSA-Er/Au/Ag-NCs in the presence of S^{2-} ions; BSA-Er/Au-NCs; BSA-Er/Au/Ag-NCs.

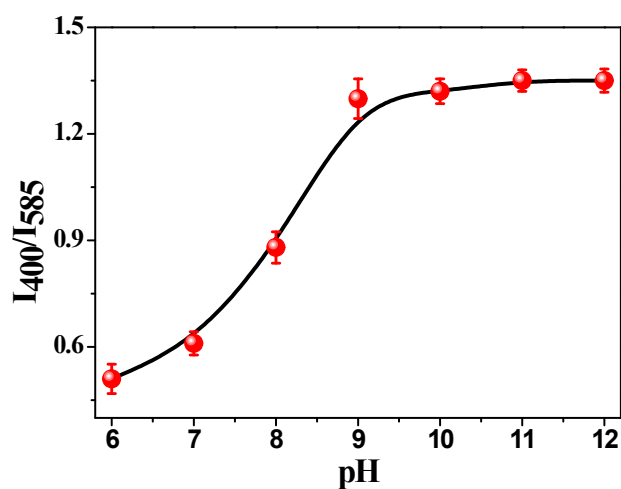


Figure S6 Effect of pH on the photoluminescence of BSA-Er/Au/Ag-NCs in the HEPES buffer (5 mM). Concentration: The concentrations of S^{2-} ions, BSA-Er/Au/Ag-NCs are 100 μ M, 440 μ g/mL, respectively. λ_{ex} : 340 nm.

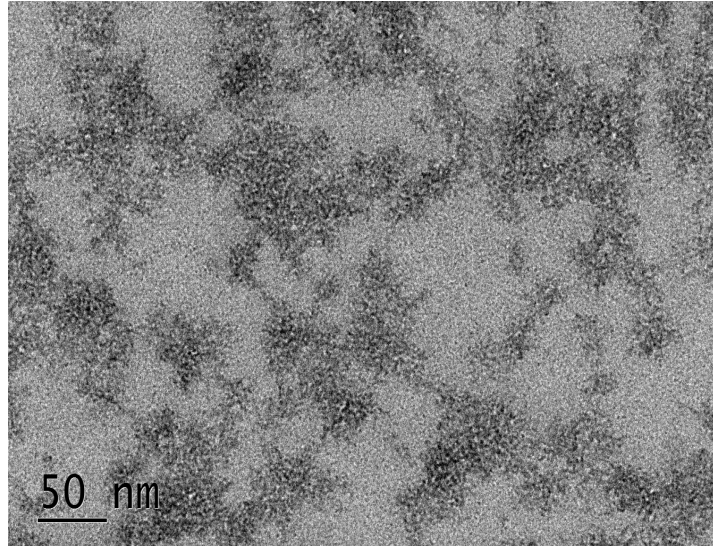


Figure S7 The TEM imaging of BSA-Er/Au/Ag-NCs.