Electronic Supplementary Information

For

Fluorescence Wavelength Shift Combining with Light Scattering for Ratiometric Sensing of Chloride in the Serum based on $CsPbBr_3$@SiO_2 Perovskite Nanocrystals Composites Halide Exchanges

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Supplemental Figures

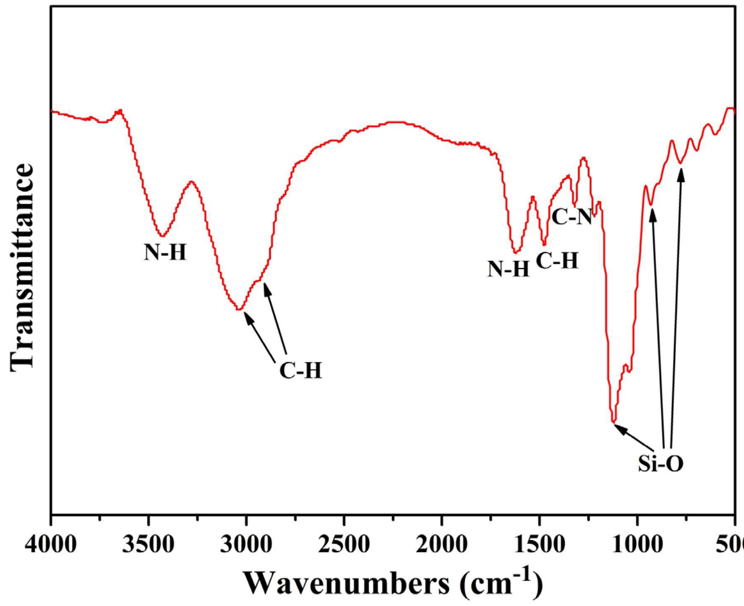

Figure S1. FTIR spectra of $CsPbBr_3@SiO_2$ PNCCs.

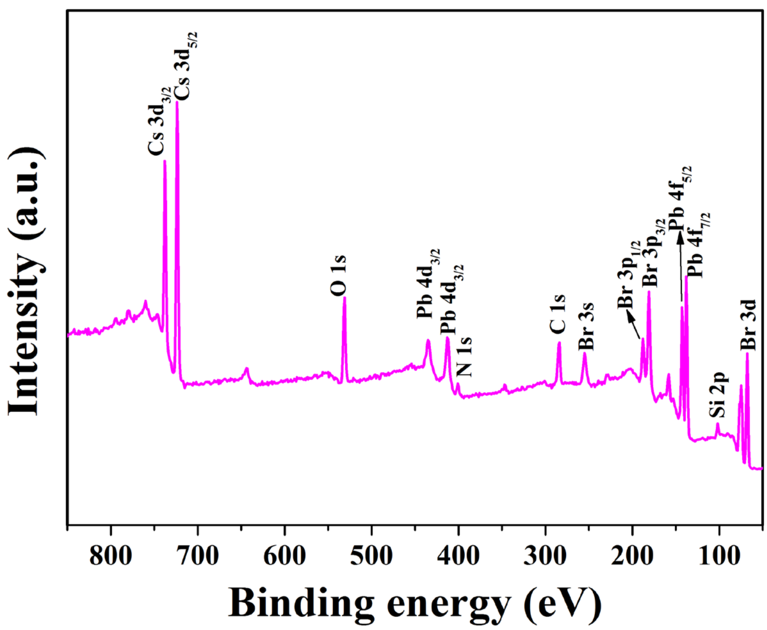

Figure S2. The XPS full spectrum of $CsPbBr_3@SiO_2$ PNCCs.

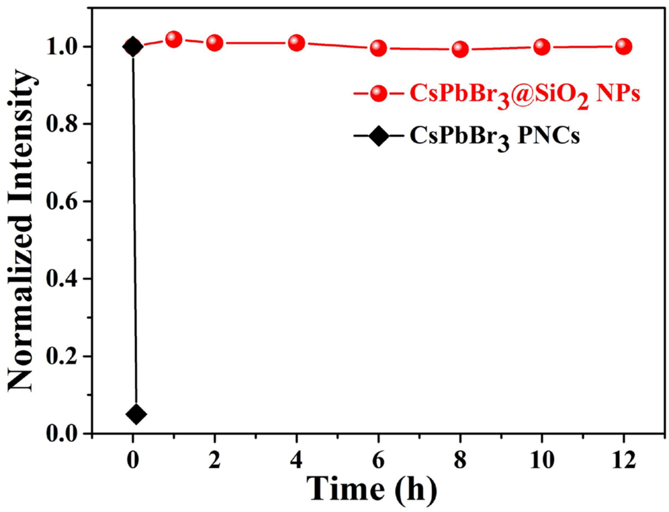

Figure S3. Stability comparation between $CsPbBr_3@SiO_2$ PNCCs and $CsPbBr_3$ PNCs in ethanol according to the fluorescence intensity.

Table S1. The fitting parameters of the decay curves for the $CsPbBr_3@SiO_2$ PNCCs with the addition of different concentration of Cl^- .

C_{Cl-}/mM	Wavelength /nm	τ_1/ns (A_1)	τ_2/ns (A_2)	τ_3/ns (A_3)	τ_{avg}/ns
0	512	0.99 (10.3%)	4.83 (24.5%)	30.33 (65.2%)	28.75
60	472	0.96 (17.5%)	4.64 (29.5%)	26.38 (53.0%)	24.18
120	457	1.03 (24.7%)	4.07 (38.0%)	19.13 (37.3%)	16.01
180	449	1.12 (20.3%)	3.79 (53.9%)	13.71 (25.7%)	9.72

Note: The PL decay curves were fitted using a triple-exponential function:

$A(t) = A_0 + A_1\exp(-t/\tau_1) + A_2\exp(-t/\tau_2) + A_3\exp(-t/\tau_3)$

Where A and τ correspond to lifetime components and relative proportion of the triple-exponential function, respectively. t is the decay time. The average lifetime (τ) is calculated as:

$\tau_{avg} = (A_1\tau_1^2 + A_2\tau_2^2 + A_3\tau_3^2) / (A_1\tau_1 + A_2\tau_2 + A_3\tau_3)$.