

A broadband optical pH sensor using upconversion luminescence

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Supplementary Information

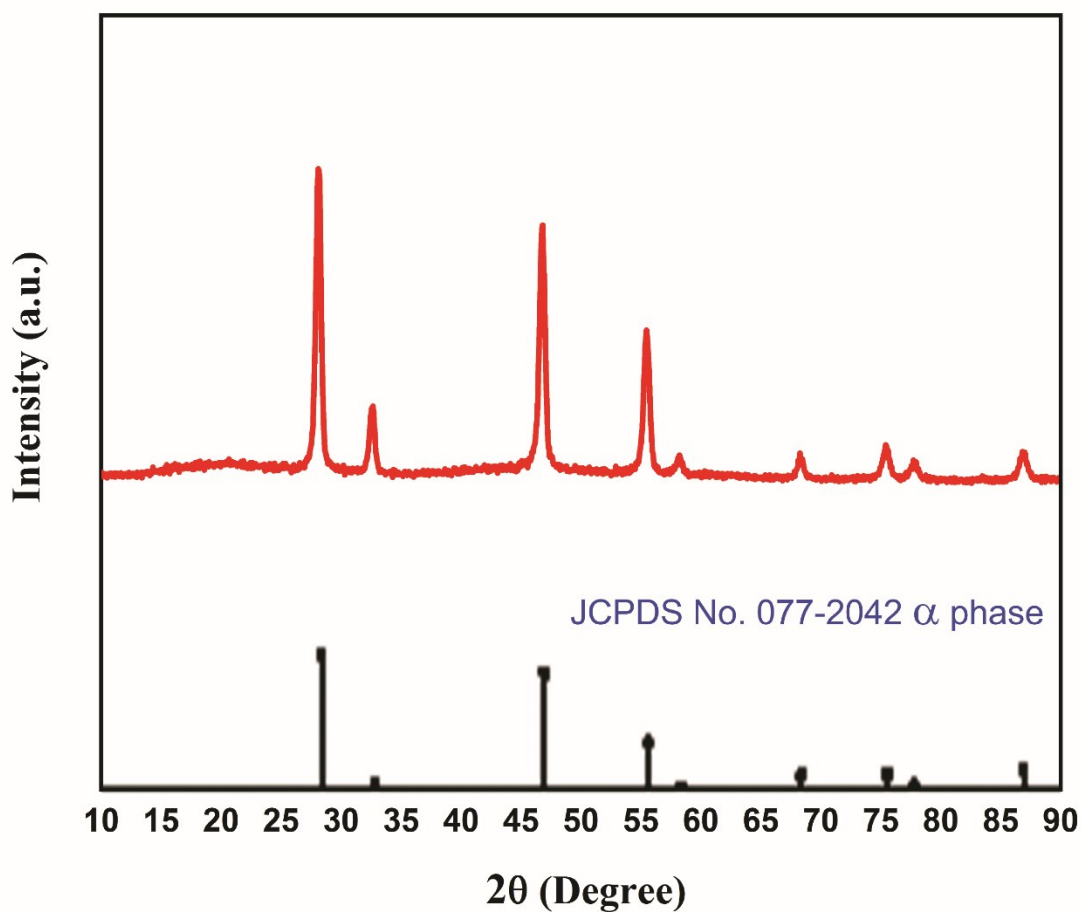


Figure S1: XRD spectra of PEI capped upconversion particles

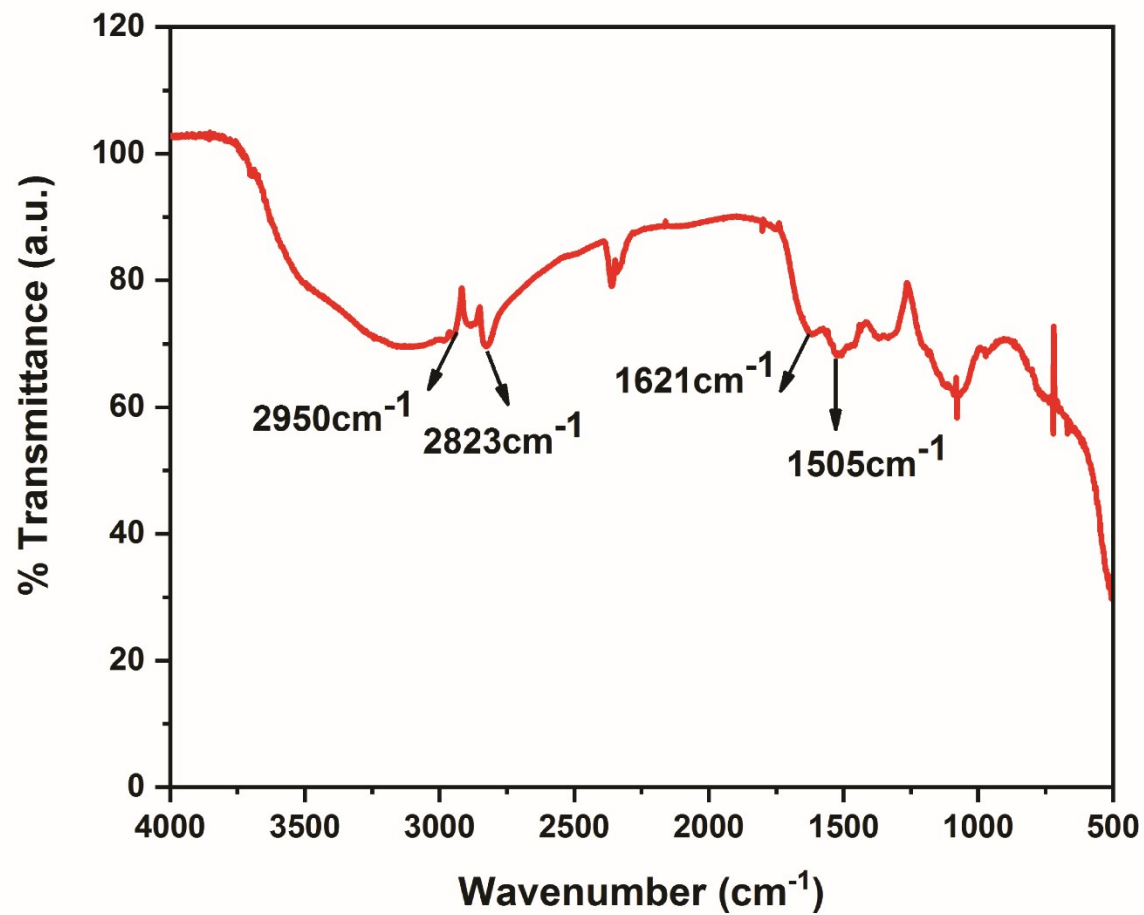


Figure S2: FT-IR spectra of PEI capped upconversion particles

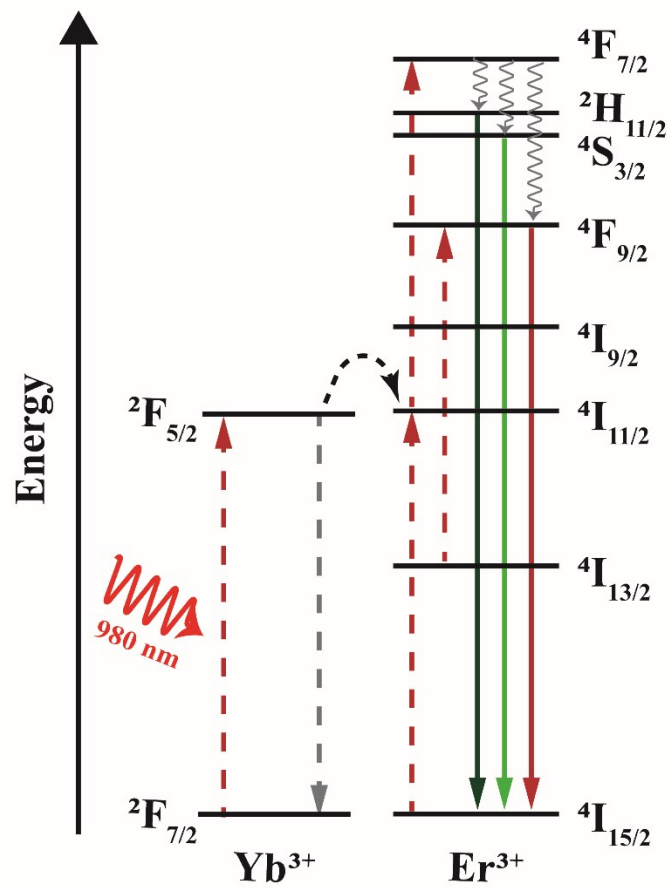


Figure S3: Energy level diagram of $\text{Yb}^{3+}/\text{Er}^{3+}$ ions

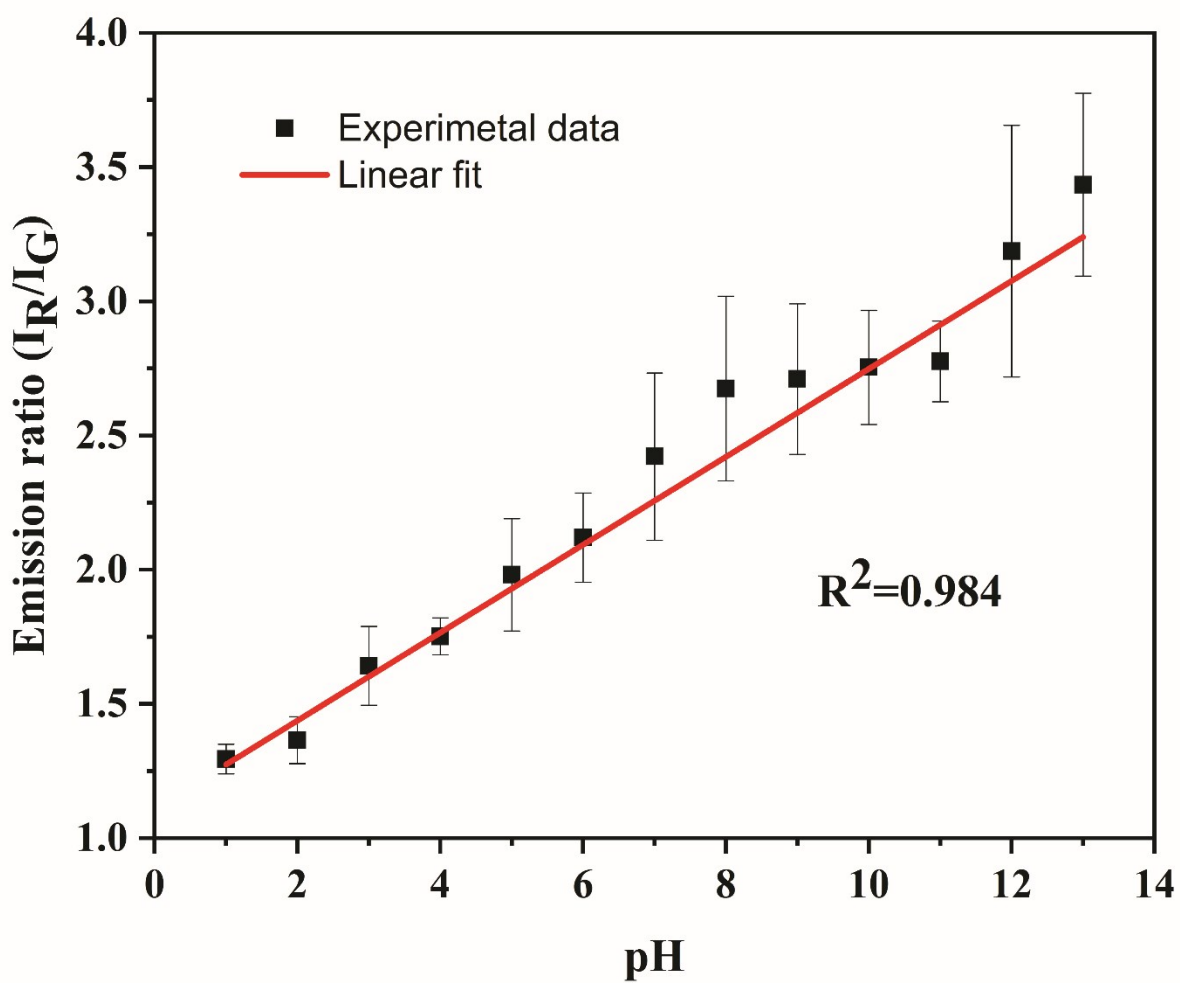


Figure S4: Red/Green emission ratio of the trapped particle in the chamber at different pH

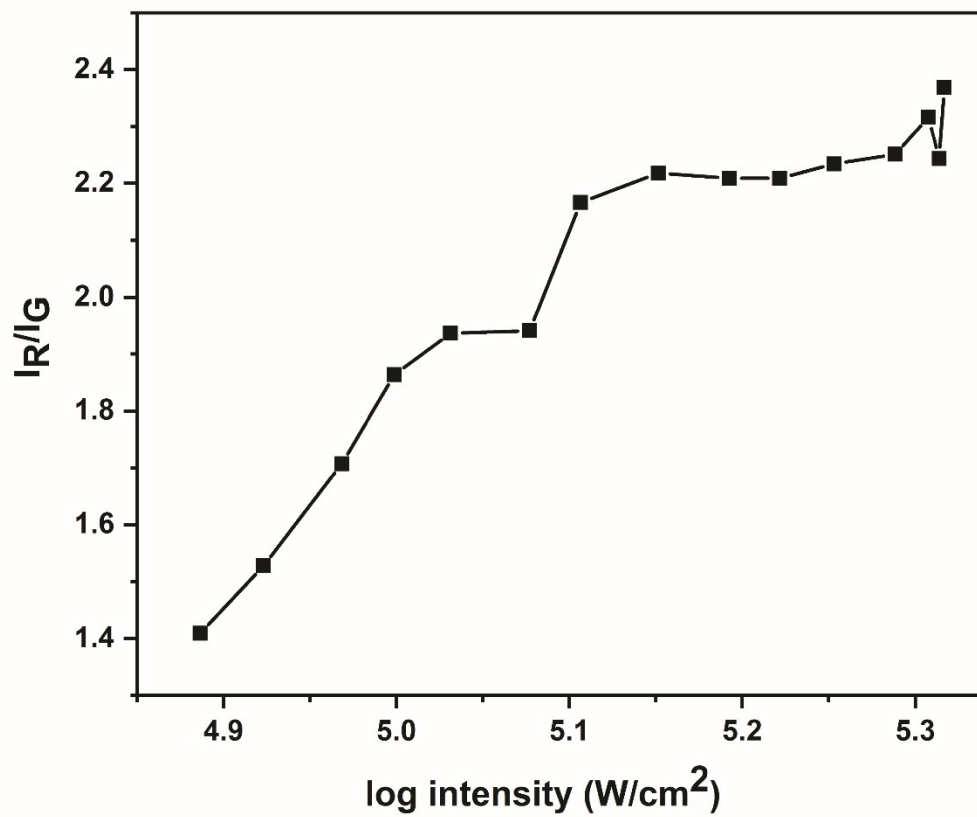


Figure S5: Red/Green emission ratio of the trapped particle at different excitation intensities

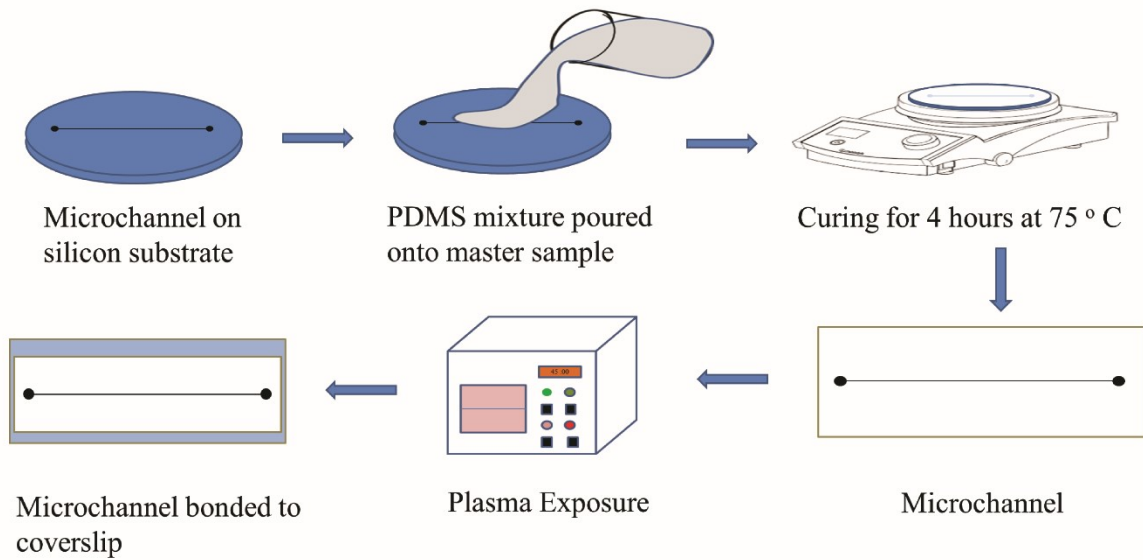


Figure S6: Microfluidic channel fabrication method

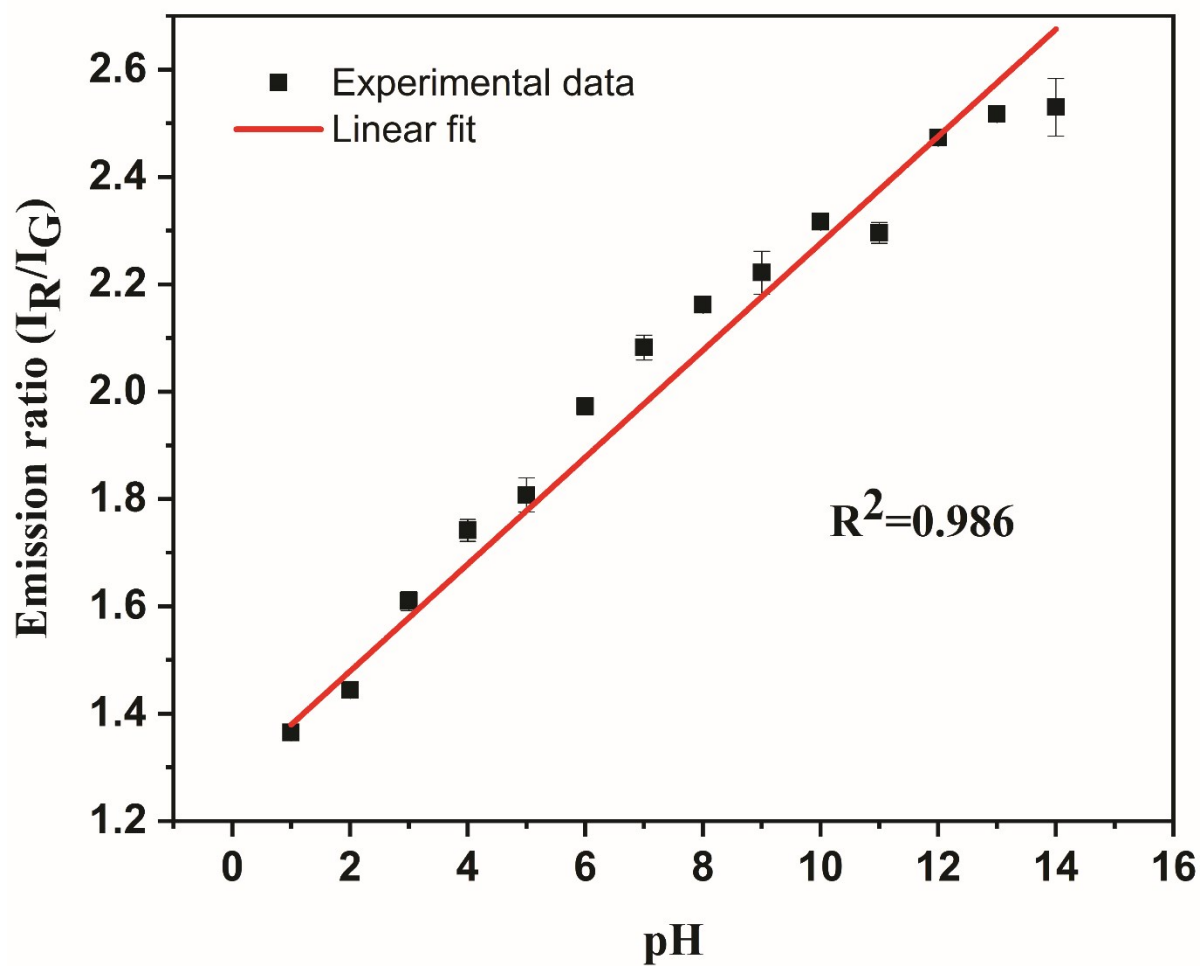


Figure S7: Red/Green emission ratio of the sample trapped in the microfluidic channel at different pH

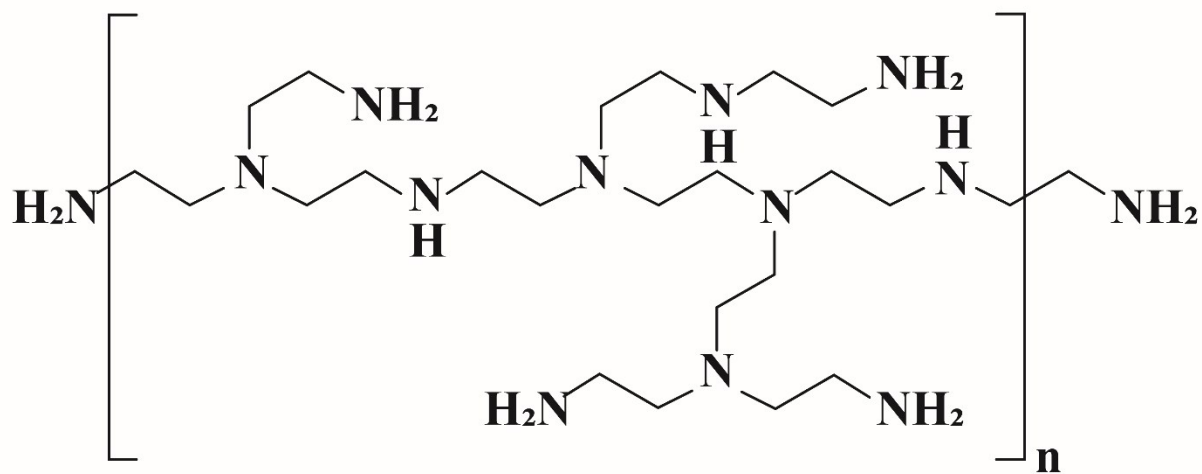


Figure S8: Structure of branched polyethylenimine (PEI)

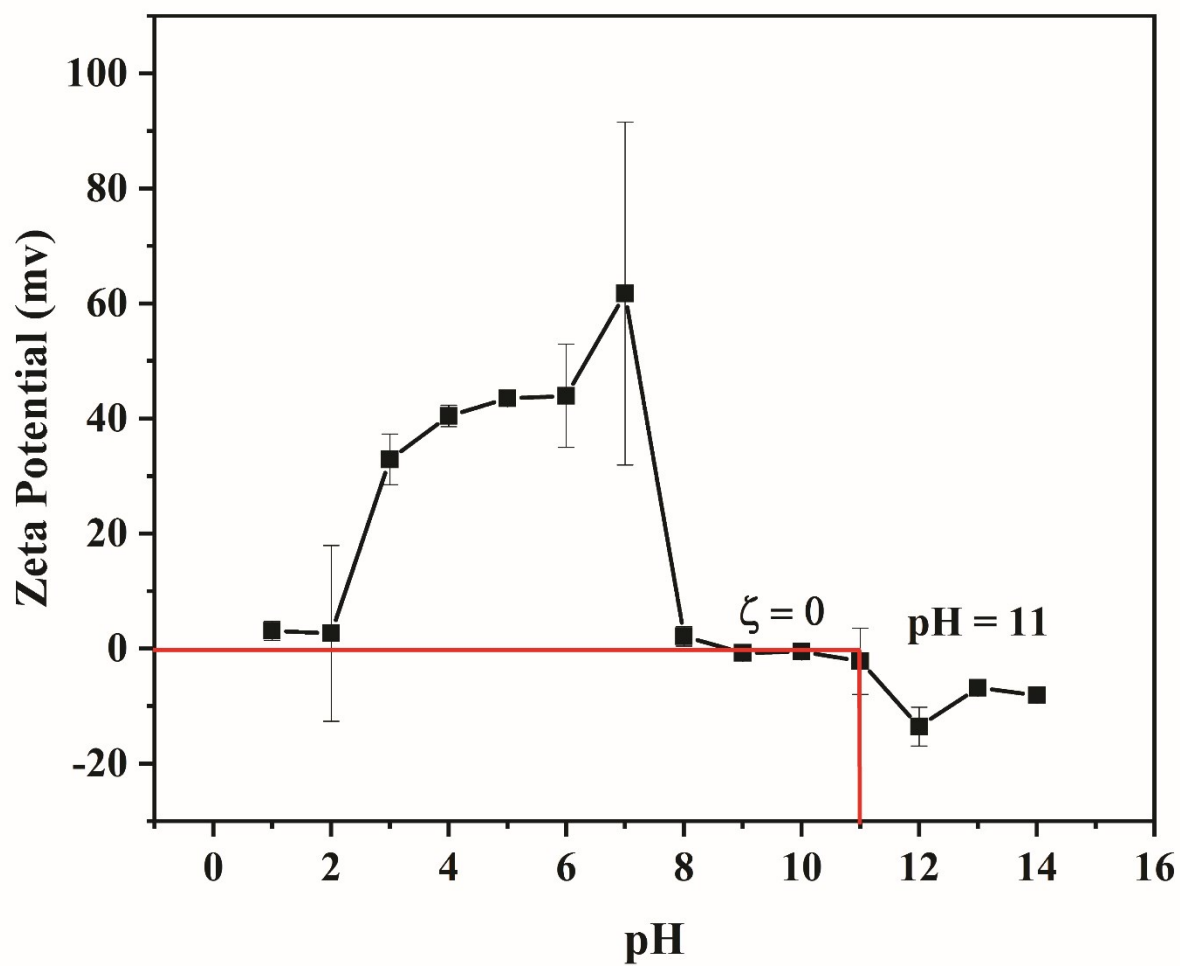


Figure S9: Zeta potential value of NaYF₄: Yb, Er at different pH

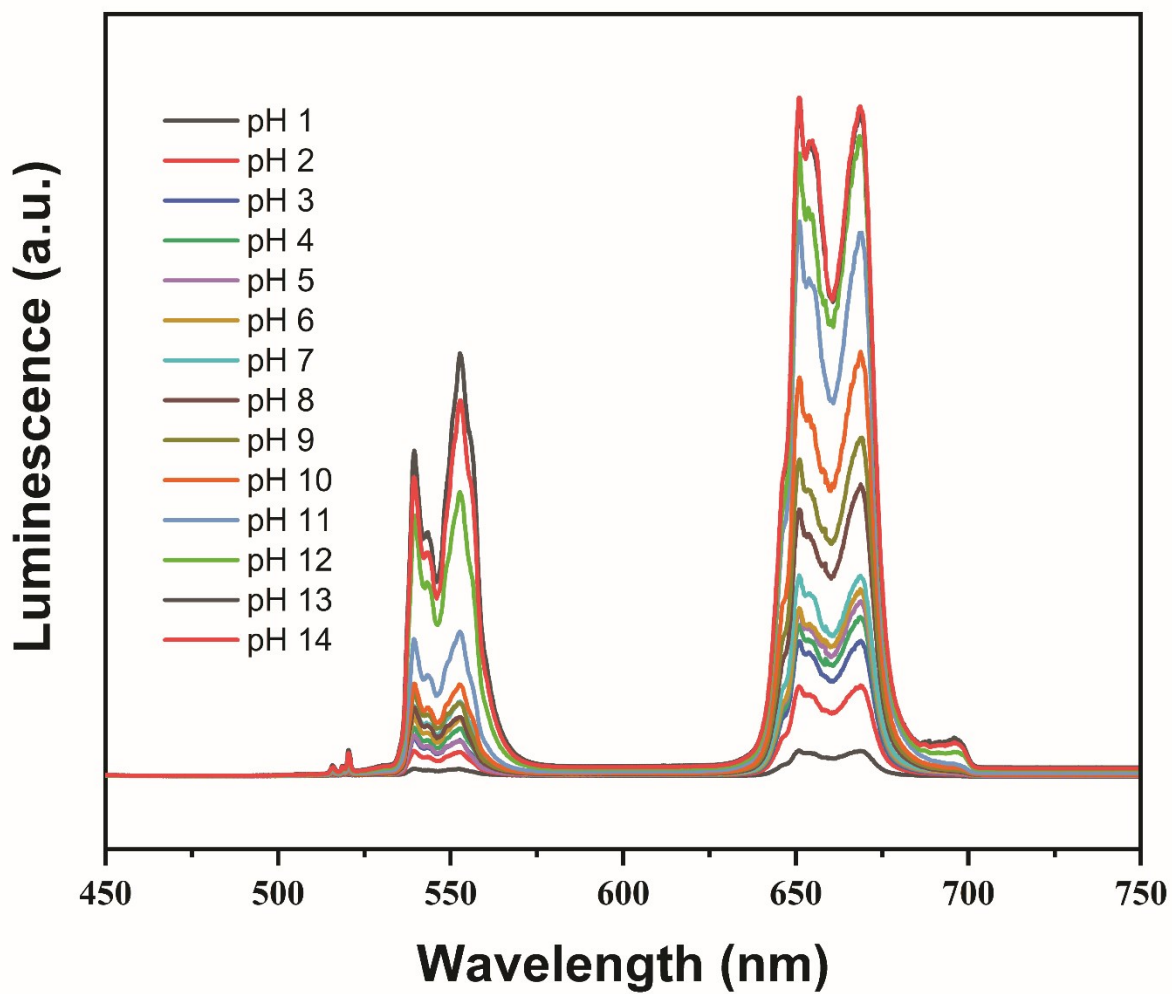


Figure S10: Upconversion luminescence spectrum of without trapping NaYF₄: Yb,Er particle at different pH

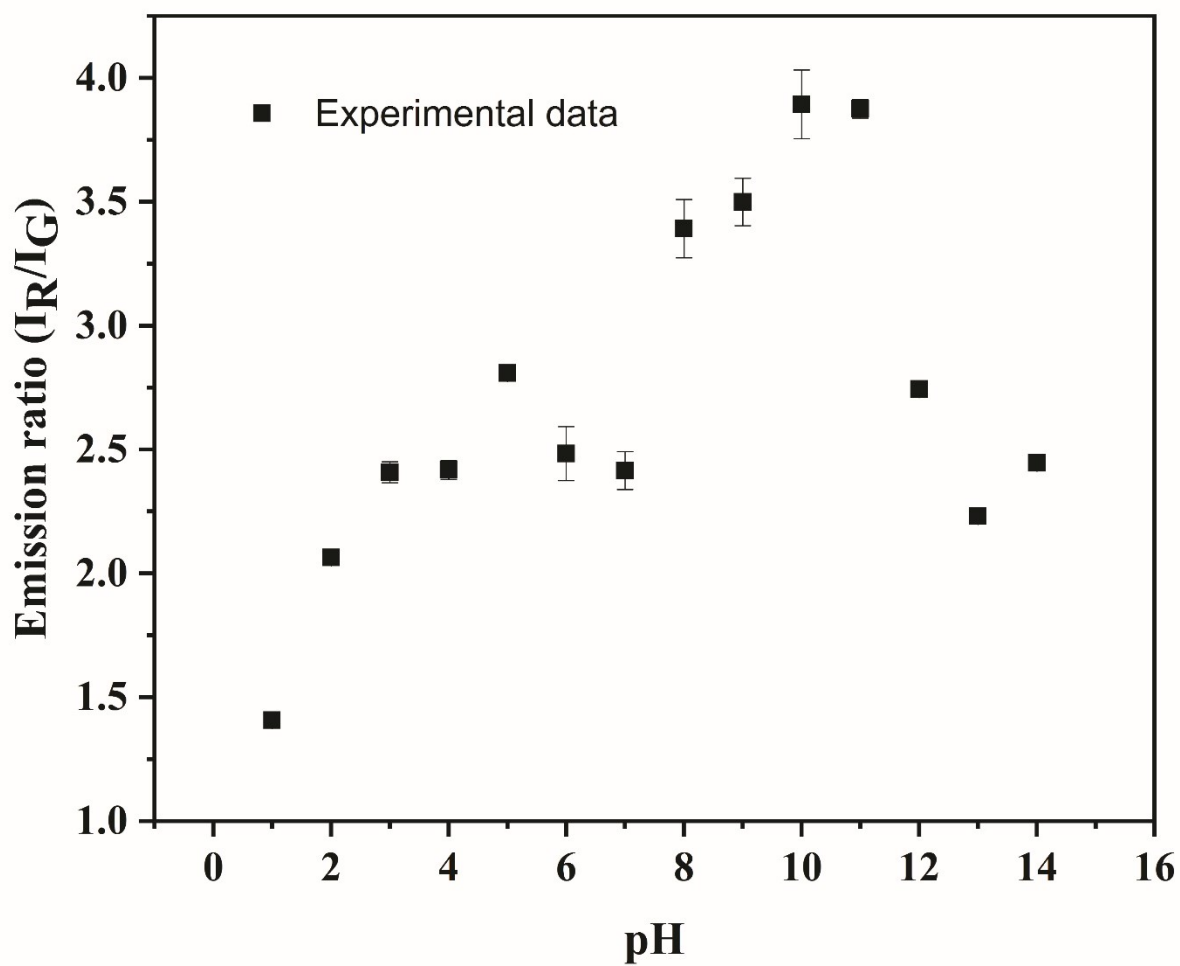


Figure S11: Red/Green emission ratio of the sample without trapped in the chamber at different pH