

Supplementary Information

A novel and sensitive ratiometric fluorescent quantum dot-based biosensor for alkaline phosphatase detection in biological samples via inner-filter effect

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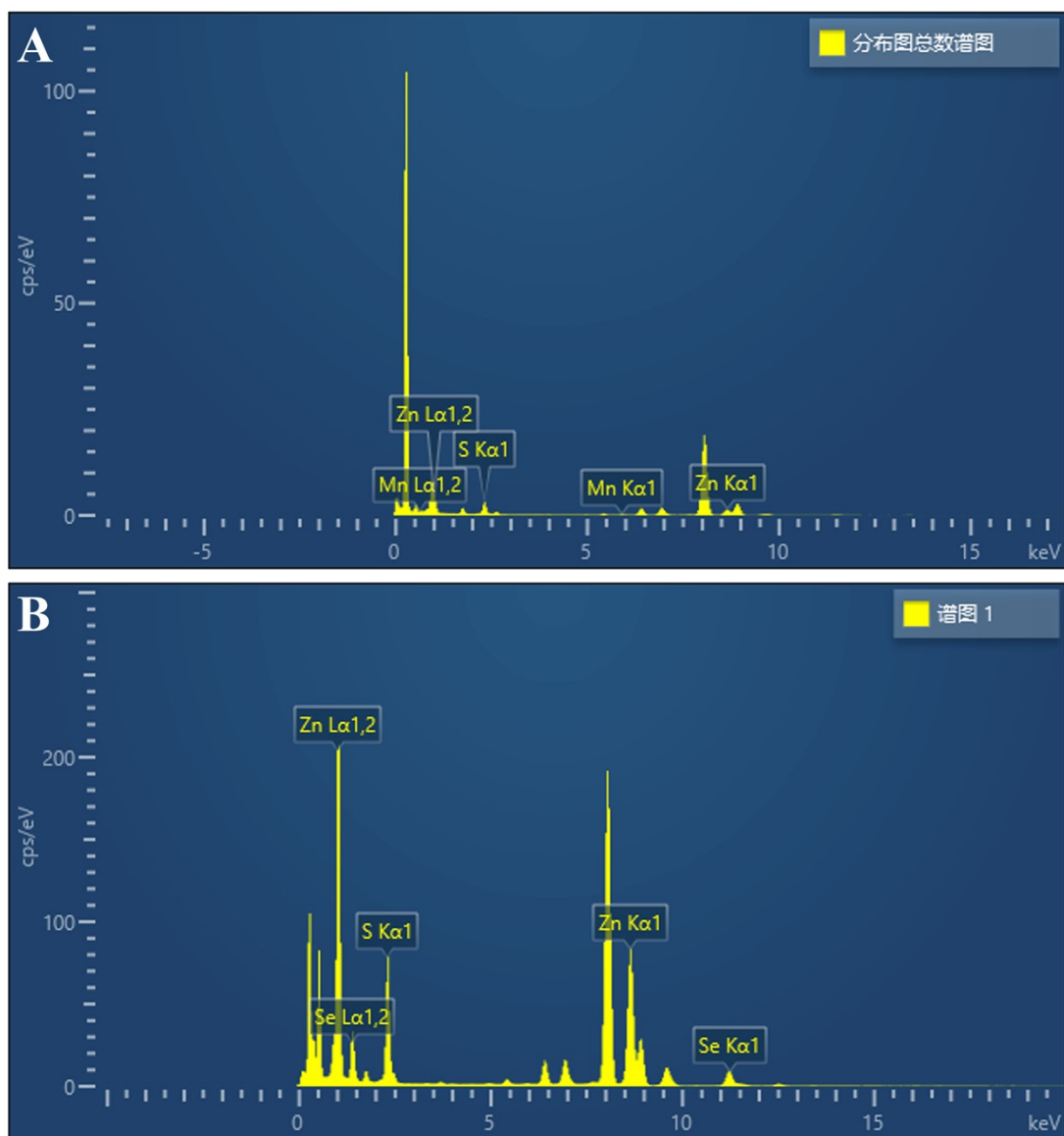


Fig.S1 The EDS spectra of oil-dispersible Mn:ZnS QDs (A) and ZnSe@ZnS QDs (B).

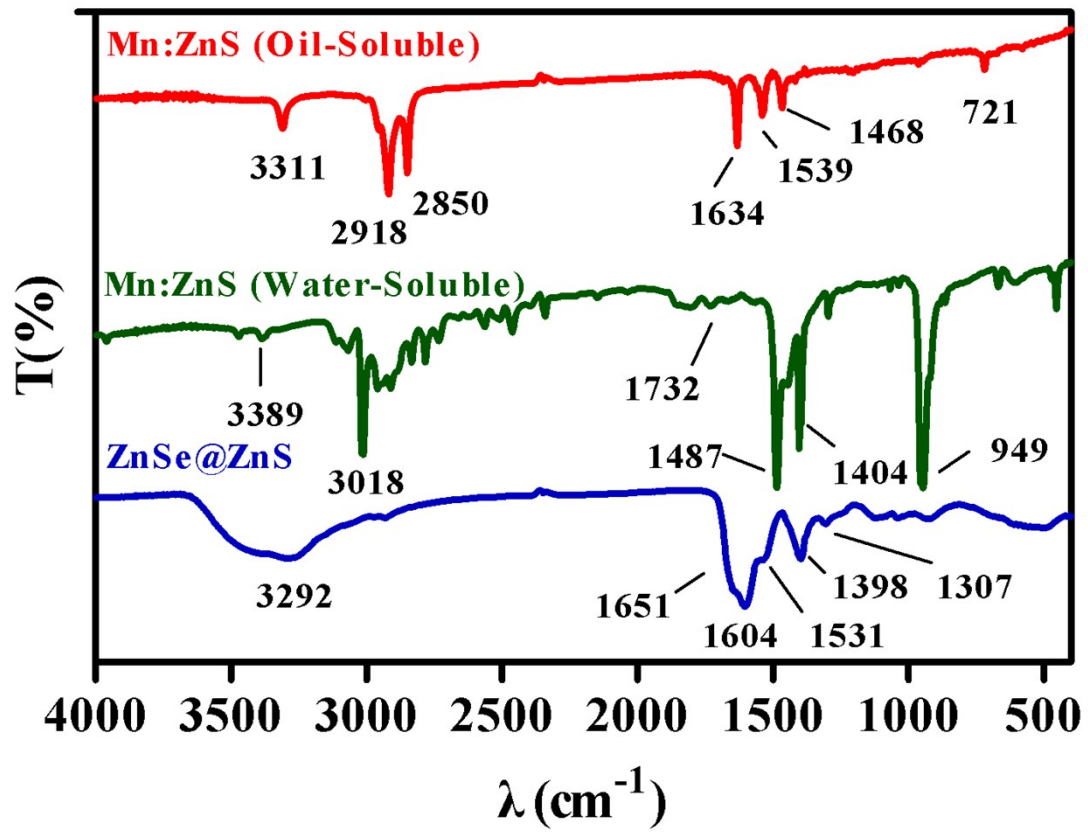


Fig.S2 The FTIR spectra of Mn:ZnS QDs and ZnSe@ZnS QDs.

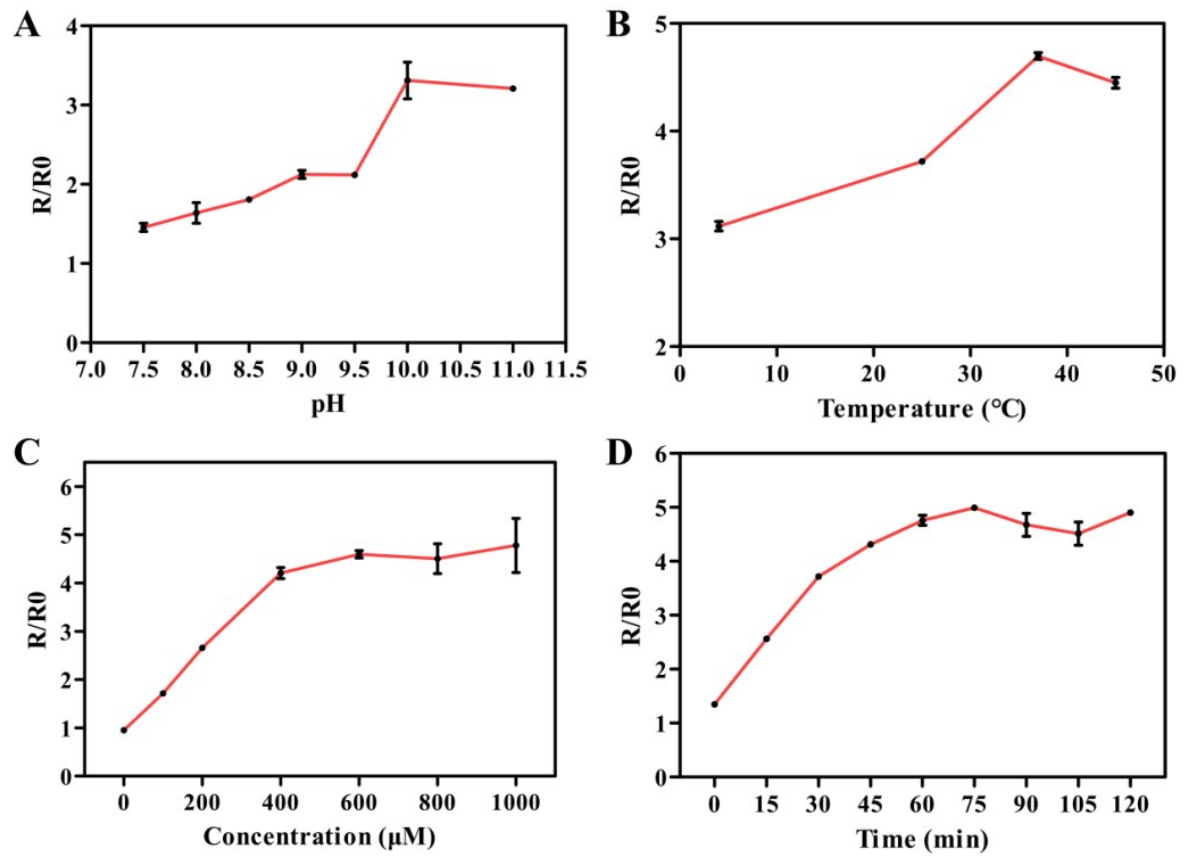


Fig.S3 The optimization of condition for ALP activity detection. The effects of pH of incubation buffer (A), temperature (B), concentration of PNPP in incubation buffer (C) and incubation time (D) on R/R0 was investigated, respectively. R and R0 are the values of F_{585}/F_{405} in the presence and absence of ALP, respectively.

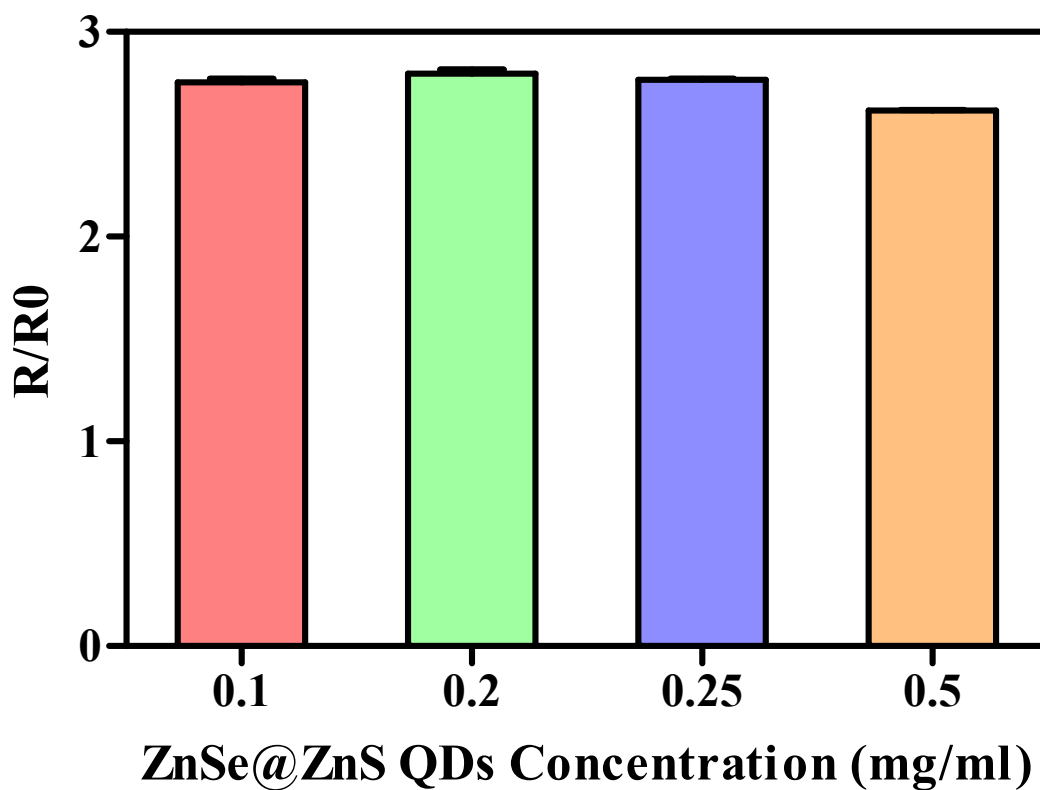


Fig.S4 The influence of the ratio of Mn:ZnS QDs to ZnSe@ZnS QDs on the detection signals. The concentration of Mn:ZnS QDs was fixed at 10 mg/ml while the concentration of ZnSe@ZnS QDs changed from 0.1 mg/ml to 0.5 mg/ml. The ALP activity of samples was set at 100 U/L. R and R0 are the values of F585/F405 in the presence and absence of ALP, respectively.

Table S1. Calculation of fluorescence quantum yield of Mn:ZnS QDs

	Refractive Index (25 °C)	OD (275 nm)	I (450-700 nm)	Φ
Rhodamine 6G	1.383 (Ethyl Alcohol)	0.048	688703	0.95
Mn:ZnS QDs (Oil-Soluble)	1.372 (n-Hexane)	0.037	181333	0.33
Mn:ZnS QDs (Water-Soluble)	1.332 (Water)	0.018	81386	0.27

Table S2. Calculation of fluorescence quantum yield of ZnSe@ZnS QDs

	Refractive Index (25 °C)	OD (310 nm)	I (310-450 nm)	Φ
L-Tryptophan	1.332 (Water)	0.069	260741	0.14
ZnSe@ZnS QDs	1.332 (Water)	0.033	218793	0.25

Table S3. Comparison of performance of different analytical methods for ALP activity detection.

Material/Probe	Mechanism	Linear Range (U/L)	LOD (U/L)	Ref.
AgS ₂ QDs	AIE	2-100	1.28	1
CdTe/ZnS QDs	IFE	2.2-220	0.34	2
TPEPy-pY	AIE	1-1000	6.6	3
FAS-P	ESIPT	1-100	0.6	4
QMTP	AIE	0-1200	5.6	5
AgNPs	LSPR	5-70	1.1	6
CDs	IFE & SQE	5-200	1.2	7
QX-P	ICT	50-1000	17	8
CDs@Tb-GMP	IFE	0.5-80	0.13	9
Luminol-SiNPs	ECRET	5-50	0.8	10
3D origami μ PAD	IFE	5-350	3.6	11
PEI-Cu NCs	EET & FRET	1-100	0.27	12
Mn:ZnS QDs & ZnSe@ZnS QD	IFE	4-96	0.57	This work

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