Supplementary materials

Colorimetric Sensing Alkaline Phosphatase and α-Fetoprotein based on the Photoinduced Oxidase Activity of Fluorescein

Xuemei Hu, Chaoqun Sun, Ying Shi, Yijuan Long, Huzhi Zheng*

Key Laboratory of Luminescent and Real-Time Analytical Chemistry (Southwest University), Ministry of Education, College of Chemistry and Chemical Engineering, Southwest University, Beibei, Chongqing 400715, China

Corresponding author: Huzhi Zheng, E-mail: zhenghz@swu.edu.cn.

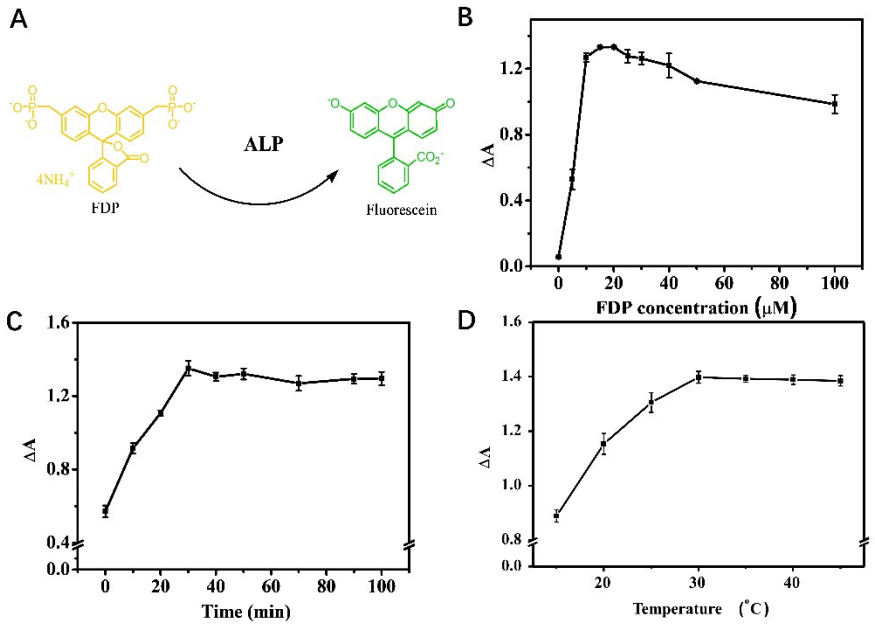

Fig. S1 Condition optimization of hydrolysis process. (A) Hydrolysis diagram of FDP. (B) Optimization of FDP concentrations. hydrolysis time, 40 min; hydrolysis temperature, 35℃. (C) hydrolysis time. FDP, 20 μM; hydrolysis temperature, 35℃. (D) hydrolysis temperature. FDP, 20 μM; hydrolysis time, 40 min. $\Delta A=A-A_0$, where A and A_0 represents the absorbance at 652 nm in the presence and absence of 50 mU/mL ALP, respectively. TMB, 0.80 mM; illumination time, 40 min; hydrolysis buffer, pH 8.0 Tris-HCl; chromogenic buffer, pH 4.0 HAc-NaAc. The error bars represent the standard deviation of three measurements.

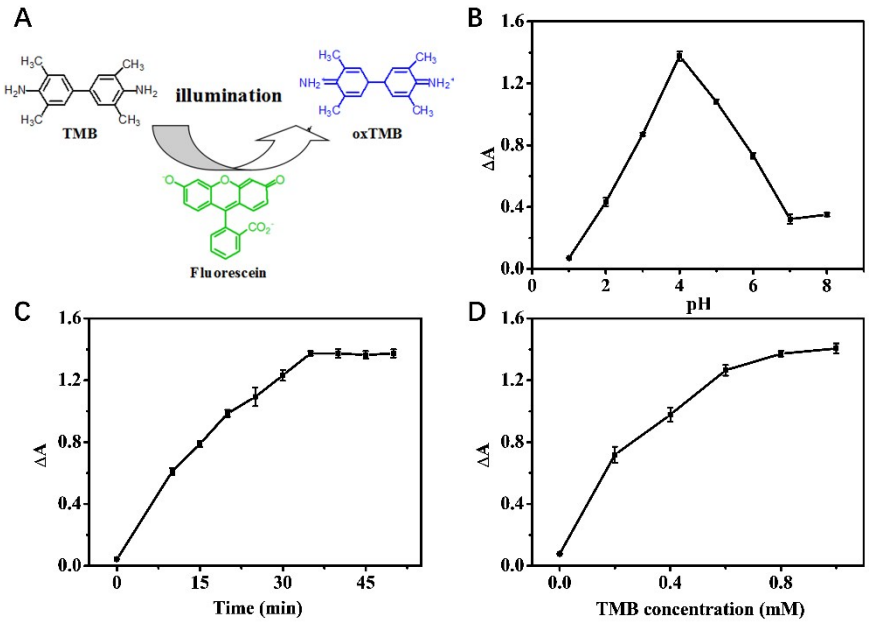

Fig. S2 Condition optimization in the process of catalytic chromogenic reaction. (A) Photoinduced TMB color change diagram; (B) optimization of pH; TMB, 0.80 mM; illumination time, 40 min. (C) optimization of illumination time; TMB, 0.80 mM; chromogenic buffer, pH 4.0 HAc-NaAc; (D) optimization of TMB concentrations. illumination time, 40 min; chromogenic buffer, pH 4.0 HAc-NaAc. $\Delta A=A-A_0$, where A and A_0 represents the absorbance at 652 nm in the presence and absence of 50 mU/mL ALP, respectively. FDP, 20 μM; hydrolysis time, 40 min; hydrolysis temperature, 35℃; hydrolysis buffer, pH 8.0 Tris-HCl. The error bars represent the standard deviation of three measurements.

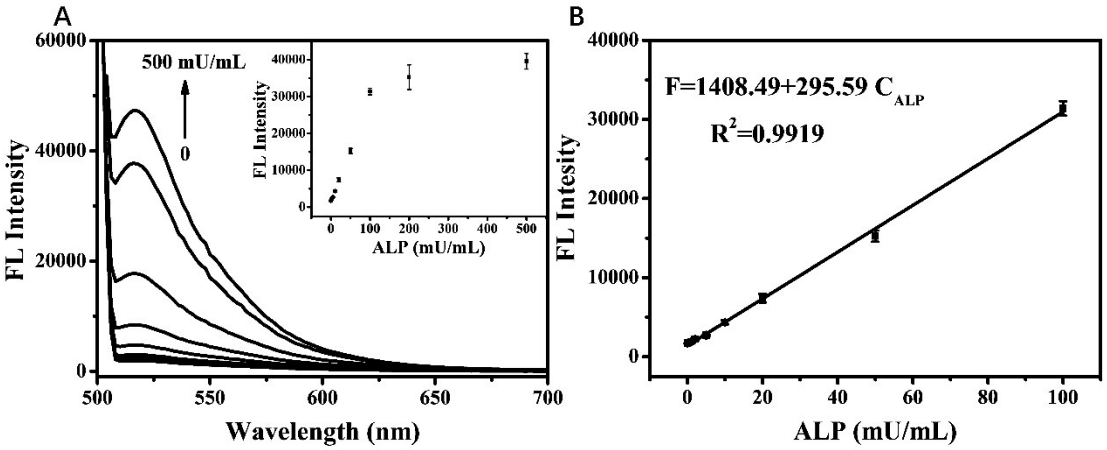

Fig. S3 Conventional fluorescence method to measure different concentrations of ALP (0, 1, 2, 5, 10, 20, 50, 100, 200 mU/mL); Experimental conditions for the enzymatic reaction: FDP, 20 μM; hydrolysis time, 40 min; hydrolysis temperature, 35°C; hydrolysis buffer, pH 8.0 Tris-HCl; Ex: 480 nm, Em: 530 nm. The error bars represent the standard deviation of three measurements

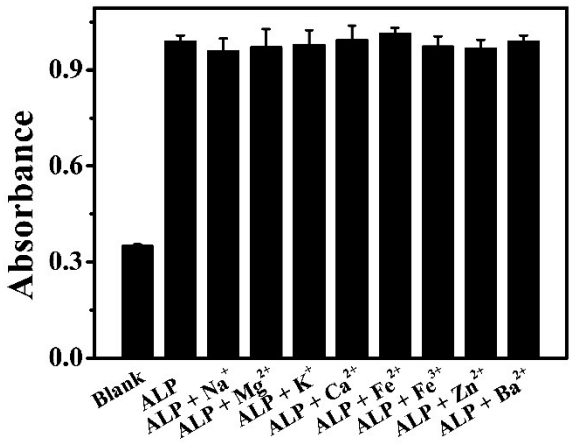

Fig. S4 Effects of coexisting inorganic salt ions on the sensing of ALP. Experimental conditions for the reaction: FDP, 20 μM; ALP, 20 mU/mL; other inorganic salt ions (Na^+, Mg^{2+}, K^+, Ca^{2+}, Fe^{2+}, Fe^{3+}, Zn^{2+} and Ba^{2+}, 10 μM). The error bars represent the standard deviation of three measurements.

Table S1 Comparison of the current work other reported methods for the detection of ALP.

Method	Sensing system	Detection range(mU/mL)	LOD (mU/mL)	Ref.
Chemiluminescence	CSPD substrate	0.01-10	0.01	[1]
Fluorometry	CdS QDs	0-50	0.5	[2]
Fluorometry	TPDA-PPI	0-200	0.09	[3]
Colorimetry	AuNPs/ATP	100-600	10	[4]
Colorimetry	AuNPs/ATP/Ca^{2+}	5-100	0.1	[5]
	AuNPs/ATP/Pb^{2+}	0.2-20	0.1	
Colorimetry	Redox active nanoceria	0.04-2	0.04	[6]
Colorimetry	Calcein-Ce^{3+}	0.1-0.4 0.4-1.2	0.023	[7]
Colorimetry	FDP-ALP-TMB	0.2-80	0.18	This work

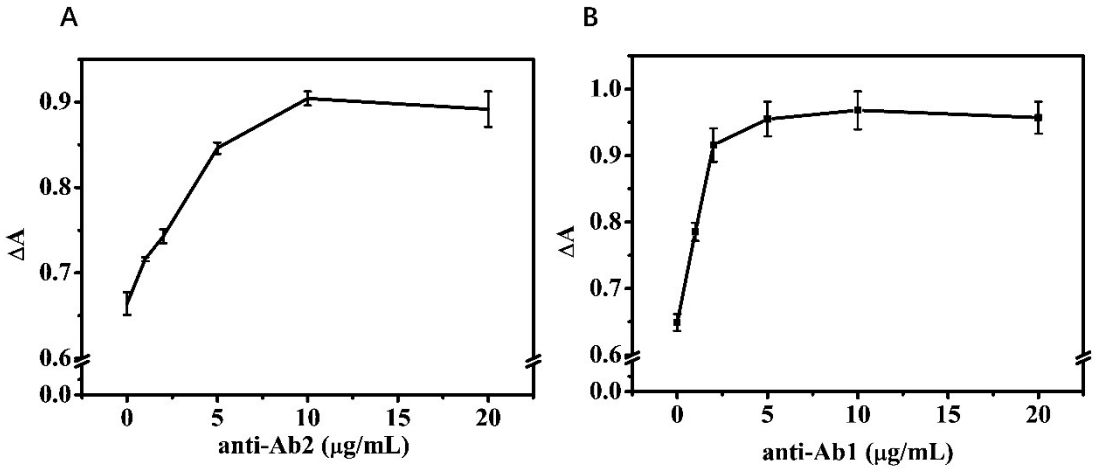

Fig. S5 Optimizing of AFP anti-Ab2 and anti-Ab1 concentrations for ELISA. (A) Optimization of anti-Ab2 concentrations. anti-Ab1, 5 μg/mL; AFP, 20 ng/mL. (B) Optimization of anti-Ab1 concentrations. anti-Ab2, 10 μg/mL; Other conditions are the optimized conditions for the reaction. $\Delta A=A-A_0$, where A and A_0 represents the absorbance at 652 nm in the presence and absence of AFP, respectively. The error bars represent the standard deviation of three measurement.

Table S2 Comparasion of our AFP detection method with other methods.

Method	Sensing system	Detection range(ng/mL）	LOD (ng/mL)	Ref.
Chemiluminescence	Luminol-H_2O_2-HRP-PBP	0.1−5.0	0.01	[8]
Immunochromatography	QD-based ICTS	—	1.0	[6]
Fluorescence-anisotropy	Methylene blue-doped SiNPs	1.9−51.9	—	[9]
Fluorometry	Calcein-Ce^{3+}	0.2−1.0, 1.0−4.0	0.041	[7]
Colorimetry	silver nanoparticles	1−100	0.23	10
Colorimetry	SA-HRP-Cu-3(PO_4) (2) hybrid nanoflowers	0.1-50	0.078	[11]
Colorimetry	FDP-ALP-TMB	0.5-50	0.2	This work

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