

Supporting information

**Responsive methylene blue releasing from lanthanide coordination polymer for label-free, immobilization-free and sensitive electrochemical alkaline phosphatase activity assay**

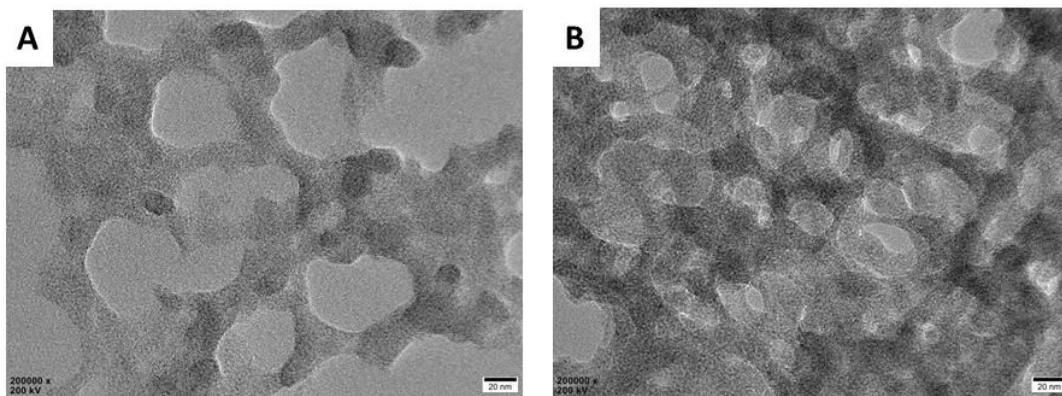
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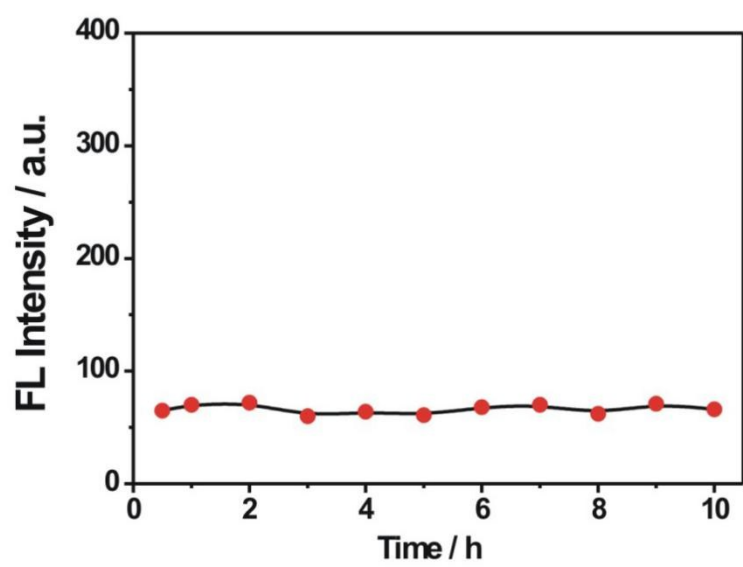
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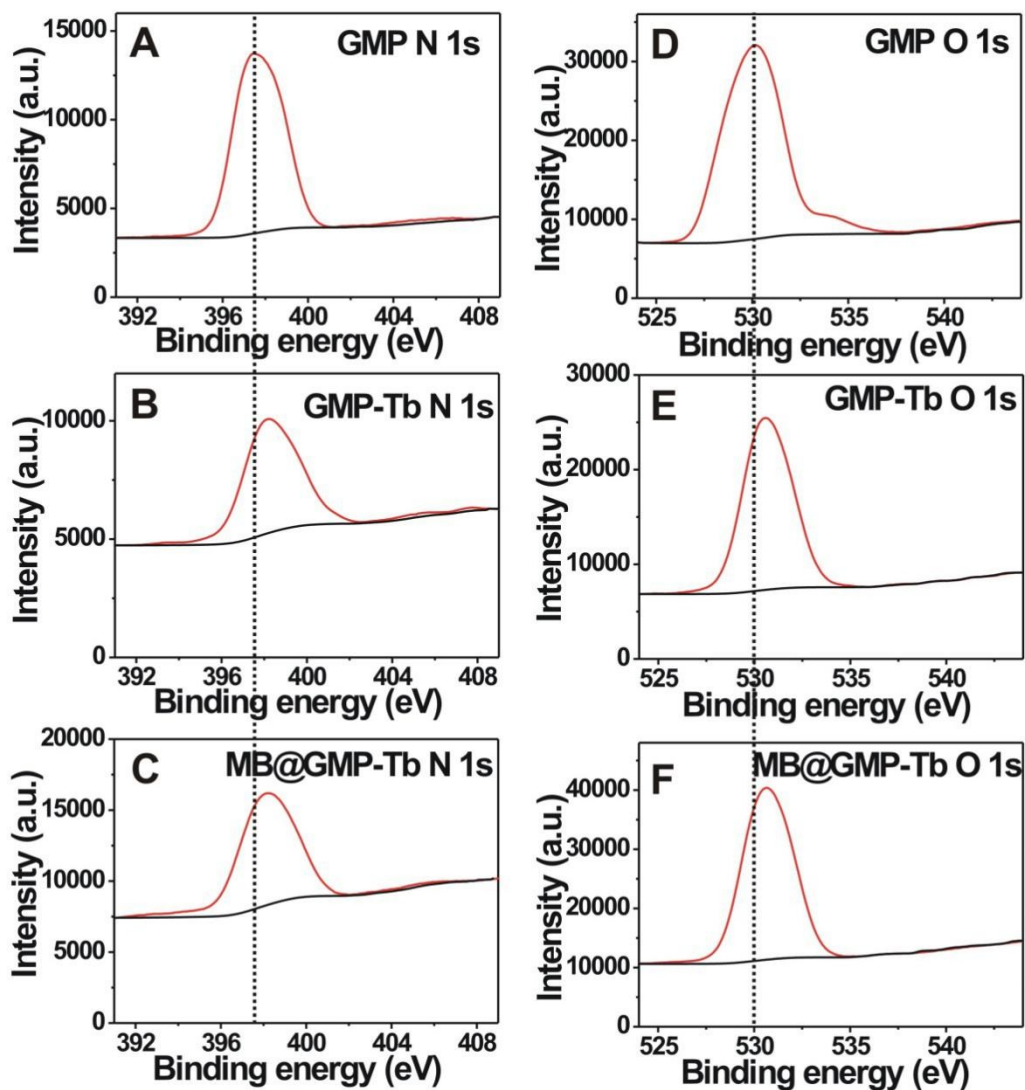
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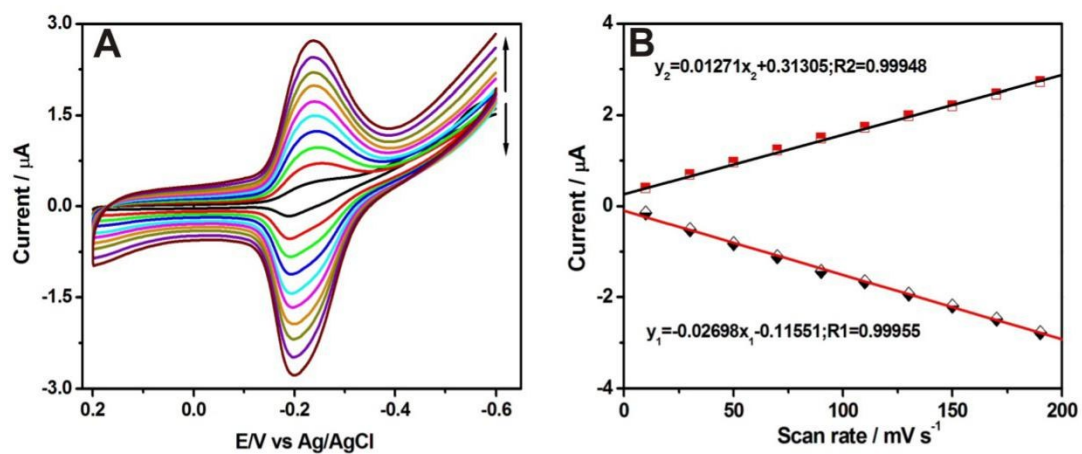
**Figure S1.** High-resolution TEM images of GMP-Tb (A) and MB@GMP-Tb (B) coordination polymer



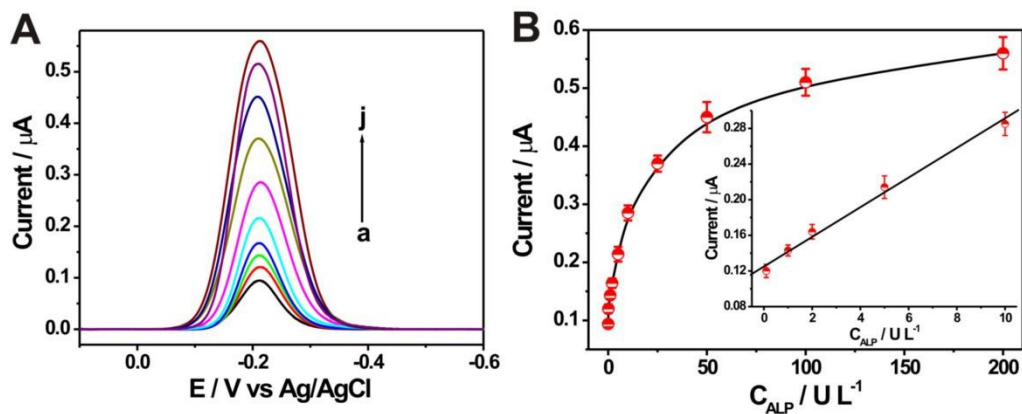
**Figure S2.** The fluorescence intensity of MB@GMP-Tb at 682 nm versus time.



**Figure S3.** The N 1s (A, B, C) and O 1s (D, E, F) binding energy of GMP, GMP-Tb, and MB@GMP-Tb.



**Figure S4.** (A) Cyclic voltammograms obtained in the presence of 2.0 U/mL ALP at various scan rates from 10 mV/s to 190 mV/s. (B) The plots of anodic and cathodic peak currents vs scan rates.



**Figure S5.** (A) SWV responses corresponding to different concentrations of ALP. The electrochemical measurements were conducted in 50 mM Tris-HCl buffer (pH 8.0, 1 mM  $\text{MgCl}_2$ ) after ALP-treated MB releasing from MB@GMP-Tb and successive MB enrichment onto the dodecanethiol monolayer-assembled electrode. The curves from a to j for ALP concentrations were 0, 0.1, 1, 2, 5, 10, 25, 50, 100 and 200 U/L, respectively. (B) Calibration curve between the SWV peak currents and ALP concentrations. Inset shows the linear relationship between the SWV peak current and the ALP concentration (0.1 to 10 U/L).

**Table S1.** Detection performance comparison toward ALP by current method with these reported methods

Method	Linear range(U/L)	LOD (U/L)	Strategy	Ref.
Fluorescence	25-200	10	Responsive infinite coordination polymer	1
Fluorescence	1-400	0.4	Au-NPs@GMP-Tb core-shell nanoparticles	2
Fluorescence	10-2500	3.3	Infinite coordination polymer nanoparticles (CyOH@Tb-GMP)	3
Fluorescence	0.01-10	0.01	Chromogenic interaction of diethanolamine with 4-aminophenol	4
Fluorescence	None	18	Aggregation and deaggregation of tetraphenylethylenemolecules	5
Fluorescence	4.6-383.3	1.4	Aggregation and disaggregation of carbon quantum dots	6
Fluorescence	None	100	Betaine-modified polyethylenimine via excimer/monomer conversion	7
Fluorescence	3.4-100	0.9	$\beta$ -cyclodextrin-modified carbon quantum dots	8
Fluorescence	0-220	0.27	Fluorescence quenching	9
Fluorescence	2.5-45	0.4	Nitrogen-doped Carbon Dots	10
Fluorescence	0-10	0.47	Target-promoted exponential strand displacement	11
Colorimetry	None	1000	Unmodified silver nanoparticles	12
Colorimetry	None	8000	Non-crosslinking gold nanoparticle aggregation	13
Colorimetry	0-200	1.25	Cu(II)-phenanthroline complex	14
Colorimetry	0-50	2.3	phosphate anion-quenched oxidase-mimicking activity of Ce(IV) ions	15
Electroluminescence	2-25	2	CdSe nanoparticles	16
Electrochemistry	1-500	0.5	Phosphate ions induced deposition of redox precipitates	17
Electrochemistry	None	20	Nanoceria particles as catalytic amplifiers	18
Electrochemistry	0.5-20 or 0.1-10	0.5 or 0.1	Stimulus responsive MB releasing from lanthanide coordination polymer	This work

**Table S2.** Recovery experiments of ALP in diluted human serum using the proposed method

<b>Samples</b>	<b>Added ALP (U/L)</b>	<b>Detected ALP (U/L)</b>	<b>Recovery (%)</b>
1	0	$1.97 \pm 0.15$	/
2	5	$7.23 \pm 0.53$	105
3	10	$12.27 \pm 0.76$	103
4	15	$16.57 \pm 0.92$	97

The recovery rate was obtained based on the ratio of the detected ALP value (after deduction of the original ALP value in the diluted serum) to the added ALP value.



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