

Supporting Information

Chimeric Aptamers-Based and MoS₂ Nanosheet-Enhanced Label-Free Fluorescence Polarization Strategy for Adenosine Triphosphate Detection

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Table S1. Sequences of DNA used in this study

Berberine binding-aptamer (BBA)	5'-AACATAAATATTTAAATTATGT-3'
ATP binding-aptamer (ABA)	5'-ACC TGG GGG AGT ATT GCG GAG GAA GGT-3'
BBA-ABA	5'-AACATAAATATTTAAATTATGTAACCTGGGGGA GTATTGCGGAGGAAGGT-3'
BBA-3T-ABA	5'-AACATAAATATTTAAATTATGTTTTAACCTGGGG GAGTATTGCGGAGGAAGGT-3'
BBA-9T-ABA	5'-AACATAAATATTTAAATTATGTTTTTTTTAACCT GGGGGAGTATTGCGGAGGAAGGT-3'
BBA-15T-ABA	5'-AACATAAATATTTAAATTATGTTTTTTTTTTTTTT AACCTGGGGGAGTATTGCGGAGGAAGGT-3'
BBA-21T-ABA	5'-AACATAAATATTTAAATTATGTTTTTTTTTTTTTT TTTTTTAACCTGGGGGAGTATTGCGGAGGAAGGT-3'
BBA-27T-ABA	5'-AACATAAATATTTAAATTATGTTTTTTTTTTTTTT TTTTTTTTTTTTTTAACCTGGGGGAGTATTGCGGAGGAAGGT-3'

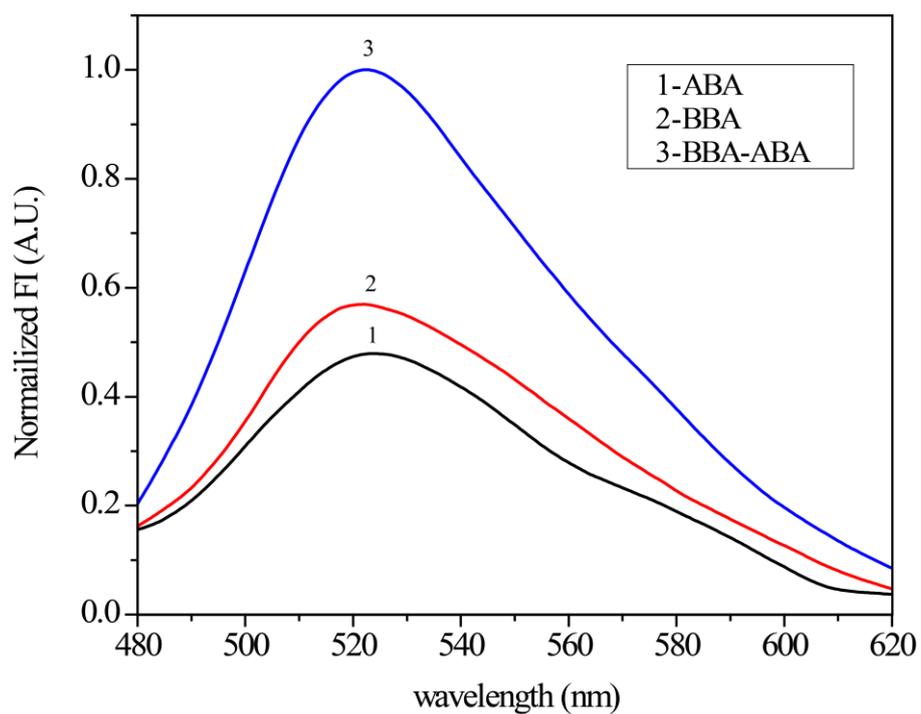


Figure S1. Fluorescence spectra of 40 μ M berberine with ABA (400 nM), BBA (400 nM) and BBA-ABA (400 nM), respectively.

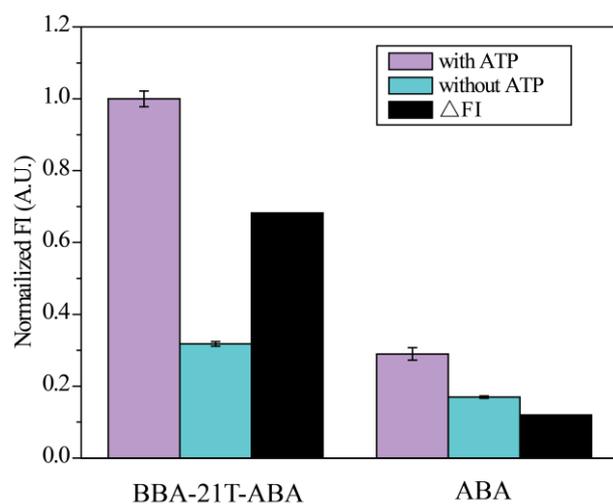


Figure S2. The effects of BBA-21T-ABA(400 nM) and ABA (400 nM) on fluorescence intensity of berberine (40 μM) with Exo I (12U), in the absence and presence of ATP (106.7 μM), respectively.

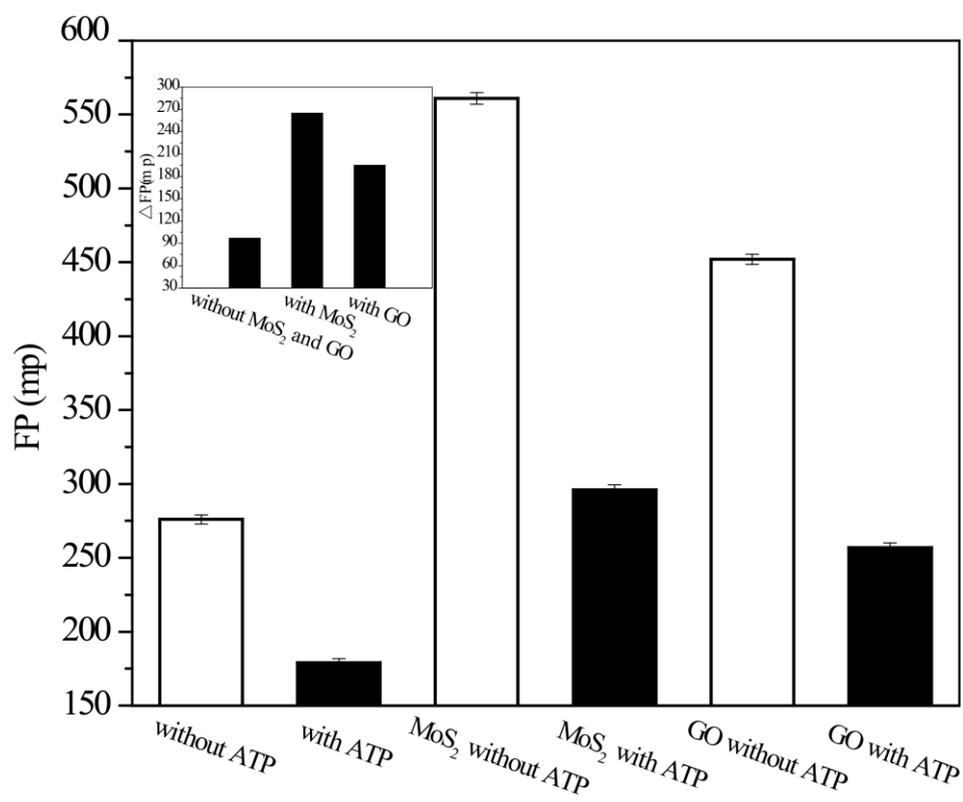


Figure S3. The enhancement effects of MoS₂ (5.33 μg mL⁻¹) and GO (5.33 μg mL⁻¹) on fluorescence polarization (FP) values of berberine (40 μM) with DNA (400 nM) and Exo I (12U), in the absence and presence of ATP (106.7 μM), respectively.

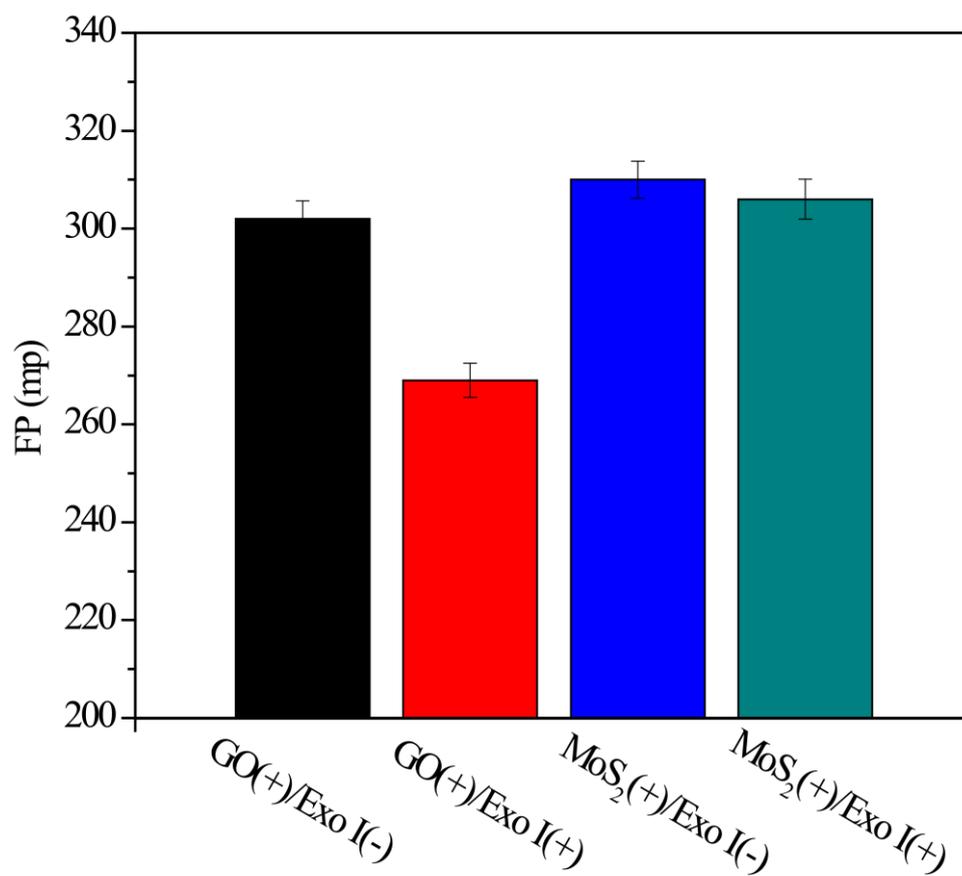


Figure S4. The effects of MoS₂ (5.33 $\mu\text{g mL}^{-1}$) and GO (5.33 $\mu\text{g mL}^{-1}$) on fluorescence polarization (FP) values of berberine (40 μM) with DNA (400 nM) in the absence and presence of Exo I (12 U), respectively. The reaction buffer contains 20 mM Tris, pH 7.6, 75 mM NaCl.

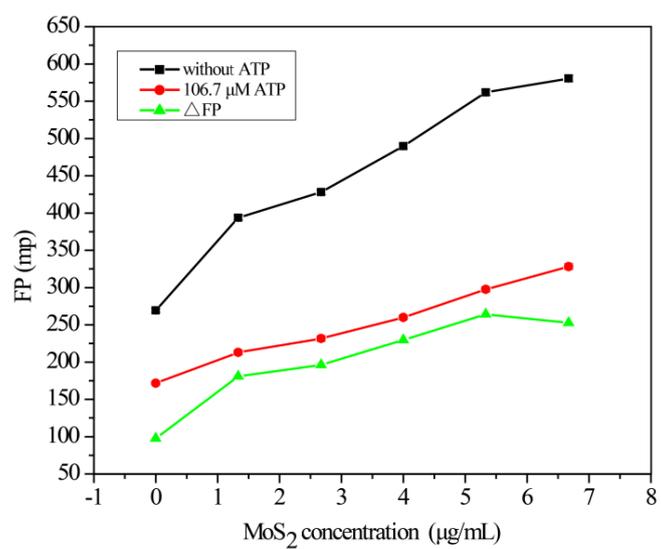


Figure S5. Optimization of MoS₂ concentration for ATP (106.7 µM) detection.

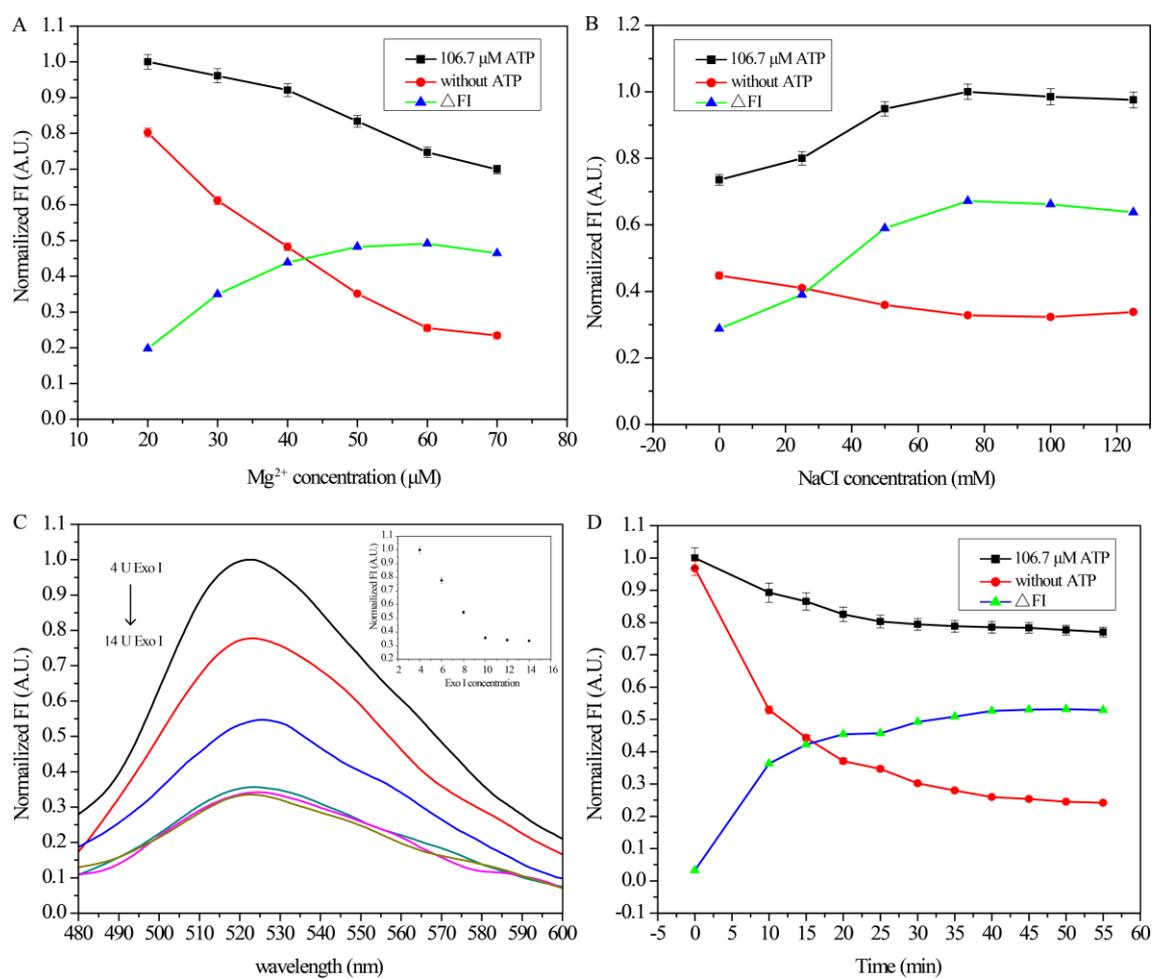


Figure S6. The affections of (A) Mg^{2+} concentration, (B) NaCl concentration, and (D) enzymatic reaction time on fluorescence intensity for ATP detection, respectively; (C) Fluorescence spectra of the complex of berberine and DNA in the various enzymatic concentration (4 U, 6 U, 8 U, 10 U, 12 U, 14 U).

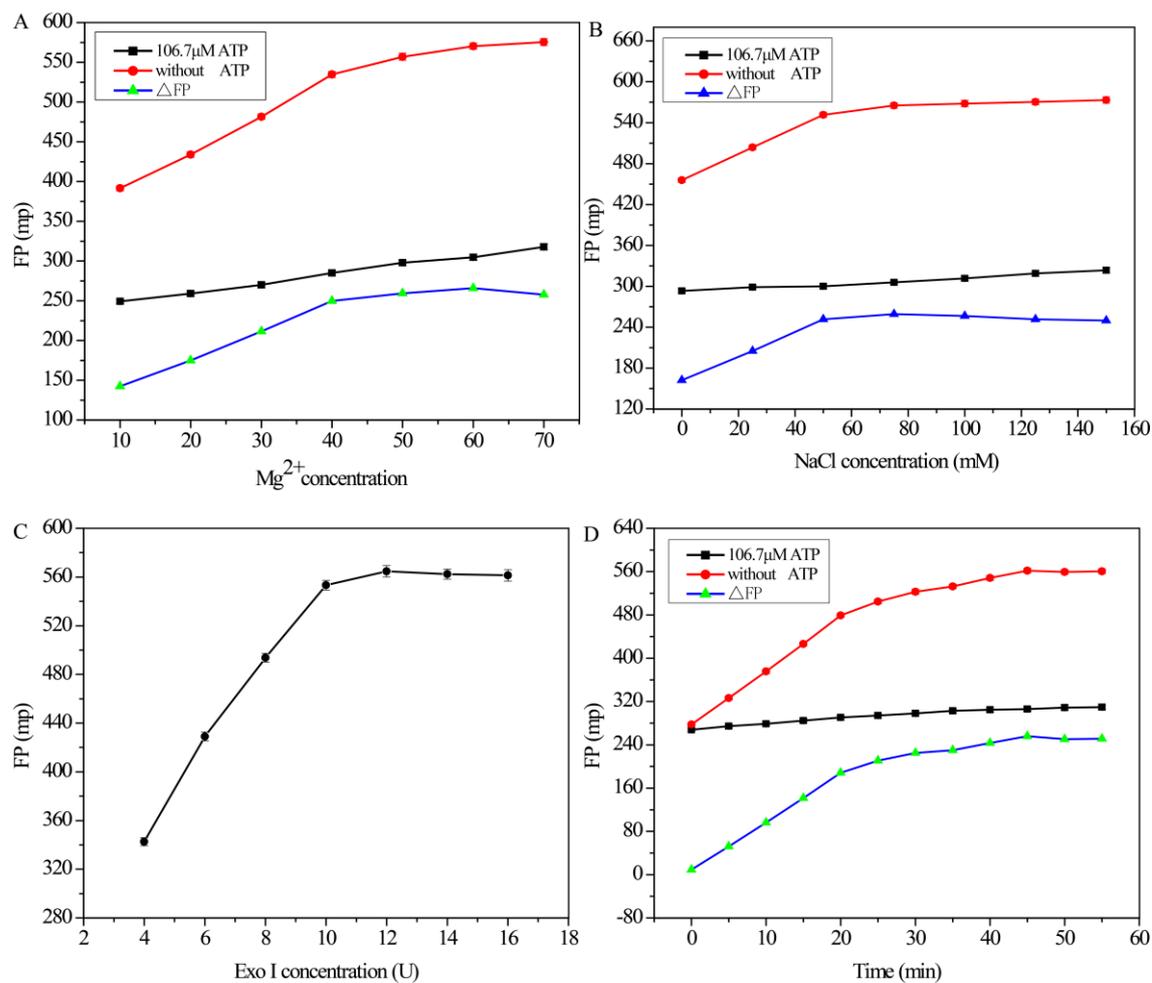


Figure S7. The affections of (A) Mg²⁺ concentration, (B) NaCl concentration, (C) various enzymatic concentrations (4 U, 6 U, 8 U, 10 U, 12 U, 14 U, 16U) in the complex of berberine and DNA, and (D) enzymatic reaction time on FP values for ATP detection, respectively.

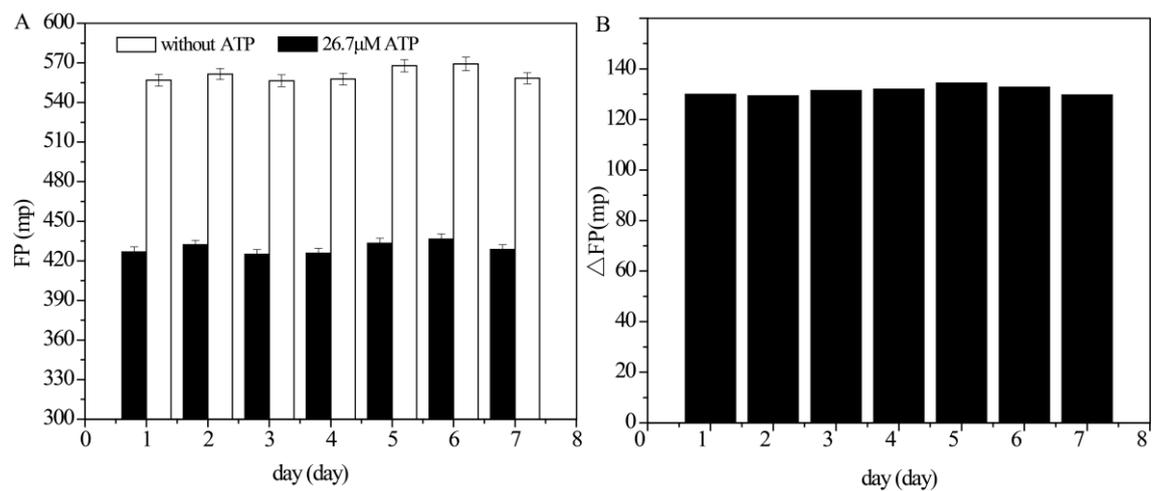


Figure S8. The repeatability (inter-day) of the FP and Δ FP values for this aptasensor in the absence and presence of ATP (26.7 μ M), respectively. The inter-day RSD of the FP value was 0.95% for the blank and 1.0% for ATP-containing samples, and RSD of Δ FP was 1.4%.

Table S2. The recovery measurement of ATP in 5% diluted human serum samples with fluorescence intensity method (n=3)

Sample	Added (μM)	Found (μM)	Recovery (%)	RSD (%)
Sample 1	0.4	0.437	109.3	4.3
Sample 2	5.3	5.148	97.1	3.7
Sample 3	26.7	26.076	97.7	2.2

Table S3. The recovery measurement of ATP in 5% diluted human serum samples with fluorescence polarization method (n=3)

Sample	Added (μM)	Found (μM)	Recovery (%)	RSD (%)
Sample 1	0.4	0.384	96	4.9
Sample 2	5.3	5.451	102.8	3.8
Sample 3	26.7	24.849	93.1	4.6