Electronic Supplementary Material (ESI) for Analyst.

Isolation of a DNA aptamer to develop the fluorescent aptasensor for pesticide thiamethoxam

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Table S1 Detailed sequences used in the SELEX procedure.

Name	Sequence (5’ to 3’)
ssDNA library	GGAGGCTCTCGGGACGAC-(N)30- GTCCCGATGCTGCAATCGTAAGAAT
Bio-capture	GTCGTCCCGAGAGCCATA-biotin
P1	GGAGGCTCTCGGGACGAC
P2	ATTCTTACGATTGCAGCATCGGGAC
Bio-P2	biotin-ATTCTTACGATTGCAGCATCGGGAC

Table S2 SELEX round in details.

Rounds	ssDNA (pmol)	Thiamethoxam (μM)	Incubation time (min)
1	1000	200	10×3
2	500	200	10×3
3	500	200	10×3
4	500	200	10×3
5	200	200	10×3
6	200	150	10×3
7	200	150	10×3
8	180	150	10×3
9	180	150	8×3
10	180	120	8×3
11	180	120	8×3
12	180	120	8×3
13	180	120	8×3

Table S3 Comparison of analytical parameters to detect thiamethoxam.

Method	Material	LOD	Linear range	Reference
Electrochemical method	Nanosilver/SDS	100 nM	0.1-9 μM	[42]
Electrochemical method	Grapheneoxide	8.3 μM	10-200 μM	[43]
Electrochemical method	β-CD-rGO	270 nM	0.5-16 μM	[44]
Electrochemical method	Graphene	40 nM	0.5-20 μM	[45]
Electrochemical method	Co_3O_4@g-C_3N_4	4.9 nM	0.01-420 μM	[46]
Flourescence sensor	Aptamer (ssDNA)	1.23 nM	0.01-1 μM	Present work

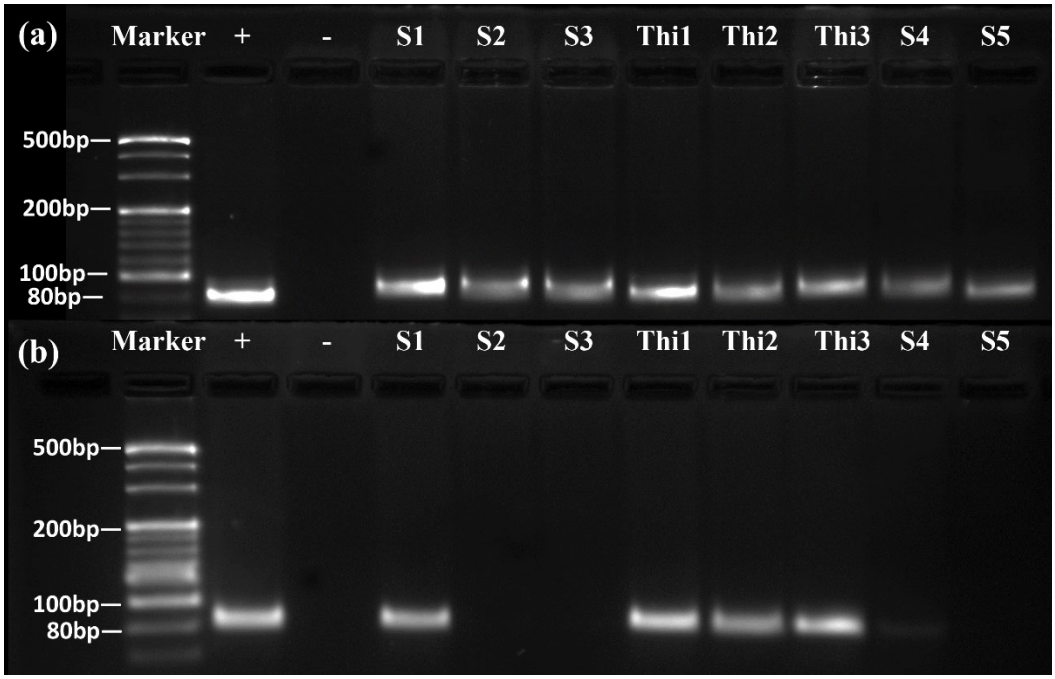

Fig. S1 The elution profile by 4% agarose gel electrophoresis for the first (a) round of selection and 13th (b) round of selection. The S bands (S1~S5) stand for the samples eluted by SELEX buffer. The Sar bands (Thi1~Thi3) stand for the samples eluted by thiamethoxam solution.

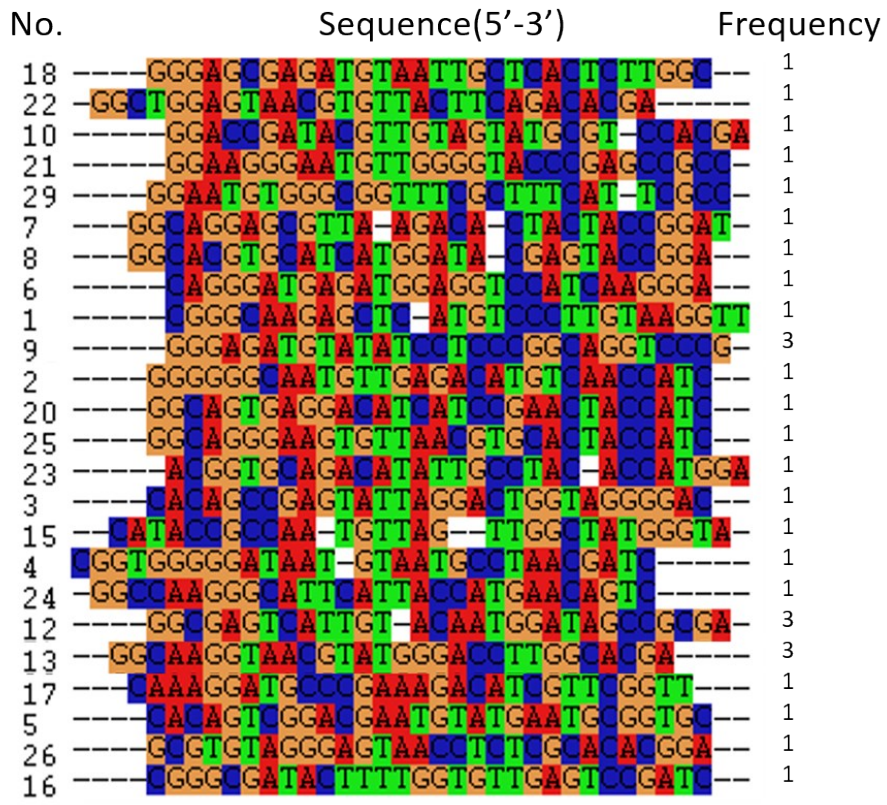

Fig. S2 Sequences alignment result by Clustalx 1.8.3.

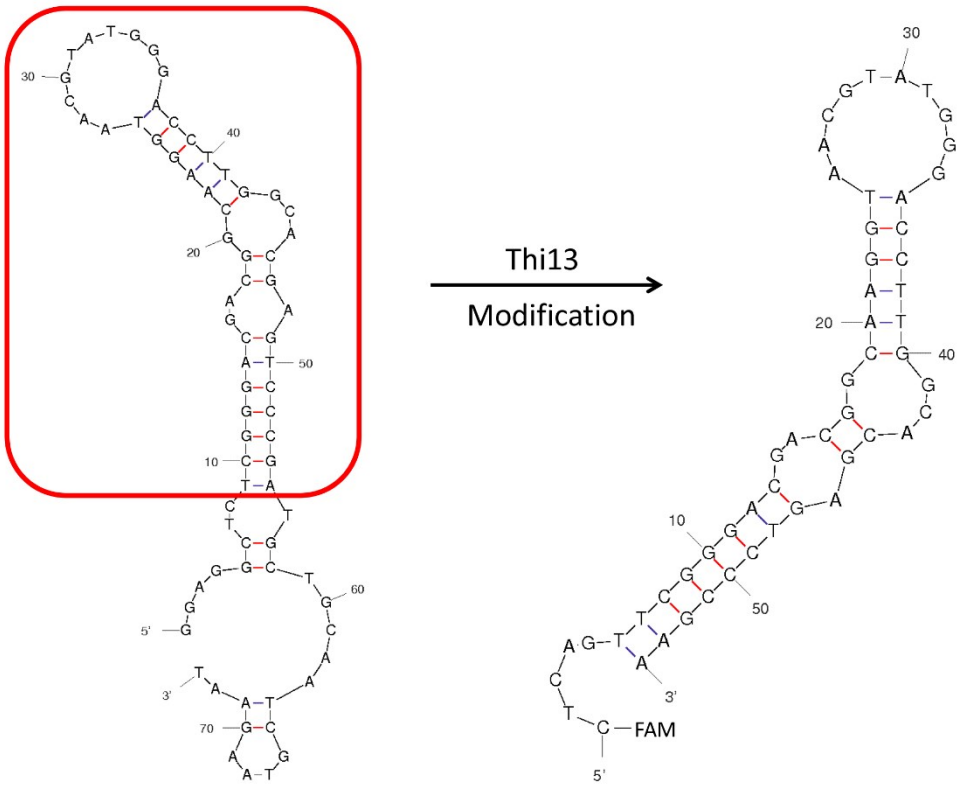

Fig. S3 The secondary structures of Thi13 and FAM-Thi13.

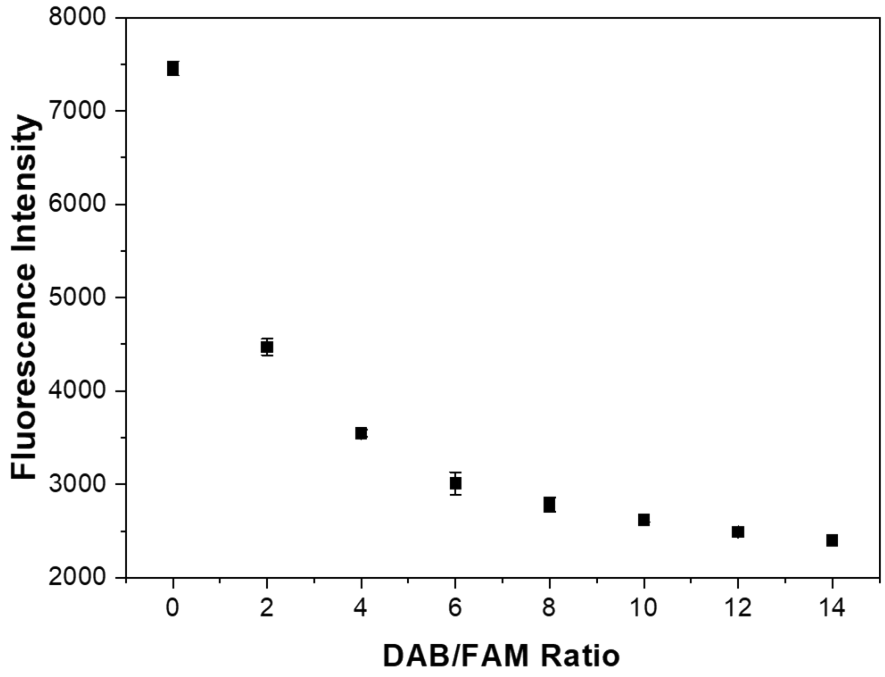

Fig. S4 Fluorescence quenching efficiency of different concentration ratios of quenching strand with FAM-Thi13. The concentration of FAM- Thi13 is 0.1 μM. DAB represents the quenching strand, and FAM represents FAM-Thi13.

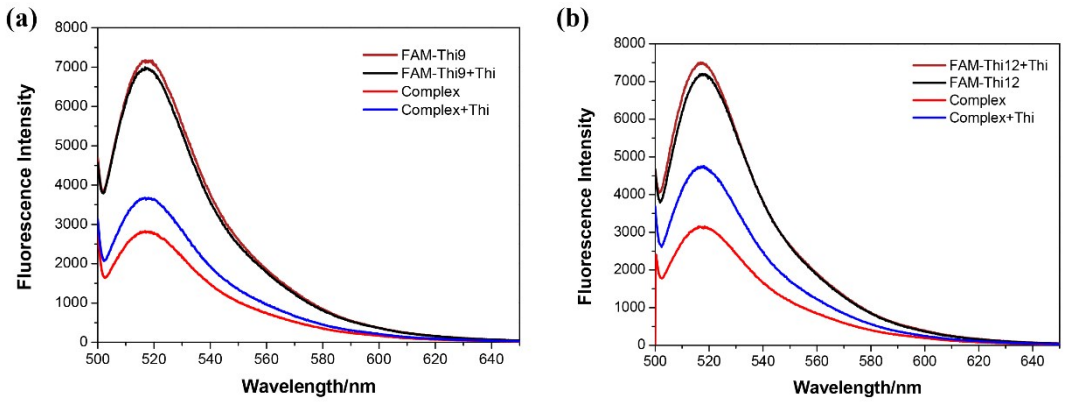

Fig. S5 Fluorescence spectra of FAM-aptamer (FAM-Thi9 (a) and FAM-Thi12 (b)) and FAM-aptamer-quenching strand complexes alone and in the presence of thiamethoxam. The concentration of FAM-aptamer is 0.1 μM and the ratio of FAM-aptamer and quenching strand is 1:6.

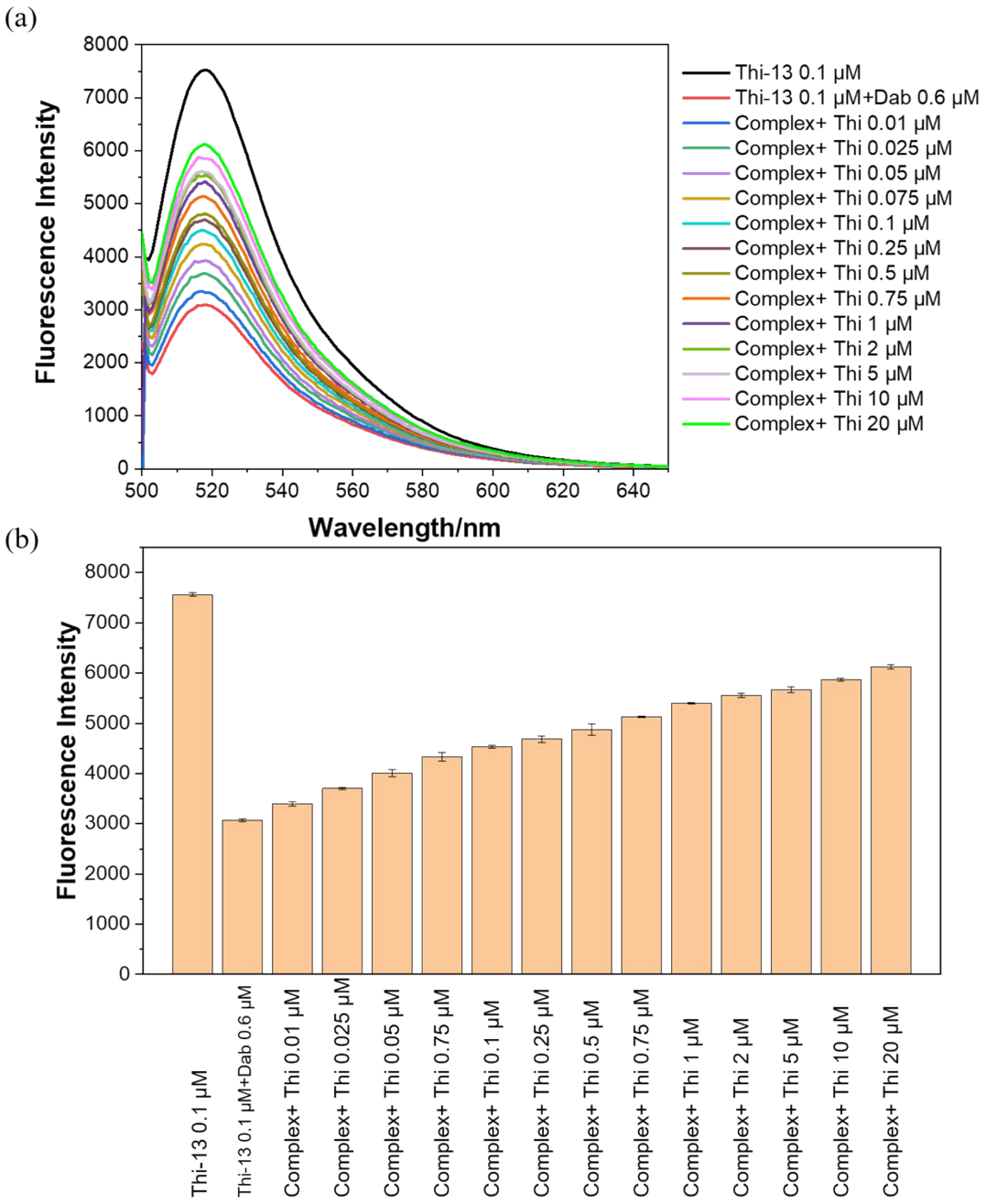

Fig. S6 Raw fluorescence spectra **(a)** and the fluorescence intensity at λ_{ex}=520 nm **(b)**. The fluorescence intensity of the FAM-aptamer-quenching strand complex after adding various concentrations (0.01-20 μM) of thiamethoxam, in which the ratio of aptamer to quencher is 1:6 and the concentration of aptamer is 0.1 μM.

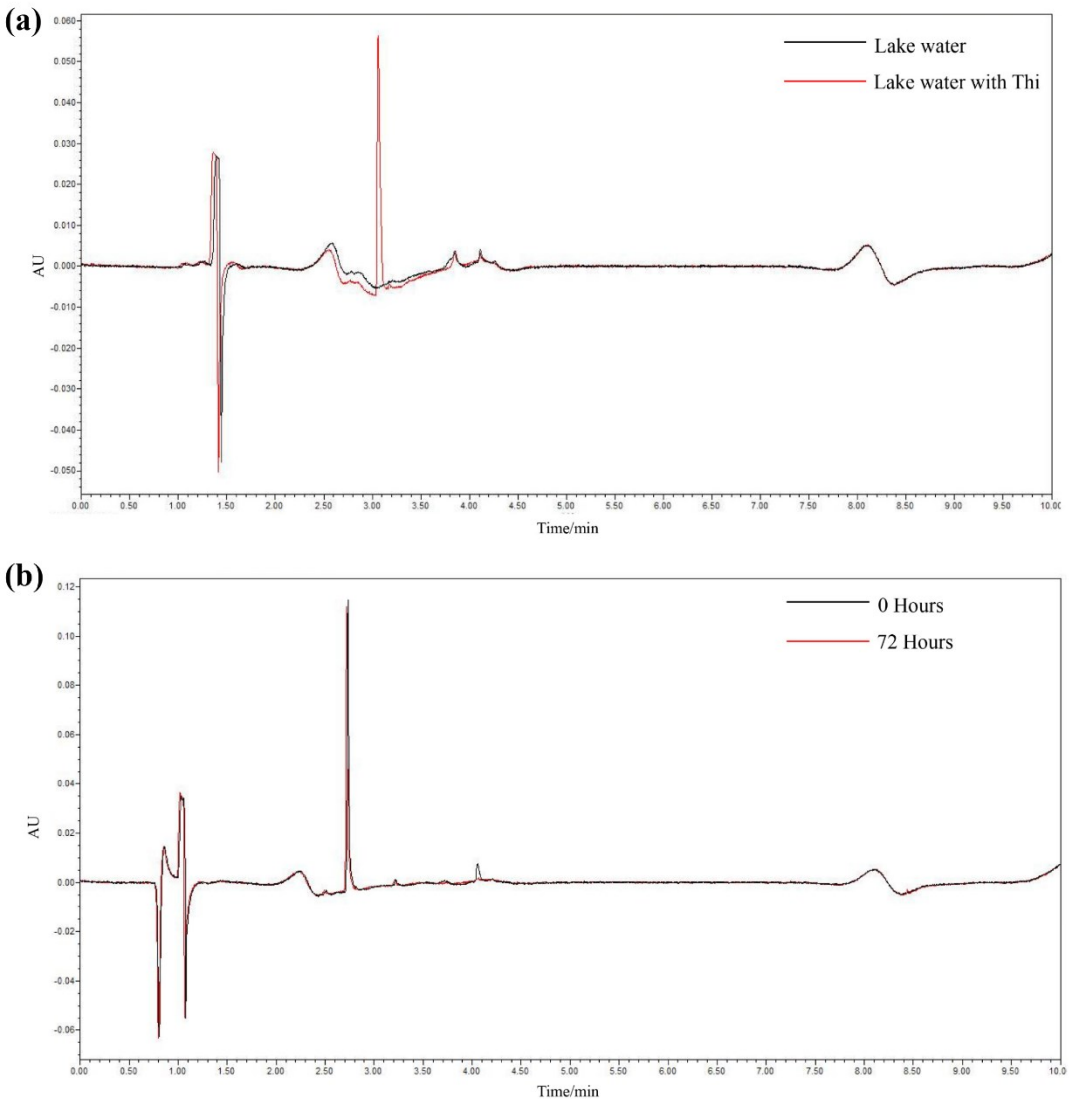

Fig. S7 (a) The original concentration of thiamethoxam in Dushu Lake. (b) The stability of thiamethoxam in binding buffer.

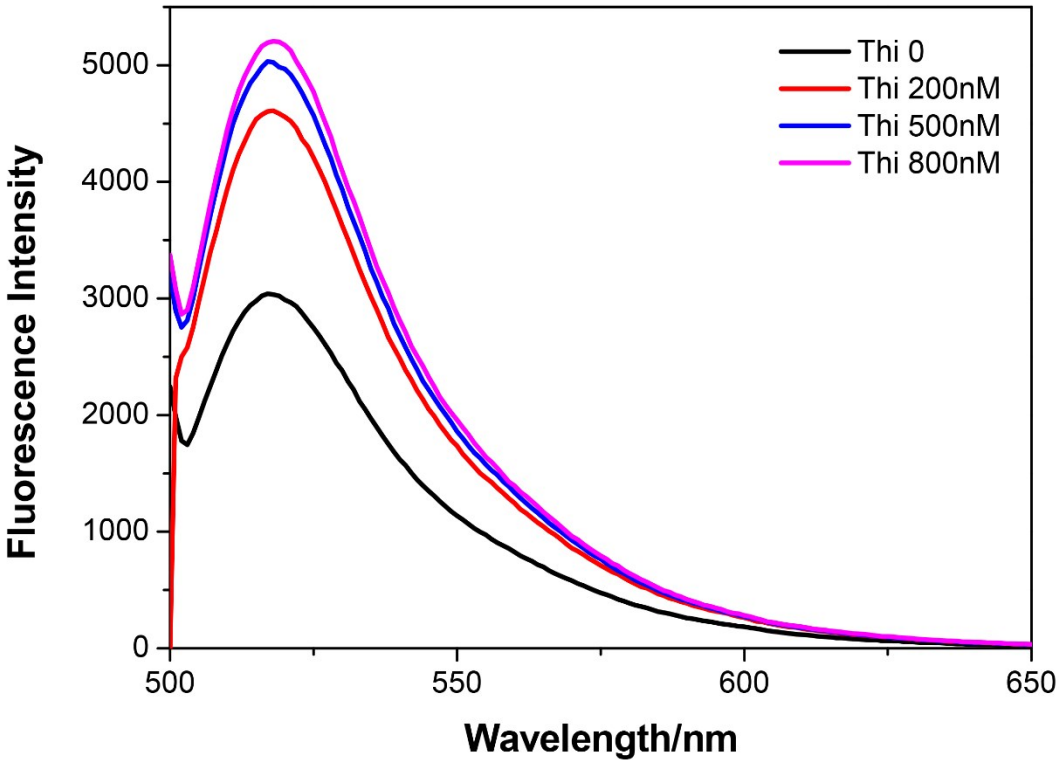

Fig. S8 Fluorescence spectra of the recovery experiment. Sample Thi 0 means to the FAM-aptamer-quenching strand complex without adding thiamethoxam. The concentration of aptamer is 0.1 μM and ratio of aptamer to quencher is 1:6.

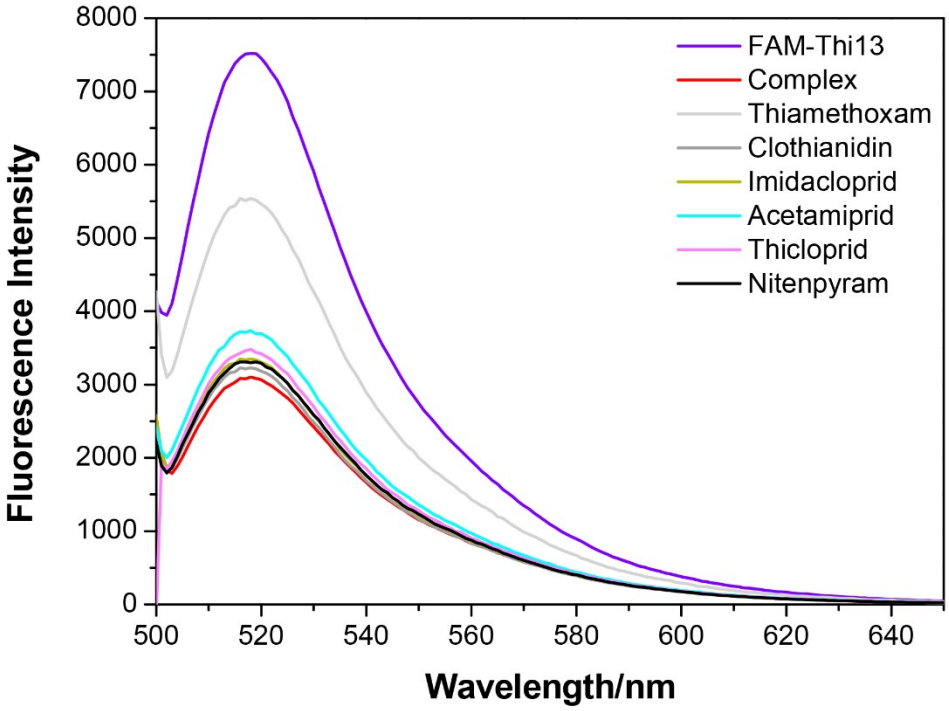

Fig. S9 Fluorescent spectra for the selectivity experiment. The fluorescence intensity of the FAM-aptamer-quenching strand complex after adding thiamethoxam and its analogues, in which the ratio of aptamer to quencher is 1:6 and the concentration of aptamer is 0.1 μM. The concentration of thiamethoxam is 2 μM, while that of its analogues are 20 μM.