Supporting Information

An upconversion fluorescent resonant energy transfer aptasensor for H5N1 influenza virus detection

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Supplementary Figures

1.Feasibility of FRET system based on H5N1 HA aptamer

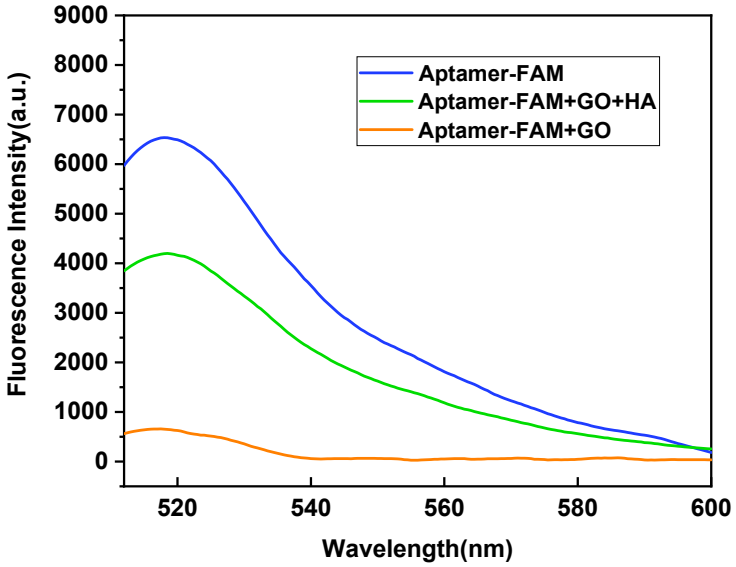

Figure S1. The typical fluorescent emission spectra of different mixtures.The concentrations of Aptamer-FAM, GO and HA were 10 nM, 50 μg m L^{-1} and 50 ng mL^{-1}. (The excitation was set at 495 nm and the emission spectra were collected from 510 nm to 600 nm)

2.The TEM image of UCNPs-Apt on GO sheet in the presence of HA

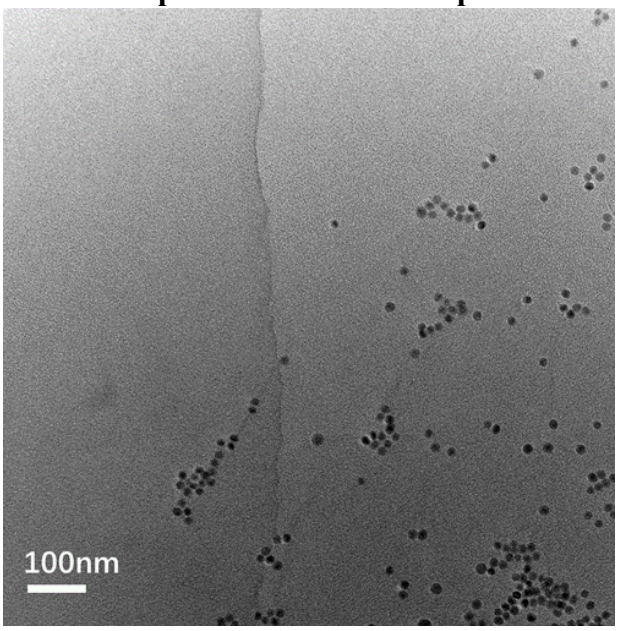

Figure S2. The TEM image of UCNPs-Apt (0.05 mg mL^{-1}) on GO sheet (50 μg m L^{-1})in the presence of HA(50 ng mL^{-1}).

3.The fluorescence spectrum in human serum samples

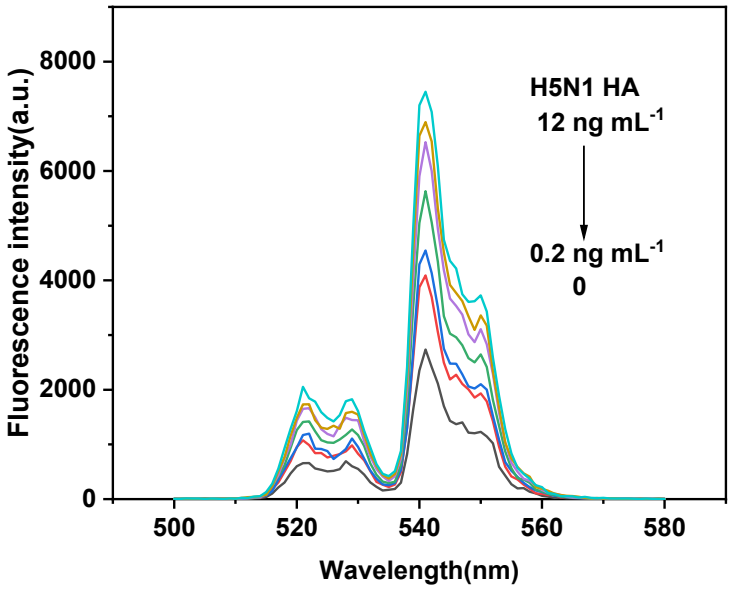

Figure S3. The fluorescence spectra regarding quantitative detection of HA in human serum for different concentrations of HA (0, 0.2, 0.5, 1, 2, 5, 7, 12 ng mL^{-1})

4.The relationship between commercial standard ELISA kits and this method

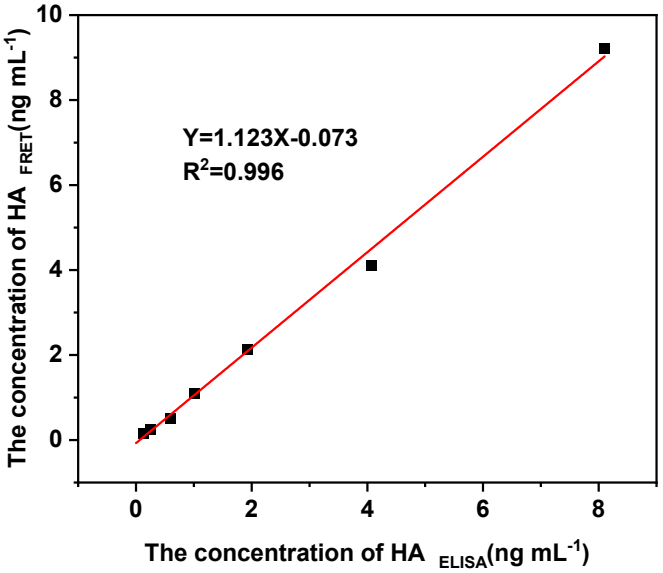

Figure S4. The relationship between commercial standard ELISA kits and this method.

5. Between-group repeated measures HA

Table S1. Inter-assay precision of Aptamer-SWUCNPs/GO platform in serum samples.

Samples	Volume of addition (ng mL^{-1})	Found±SD (ng mL^{-1})	Recovery (%)	RSD (%) n=3
1	2	2.29±0.152	114.50	6.63
2	5	5.37±0.425	107.43	9.78
3	7	6.91±0.262	98.71	3.79
4	10	9.53±0.922	95.37	9.67
5	12	12.35±0.273	102.91	2.21

6.Stability of probes

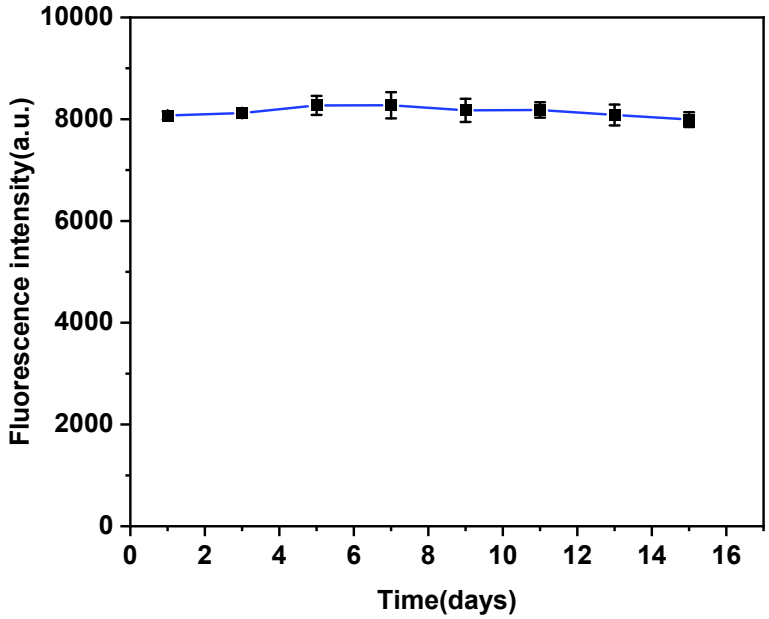

Figure S5. The fluorescence intensity was measured in the period of 15 days. The concentrations of UCNP-Apt was 0.05 mg mL^{-1}. Error bars represented the standard deviation of three parallel testing.

7. A comparison between present HA of H5N1 virus biosensor and other biosensors

Table S2. Comparison of this work with other methods for the dection of HA protein of H5N1

No.	Detection Methods	Materials	Liner range (ng mL^{-1})	LOD (ng mL^{-1})	Reference
1	Electrochemical	indium-tin-oxide thin-film transistors (ITO TFTs).	5 - 5000	0.08	[4]
2	ELISA	Immunowall Device	0.23-100	0.23	[5]
3	Fluorescence	Aptamer / Ag@SiO2 nanoparticle	2-100	2	[6]
4	Immunoassay	Enzyme-encapsulated liposome	0.1-4	0.04	[7]
5	LSPR	MF-DNA /hAuSN	0.0857-857	0.0857	[8]
6	DPV	Methylene blue-electroadsorbed graphene	2.14-8.57	0.711	[9]
7	Fluorescence	Aptamer-SWUCNP/GO	0.1-15	0.0609	This study

References

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