Supplementary Information for

Turn-on fluorescent detection of melamine based on Ag nanoclusters-Hg^{2+} system

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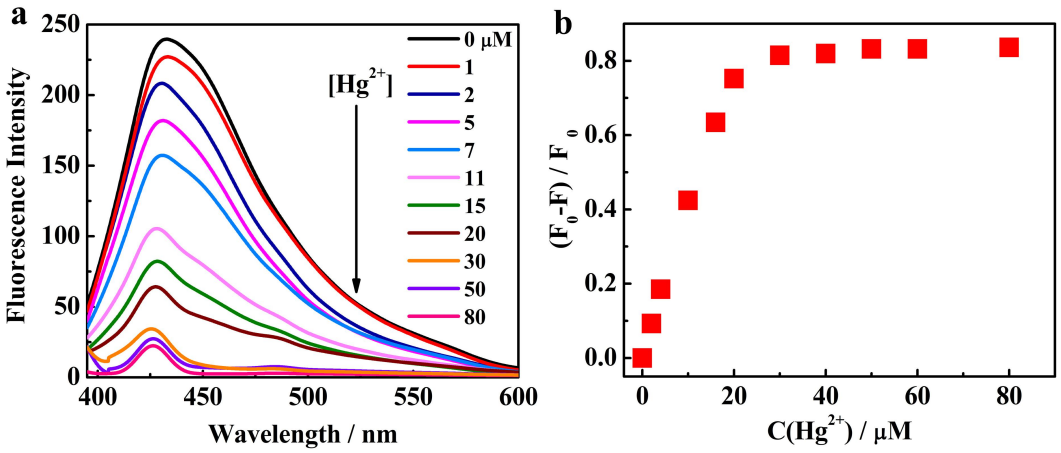

Fig. S1. Fluorescence spectra (a) and quenching efficiency (b) of Ag NCs in the presence of different concentrations of Hg^{2+}. F and F_0 were the maximum emission intensities of Ag NCs in the presence and absence of Hg^{2+}, respectively.

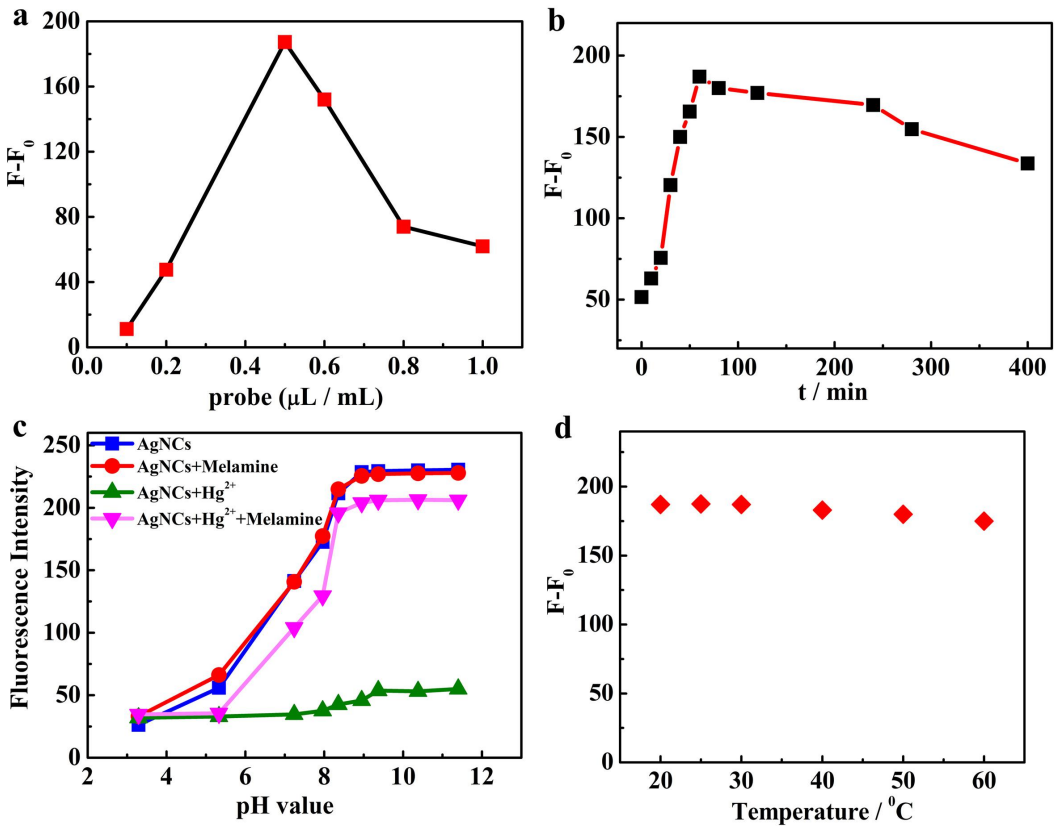

Fig. S2. Optimization of reaction conditions for detecting melamine based on Ag NCs-Hg^{2+} system (a, probe concentration; b, reaction time; c, pH value; d, temperature). The final concentration of Hg^{2+} and melamine were 30 and 30 μM, respectively.

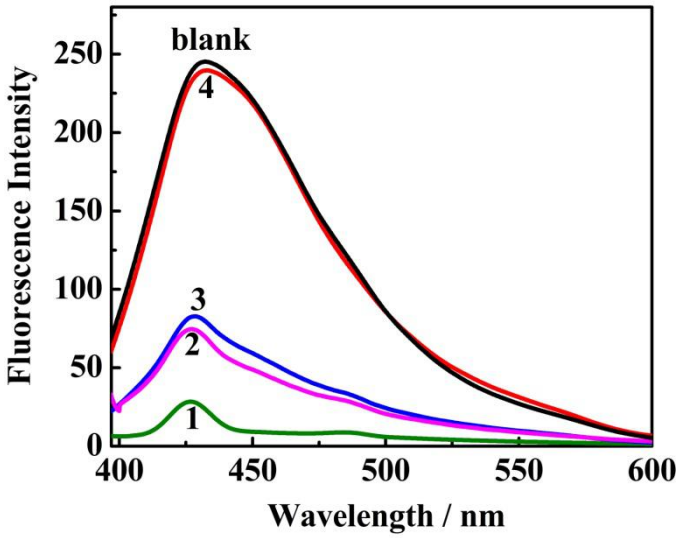

Fig. S3. Influence of addition order on the fluorescence response of melamine. Order 1: Ag NCs were incubated with Hg^{2+} for 10 min without addition of melamine; order 2: Ag NCs were pre-incubated with Hg^{2+} for 10 min and then melamine was added; order 3: Hg^{2+}, melamine and Ag NCs were added together; order 4: melamine was pre-incubated with Hg^{2+} for 1 h followed by the addition of Ag NCs. The concentration of Hg^{2+} and melamine were 30 and 30 μM, respectively. Blank was the fluorescence of Ag NCs without Hg^{2+} and melamine.

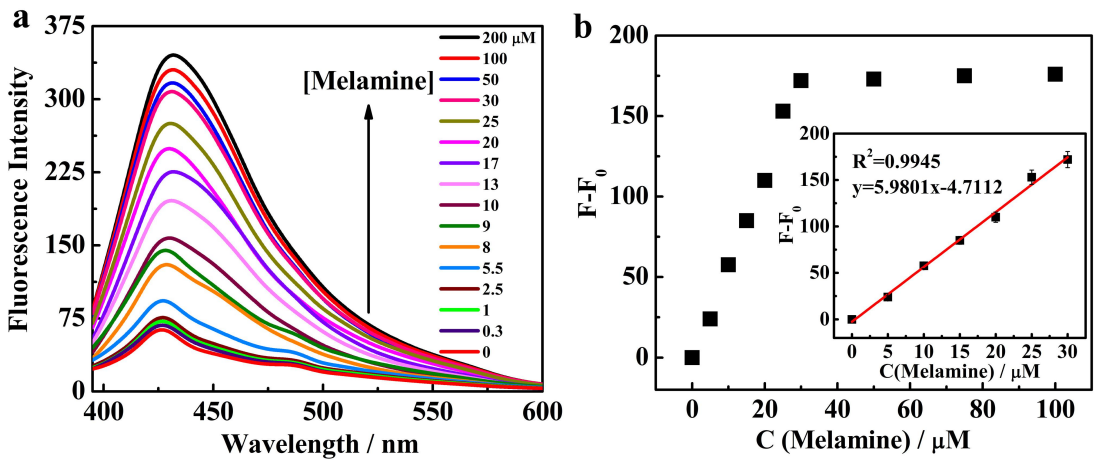

Fig. S4. Fluorescence spectra of Ag NC-PEI 1300 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.13 to 30 μM melamine).

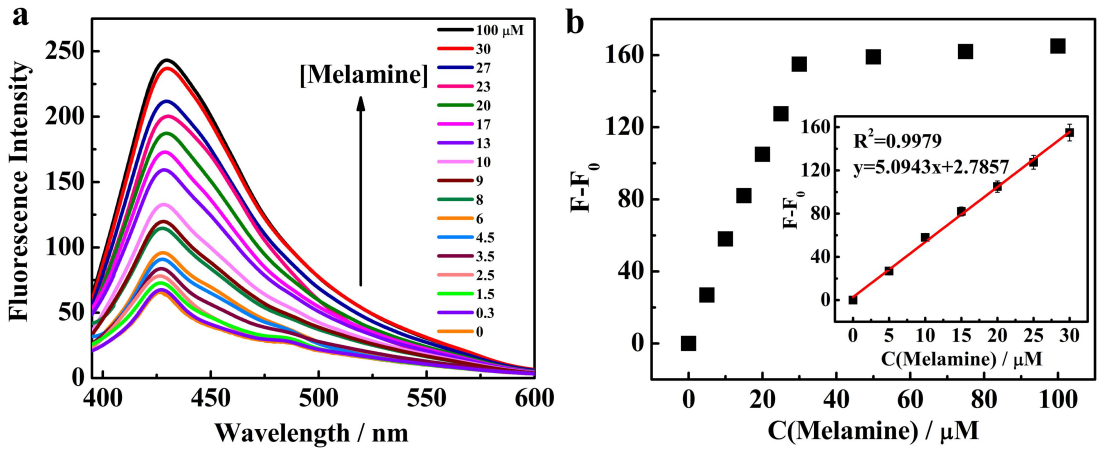

Fig. S5. Fluorescence spectra of Ag NC-PEI 1800 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.15 to 30 μM melamine).

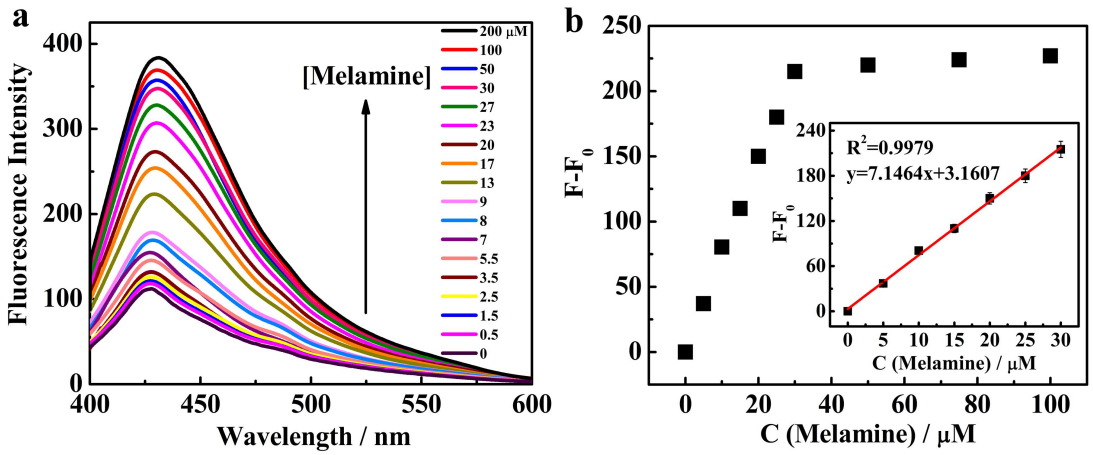

Fig. S6. Fluorescence spectra of Ag NC-PEI 2000 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.30 to 30 μM melamine).

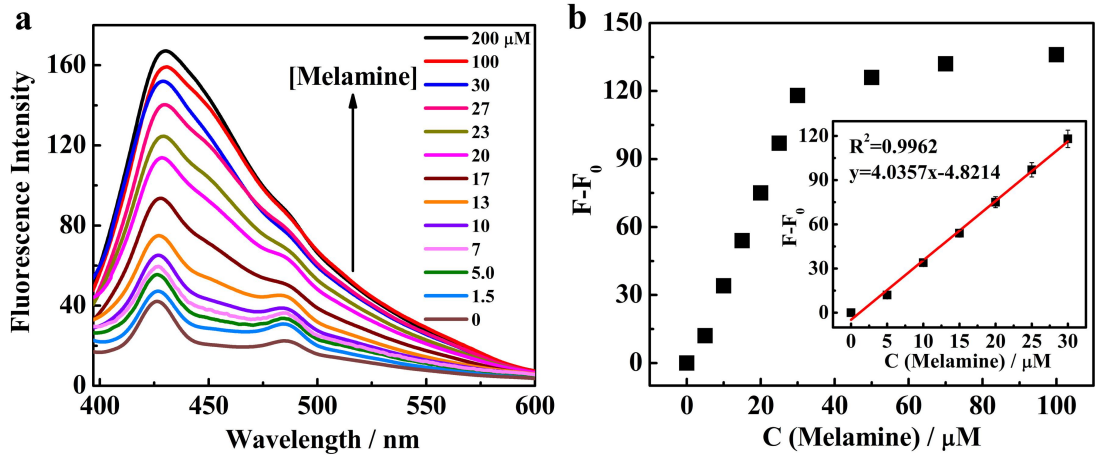

Fig. S7. Fluorescence spectra of Ag NC-PEI 10000 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.40 to 30 μM melamine).

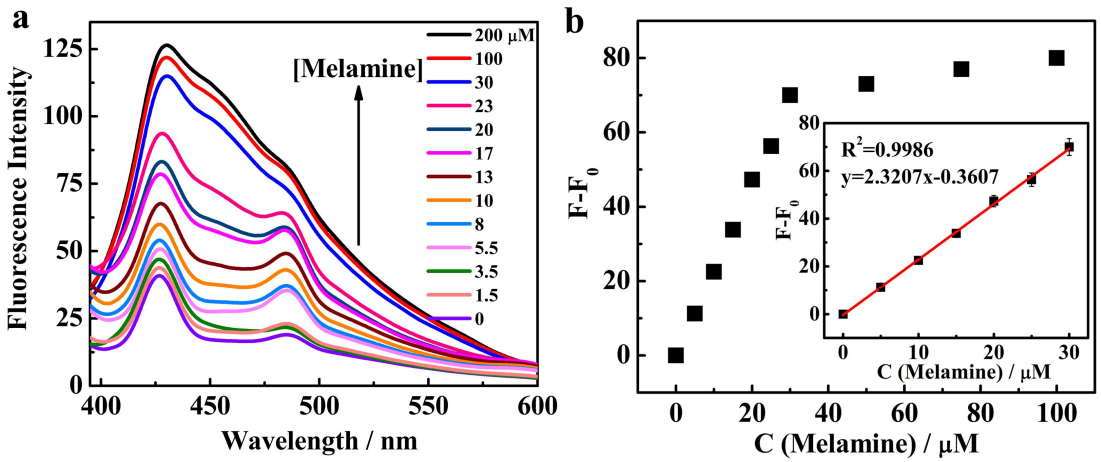

Fig. S8. Fluorescence spectra of Ag NC-PEI 25000 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.45 to 30 μM melamine).

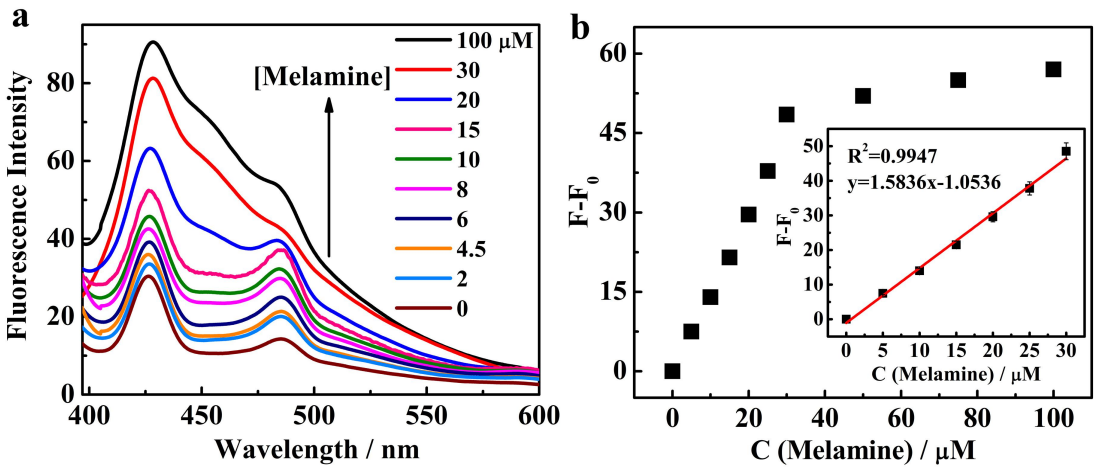

Fig. S9. Fluorescence spectra of Ag NC-PEI 70000 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.50 to 30 μM melamine).

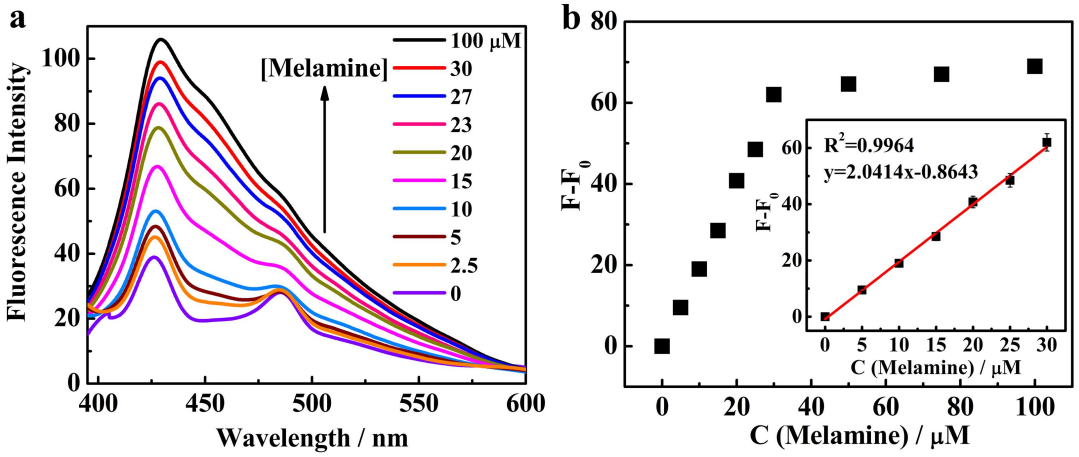

Fig. S10. Fluorescence spectra of Ag NC-PEI 750000 in the presence of different concentrations of melamine (a) and the corresponding linear range (b) (The inset displayed the linear range for 0.60 to 30 μM melamine).

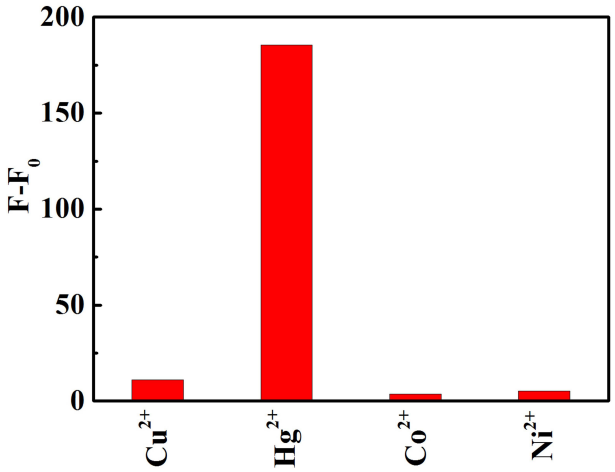

Fig. S11. Fluorescence recovery of Ag NCs with addition of melamine based on Ag NCs-metal ion systems. The concentrations of Cu^{2+}, Hg^{2+}, Co^{2+} and Ni^{2+} were 30 μM, and melamine was 30 μM.

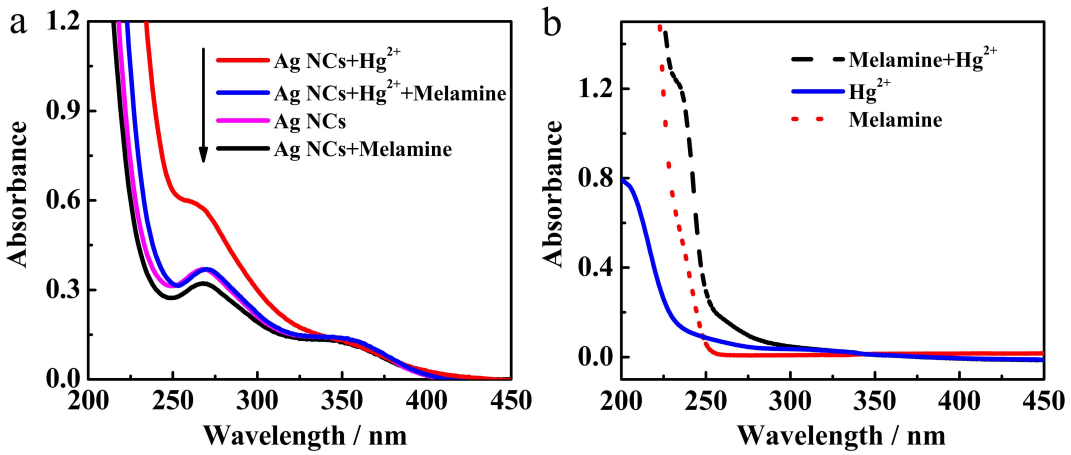

Fig. S12. (a) UV-vis spectra of Ag NCs, Ag NCs-Hg^{2+} system, Ag NCs-Hg^{2+}-Melamine complex, and Ag NCs-Melamine in aqueous solution; (b) UV-vis spectra of Hg^{2+} (stright line), Melamine (dot line), and Melamine-Hg^{2+} complex (dash line).

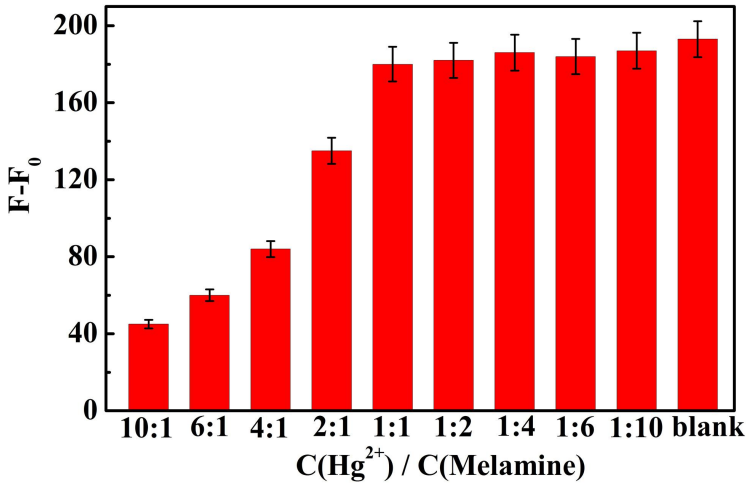

Fig. S13. Fluorescence intensity of different molar ratio between Hg^{2+} and melamine. Blank was the fluorescence of Ag NCs without Hg^{2+} and melamine. The concentration of Hg^{2+} was 30 μM.

Table S1. The influence of molecular weights of PEI on the detection of melamine based on Ag NCs-Hg^{2+} system.

Ag NC-PEIs	Linear range	Linear equation	LOD
Ag NC-PEI 600	0.10 - 30 μM	y=7.4654x-2.8013	30 nM
Ag NC-PEI 1300	0.13 - 30 μM	y=5.9801x-4.7112	45 nM
Ag NC-PEI 1800	0.15 - 30 μM	y=5.0943x+2.7857	75 nM
Ag NC-PEI 2000	0.30 - 30 μM	y=7.1464x+3.1607	0.10 μM
Ag NC-PEI 10000	0.40 - 30 μM	y=4.0357x-4.8214	0.13 μM
Ag NC-PEI 25000	0.45 - 30 μM	y=2.3207x-0.3607	0.16 μM
Ag NC-PEI 70000	0.50 - 30 μM	y=1.5836x-1.0536	0.19 μM
Ag NC-PEI 750000	0.60 - 30 μM	y=2.0414x-0.8643	0.23 μM

Table S2. Comparison of different methods for the determination of melamine.

Methods	Probes	Linear range (μM)	LOD (μM)	References
Molecular imprinting	CdTe quantum dots	0.1-0.8	0.04	26
Molecular imprinting	-	0.63-110	0.068	27
Colorimetric	Fe_3O_4 nanoparticles–H_2O_2–ABTS	2.0-40.0	2	28
Colorimetry	Au nanoparticles	-	7.9	29
Colorimetry	label-free Ag nanoparticles	4.0-170	2.32	30
Colorimetry	Ag nanoparticles functionalized with sulfanilic acid	0.1-3.1	0.011	22
Fluorescence	CdTe@SiO_2-Au nanoparticles	0.0075-0.35	0.89	20
Fluorescence	CdTe quantum dots	0.792-9.50	0.31	31
Fluorescence	Au nanoclusters	0.5-10	0.15	17
Fluorescence	Graphene quantum dots	0.15-20	0.12	16
Fluorescence	Ag NC-PEI 600-Hg^{2+} system	0.1-30	0.03	This work

Table S3. Detection of melamine in raw milk, infant formula and dog food based on Ag NC-PEI 600-Hg^{2+} system.

Sample	Concentration of melamine (μM)		Recovery (%)	RSD (n=3,%)
	Amount added	Amount found		
Raw milk 1	0	not found	-	-
Raw milk 2	3	3.03 ± 0.08	101	2.94
Raw milk 3	15	14.46 ± 0.21	96	1.48
Raw milk 4	28	27.03 ± 0.25	97	0.93
Infant formula 1	0	not found	-	-
Infant formula 2	3	2.92 ± 0.08	97	3.01
Infant formula 3	15	14.38 ± 0.26	96	1.81
Infant formula 4	28	27.67 ± 0.11	99	0.39
Dog food 1	0	not found	-	-
Dog food 2	3	2.91 ± 0.07	97	2.56
Dog food 3	15	14.82 ± 0.11	99	0.73
Dog food 4	28	27.21 ± 0.17	97	0.62