Electric Supplementary Information

Investigation of surface confinement effect of copper nanoclusters: construction of ultrasensitive fluorescence turn-on bio-enzyme sensing platform

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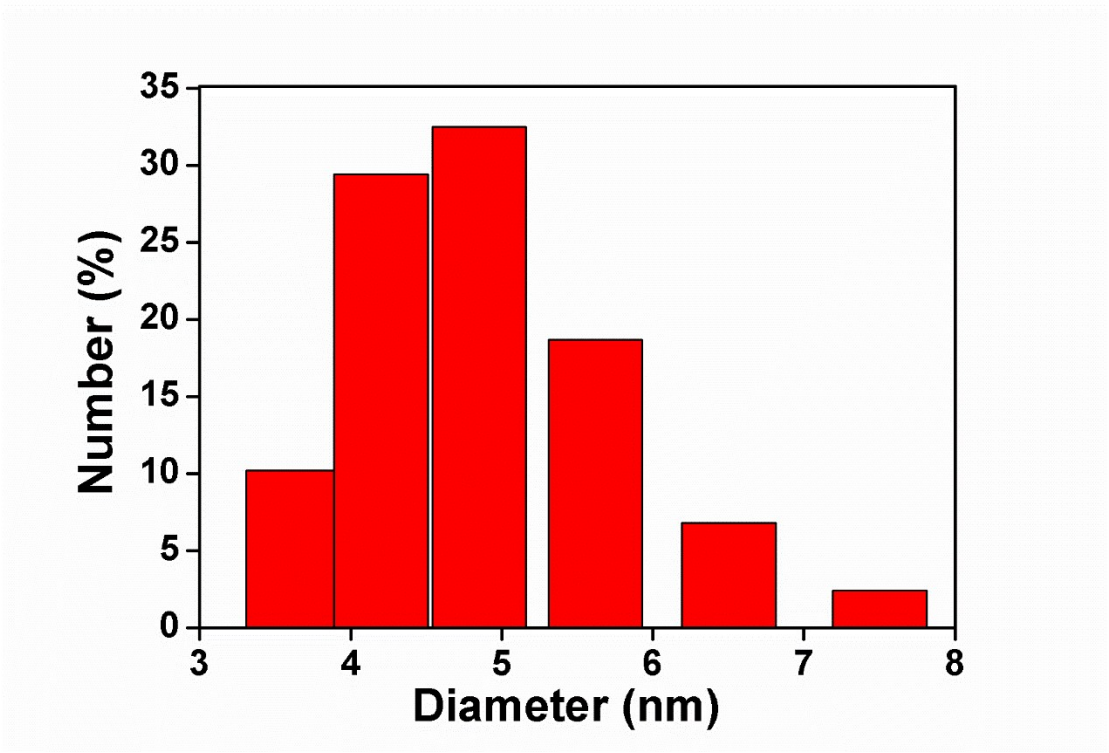

Fig. S1 Size distribution of GS-CuNCs.

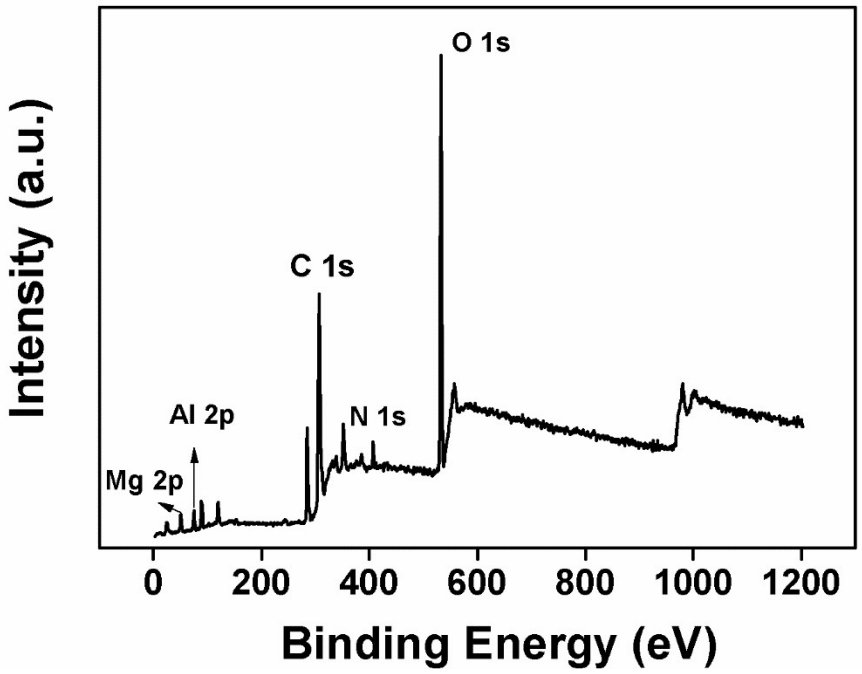

Fig. S2 XPS spectrum of LDH.

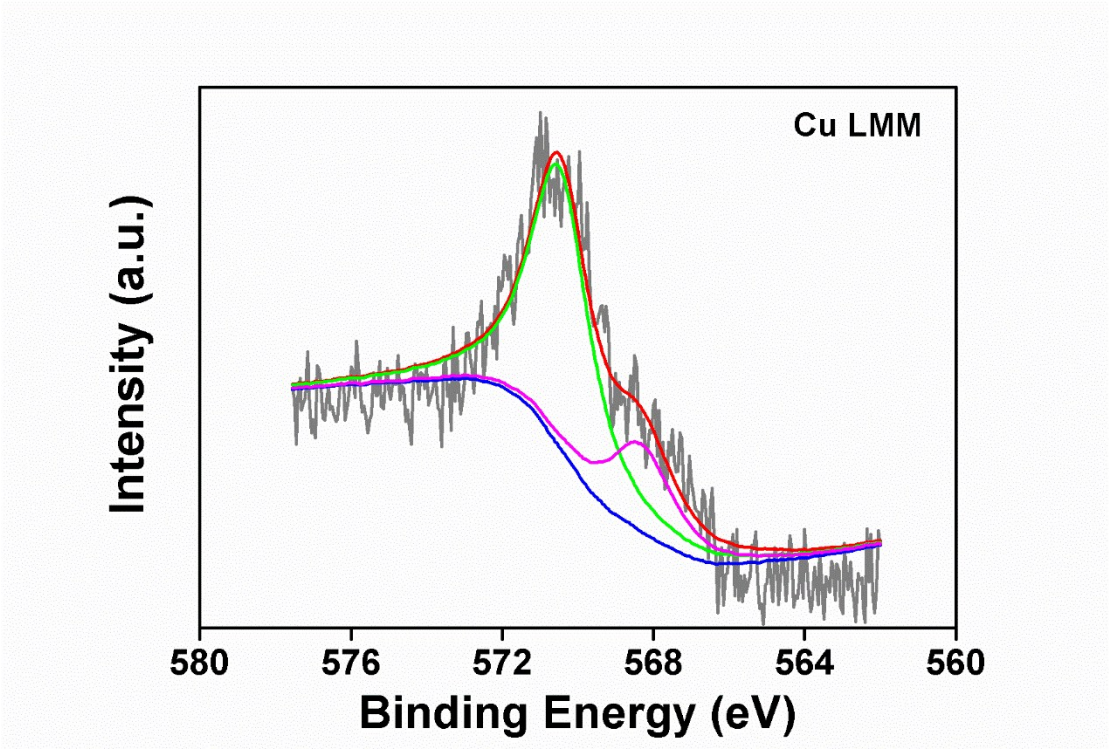

Fig. S3 Auger Cu LMM spectra of GS-CuNCs.

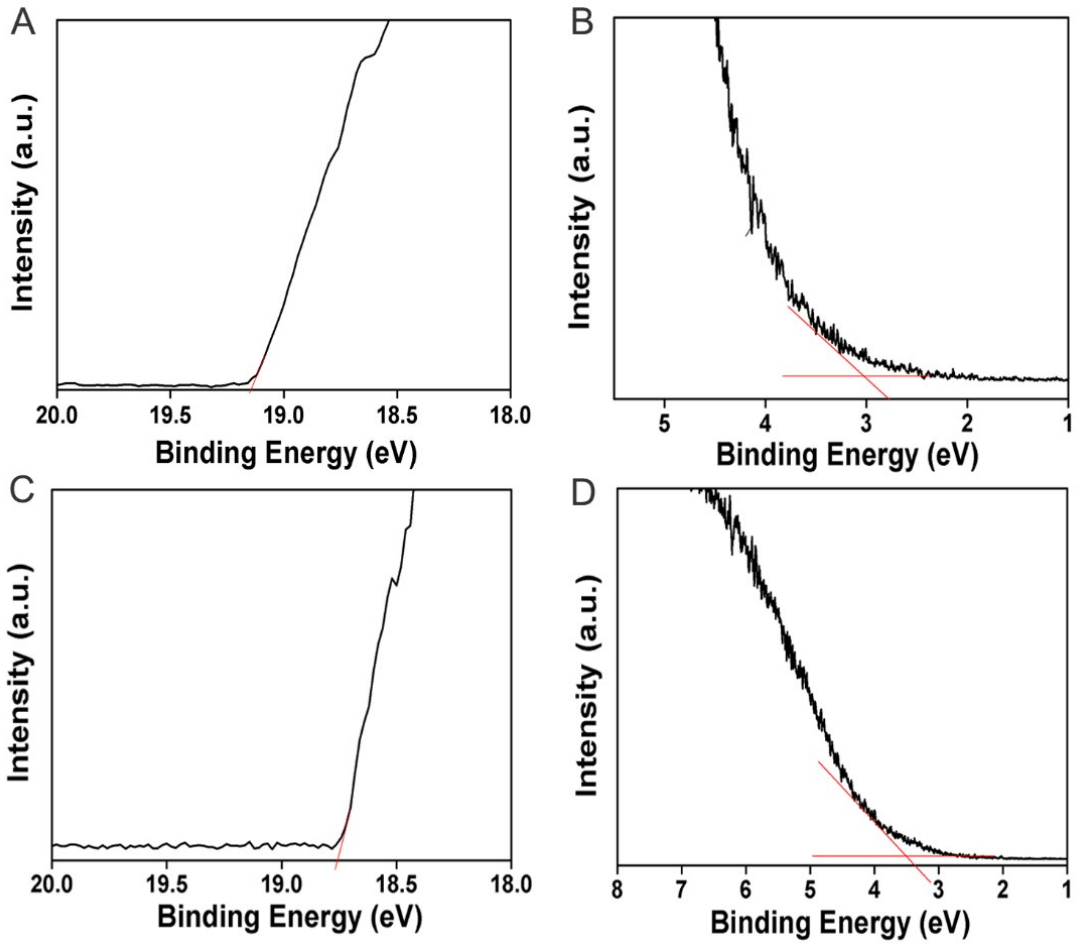

Fig. S4 UPS spectra of (A), (B) GS-CuNCs and (C), (D) LDH.

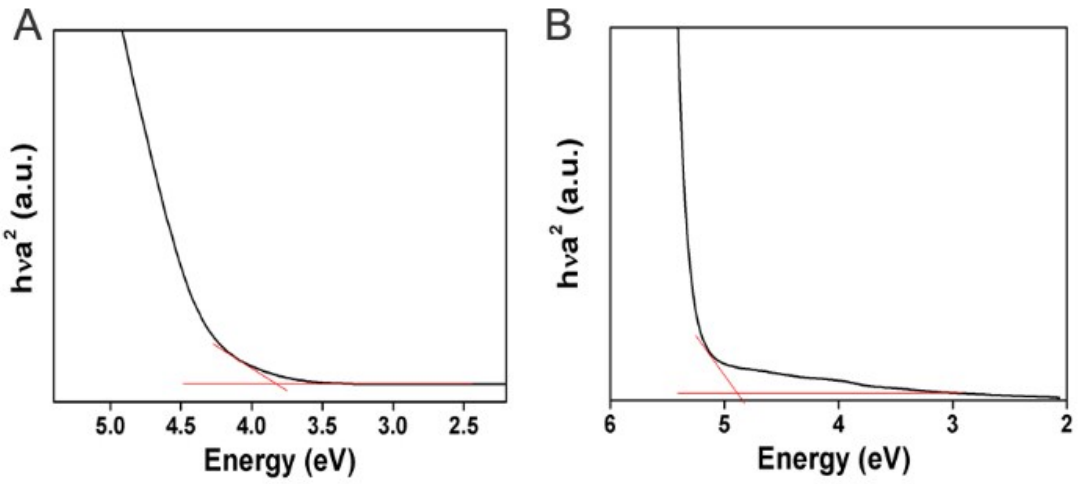

Fig. S5 Band gap energies of (A) GS-CuNCs and (B) LDH.

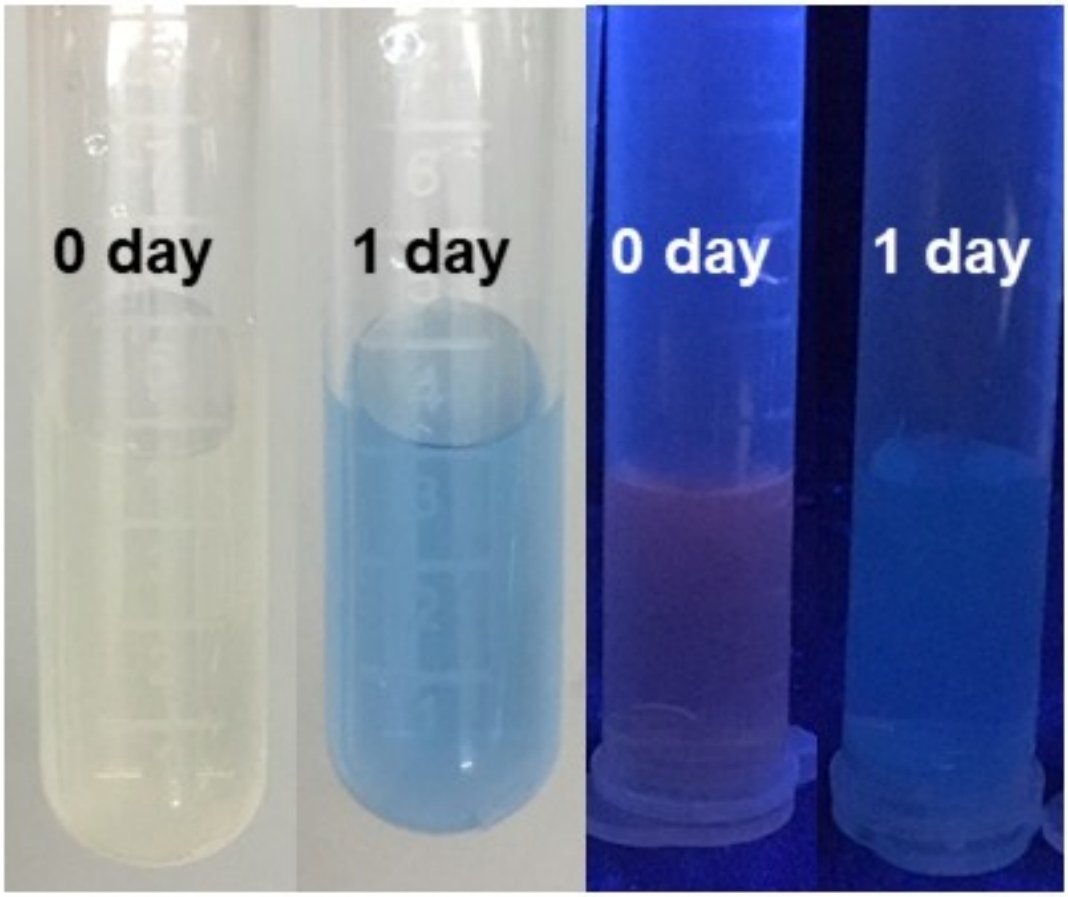

Fig. S6 Digital photos of GS-CuNCs stored for 0 day and 1 day at room temperature.

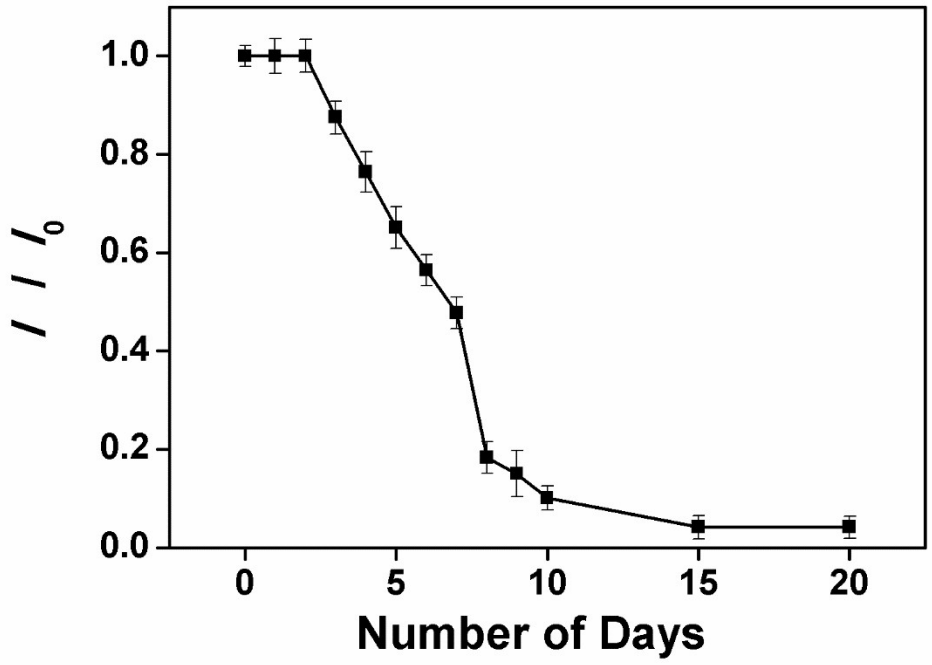

Fig. S7 The 20-day fluorescence intensity of GS-CuNCs/LDH (I_0 was the initial fluorescence and I was the fluorescence intensities during different days).

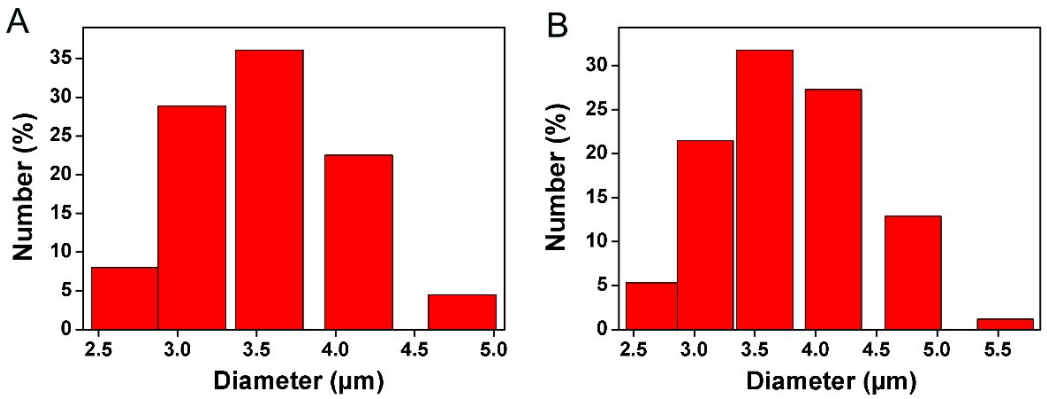

Fig. S8 DLS results of GS-CuNCs/LDH (A) before and (B) after HA capping.

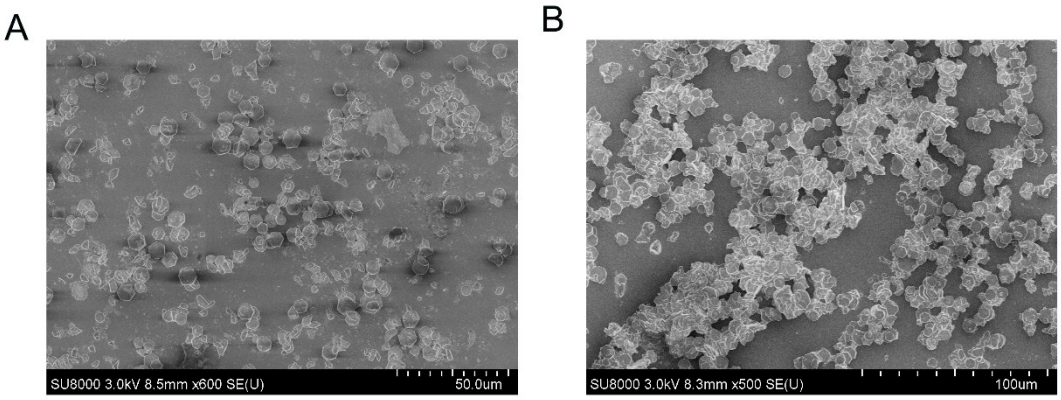

Fig. S9 SEM images of GS-CuNCs/LDH (A) before and (B) after HA capping.

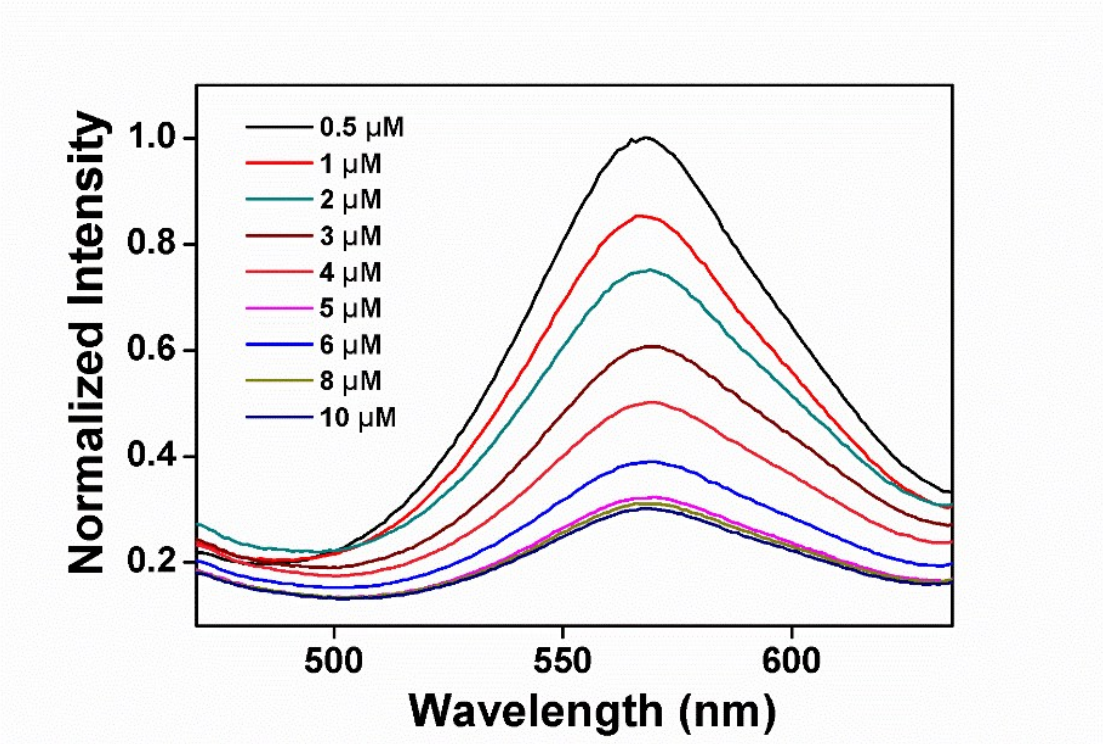

Fig. S10 Fluorescence emission spectra of GS-CuNCs/LDH sensing system in the presence of HA with different concentrations.

Table S1. Comparison of different detection methods for HAase.

Detection Method	Linear range ($U\ mL^{-1}$)	LOD ($U\ mL^{-1}$)	Ref.
Colorimetry/ AuNPs	2.4-3.6	2.4	1
Colorimetry / AuNPs	1.25–50	0.63	2
Fluorescence /Carbon dots	$0.2–10^4$	0.1	3
Fluorescence / Carbon dots	0–400	0.65	4
Fluorescence / Carbon dots	0.1–8	0.05	5
Fluorescence / Cationic conjugated polymer	0–1.85	0.075	6
Fluorescence / MoS_2 quantum dots	1–50	0.7	7
Fluorescence / Au/AgNCs	0.5–27.5	0.3	8
Fluorescence / Pyrene analog	–	0.007	9
Fluorescence / GS-CuNCs/LDH	0–0.4	0.014	This work

Table S2. Results of the determination of HAase in urine.

Sample	Found ($U \cdot mL^{-1}$)	Added ($U \cdot mL^{-1}$)	Detected ($U \cdot mL^{-1}$)	Recovery (%)	RSD (n=3, %)
Urine 1	7.82	5.0	13.09	105.4	3.3
		10.0	16.87	90.5	1.9
Urine 2	11.63	5.0	16.45	96.4	4.4
		10.0	22.06	104.3	3.7
Urine 3	9.48	5.0	14.64	103.2	3.8
		10.0	20.13	106.5	3.7
Urine 4	5.94	5.0	11.36	108.4	1.6
		10.0	16.82	108.8	2.1

* The urine samples were diluted with different multiples to ensure that the concentration of HAase was in the linear range.

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