Supporting Information

Nanocomposites of poly(L-methionine), carbon nanotube-graphene complexes and Au nanoparticles on screen printed carbon electrodes for electrochemical analyses of dopamine and uric acid in human urine solutions

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Supporting Figures and Tables

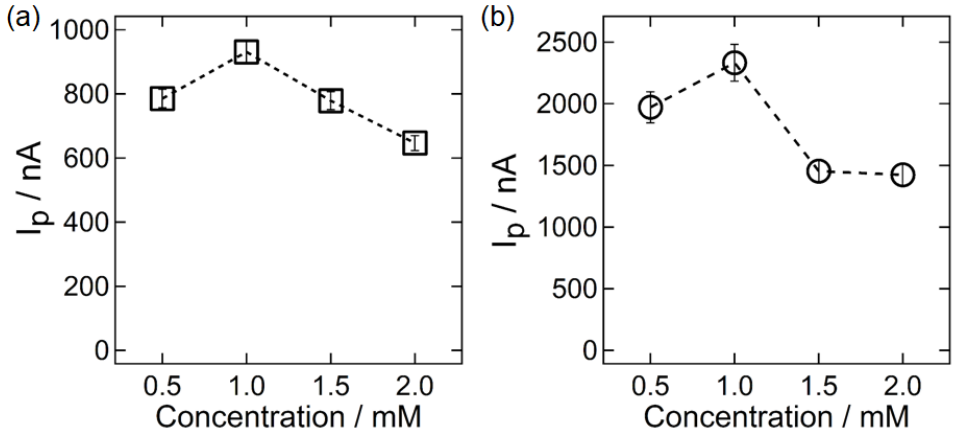

Fig. S1 *DPV peak current responses versus $HAuCl_4$ concentrations from 0.5 to 2 mM used for Au NPs-CNT-G-pMet-SPCE fabrication. Concentrations of DA (a) and UA (b) were 2 and 20 μM in 0.1 M PB pH 7.0, respectively.*

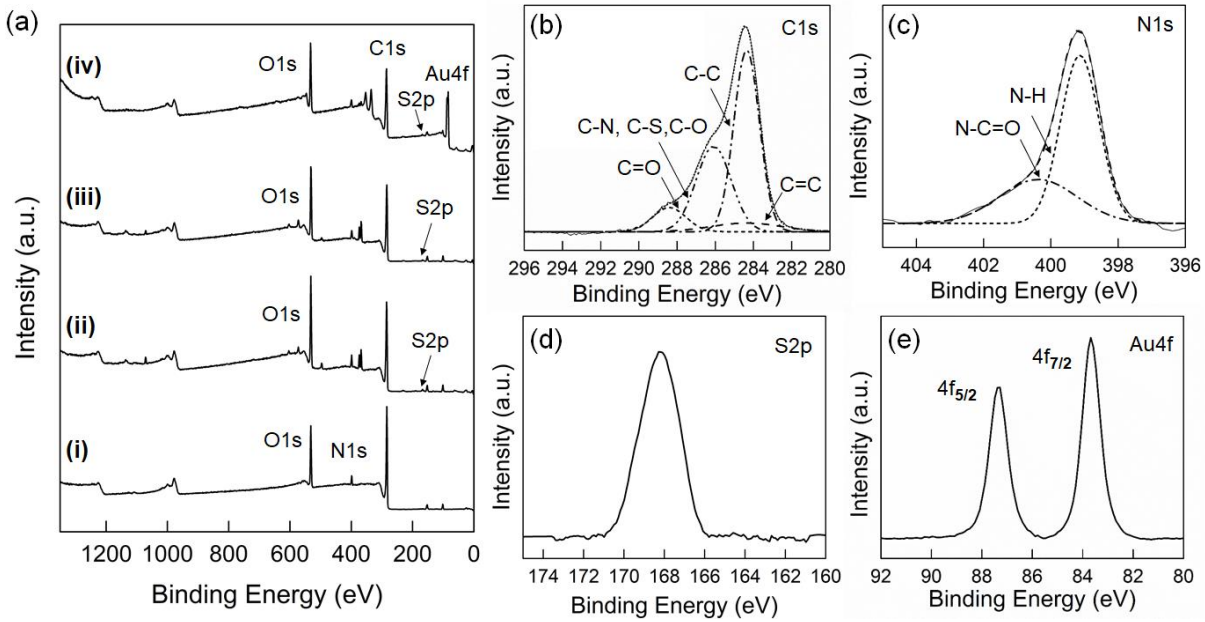

Fig. S2 *(a) XPS survey spectra of (i) oxygen plasma treated SPCE, (ii) pMet-SPCE, (iii) CNT-G-pMet-SPCE, and (iv) Au-CNT-G-pMet-SPCE. A series of XPS spectra of (b) C1s, (c) N1s, (d) S2p, and (e) Au4f for Au-CNT-G-pMet-SPCE.*

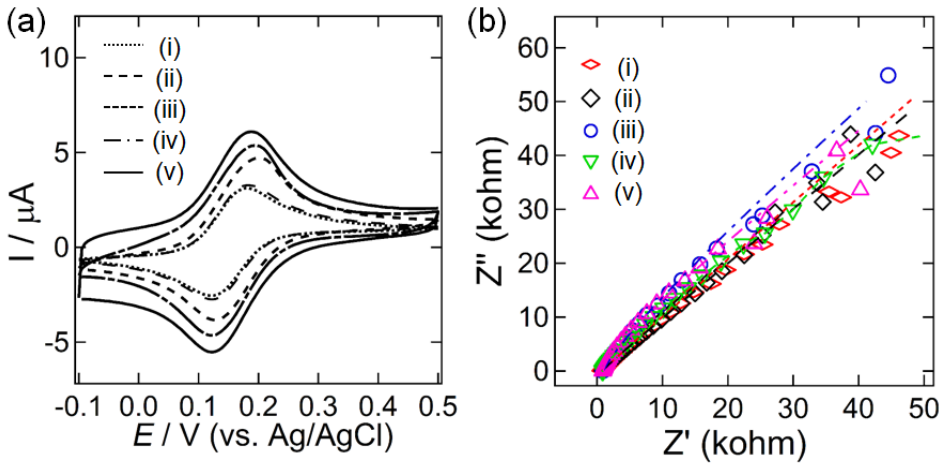

Fig. S3 *Representative (a) CVs and (b) EIS for 1 mM FcMeOH in 0.1 M KCl solution on different electrodes: (i) bare SPCE, (ii) oxygen plasma treated SPCE, (iii) pMet-SPCE, (iv) CNT-G-pMet-SPCE, and (v) Au NPs-CNT-G-pMet-SPCE. Scan rate of 50 mV* s^{-1}.

Table S1 *Comparison of the electroactive surface area and peak to peak seperation (*ΔE_p*) of different electrode configurations using* $[Fe(CN)_6]^{3-/4-}$ *and FcMeOH.*

Electrode	**$[Fe(CN)_6]^{3-/4-}$**		**FcMeOH**	
	Surface area (cm^2)	ΔE_p / mV	Surface area (cm^2)	ΔE_p / mV
(i) Bare SPCE	$3.13x10^{-2}$	190	$1.80x10^{-2}$	64.0
(ii) Oxygen plasma treated SPCE	$2.11x10^{-2}$	420	$1.87x10^{-2}$	64.0
(iii) pMet-SPCE	$3.18x10^{-2}$	140	$2.55x10^{-2}$	74.0
(iv) CNT-G-pMet-SPCE	$3.50x10^{-2}$	68.0	$2.74x10^{-2}$	68.0
(v) Au NPs-CNT-G-pMet-SPCE	$5.78x10^{-2}$	63.0	$2.92x10^{-2}$	68.0

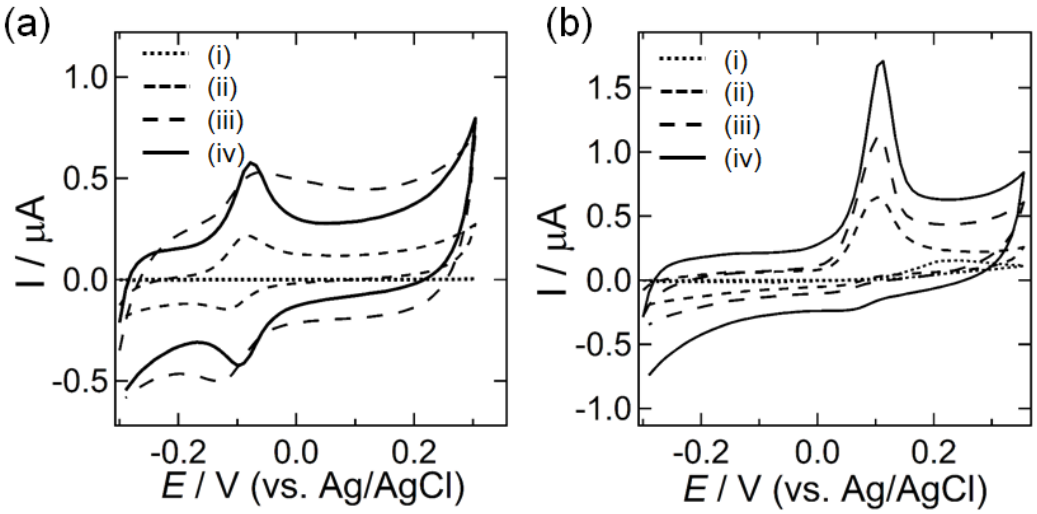

Fig. S4 *Representative CV for (a) 2 µM DA and (b) 20 µM UA in 0.1 M PB (pH 7.0) using different electrodes: (i) bare SPCE, (ii) pMet-SPCE, (iii) CNT-G-pMet-SPCE, and (iv) Au NPs-CNT-G-pMet-SPCE. Scan rate of 50 mV* s^{-1}.

Table S2 *Comparison of background corrected CV peak currents for (a) 2 µM DA and (b) 20 µM UA in 0.1 M PB (pH 7.0) on different electrodes: (i) bare SPCE, (ii) pMet-SPCE, (iii) CNT-G-pMet-SPCE, and (iv) Au NPs-CNT-G-pMet-SPCE.*

Electrode	I_p / nA (DA)	I_p / nA (UA)
(i) Bare SPCE	12.70	151.0
(ii) pMet-SPCE	172.0	596.0
(iii) CNT-G-pMet-SPCE	307.0	968.0
(iv) Au NPs-CNT-G-pMet-SPCE	404.0	1460

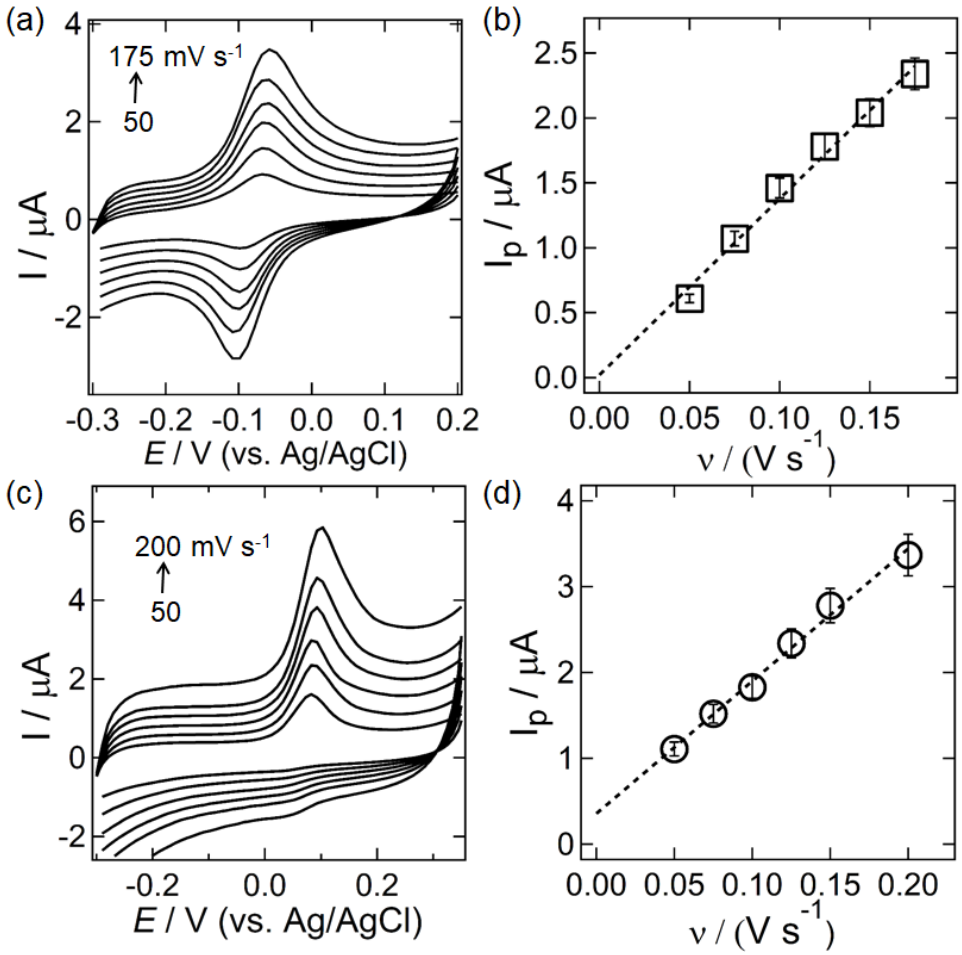

Fig. S5 *Representative CVs for (a) 3 µM DA and (c) 20 µM UA in 0.1 M PB (pH 7.0) using Au NPs-CNT-G-pMet-SPCE at different scan rates. (b) and (d) were linear plots of the background corrected DA and UA anodic peak current (I_p) versus scan rate (ν).*

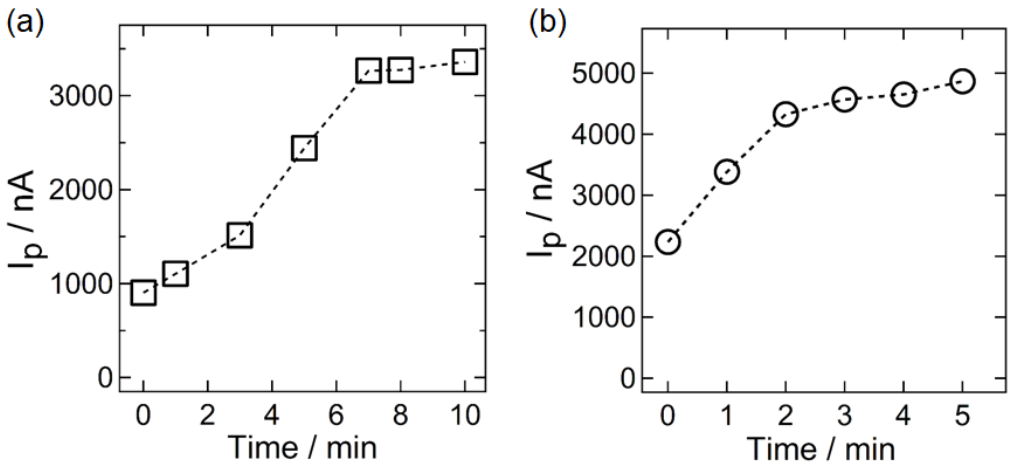

Fig. S6 *DPV peak current responses versus waiting time used for (a) 2 μM DA and (b) 20 μM UA in 0.1 M PB (pH 7.0), respectively.*

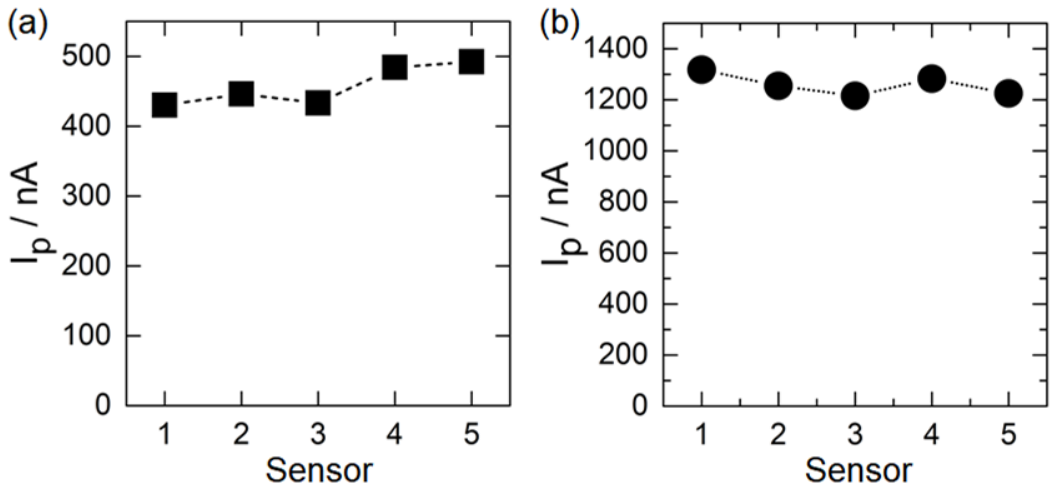

Fig. S7 *Reproducibility measurements for (a) 1 μM DA and (b) 10 μM UA in 0.1 M PB (pH 7.0) using Au NPs-CNT-G-pMet-SPCE.*

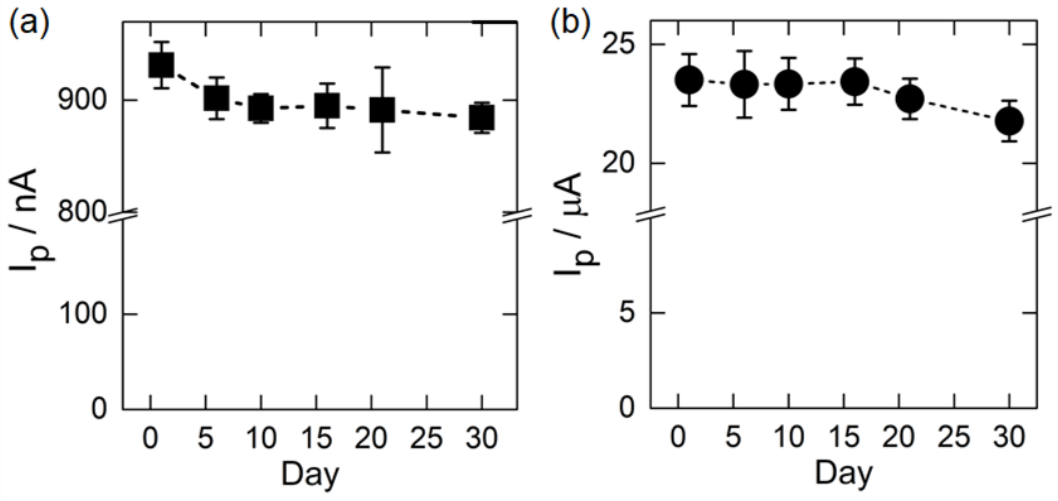

Fig. S8 *Stability measurements for (a) 2 µM DA and (b) 20 µM UA in 0.1 M PB (pH 7.0) using Au NPs-CNT-G-pMet-SPCE.*

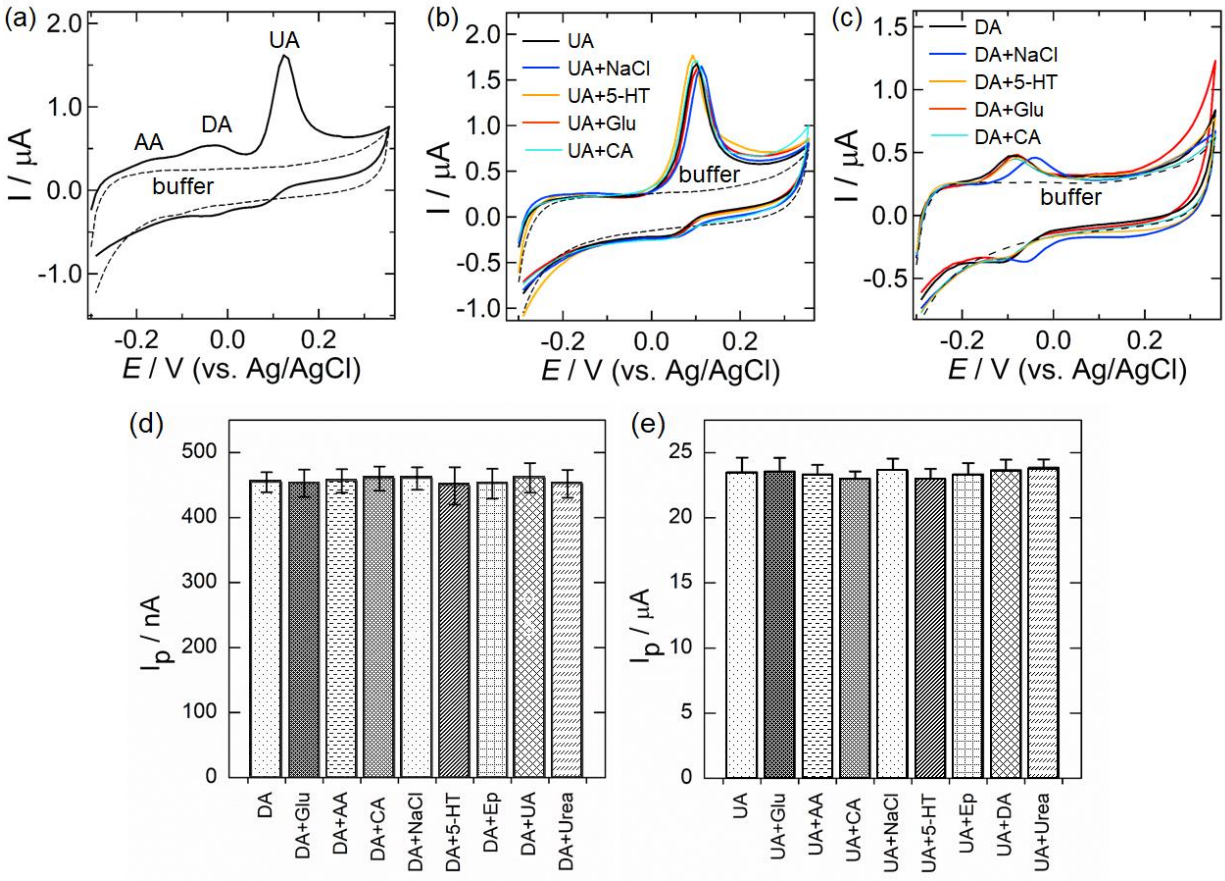

Fig. S9 *Representative CVs for (a)1 µM DA, 20 µM UA, and 20 µM AA, (b) 20 µM UA only, and the mixture of 20 µM UA, and interfering compounds including NaCl, 5-HT, Glu and CA, and (c) 1 µM DA only, and the mixture of 1 µM DA, and interfering compounds including NaCl, 5-HT, Glu, and CA in 0.1 M PB (pH 7.0) using Au NPs-CNT-G-pMet-SPCE. Concentrations of the interfering compounds were as follows: Glu (1 mM), AA (20 µM), CA (100 µM), DA (1 µM), NaCl (200 µM), and 5-HT (0.1 µM). DPV peak current responses of (d) 1 µM DA only and the mixture of 1 µM DA and various interfering compounds including Glu, AA, CA, NaCl, 5-HT, Ep, UA, and urea; (e) 20 µM UA only and the mixture of 20 µM UA and interfering compounds including Glu, AA, CA, NaCl, 5-HT, Ep, DA, and urea. Each interfering reagent was individually added to the DA or UA solution and tested separately. The concentrations of the reagents used were: Glu (1 mM), AA (20 µM), CA (100 µM), DA (1 µM), NaCl (200 µM), 5-HT (0.1 µM), Ep (0.1 µM), UA (20 µM), urea (1 mM). Each interfering compound was individually tested using CV except AA, DA, and UA tested all together.*

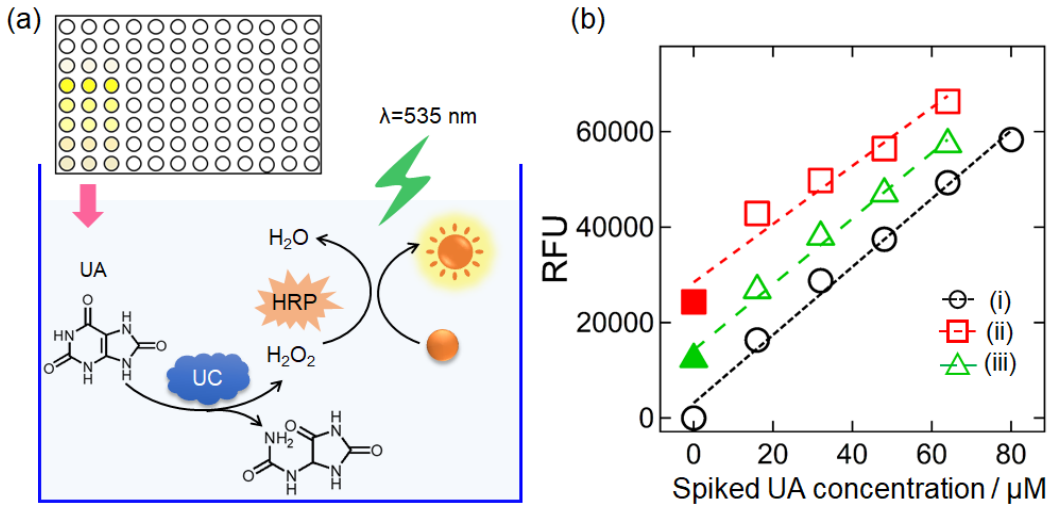

Fig. S10 *(a) Schematic showing UA detection using a commercial fluorometric assay kit. UC: uricase and HRP: horseradish peroxidase. (b) A series of linear plots for UA detection in (i) buffer, (ii) 20-fold, and (iii) 40-fold diluted human urine solutions with UA spiking concentrations from 16 to 80 μM. The filled markers were human urine analysis itself without any spiking of UA.*