

Supporting Information

Enhanced enantioseparation of drugs by capillary electrochromatography with L-cysteine functionalized gold nanoparticles based stationary phase

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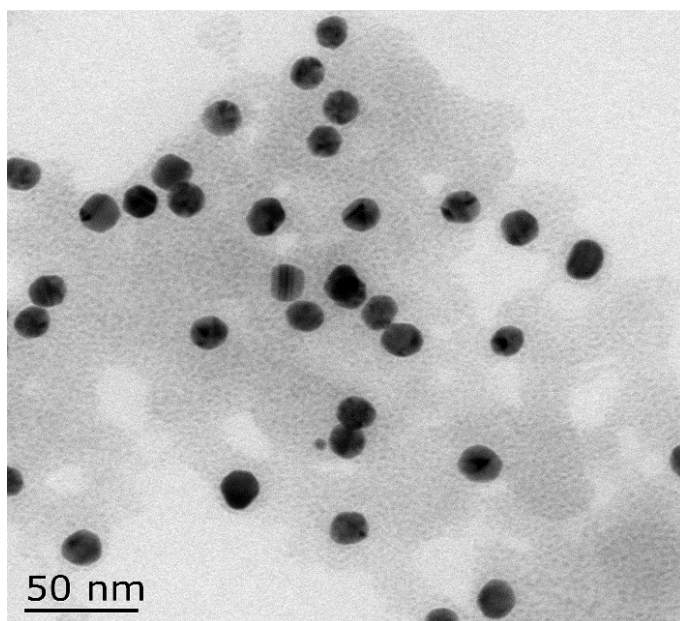


Figure S1 Transmission electron microscopy images of GNPs.

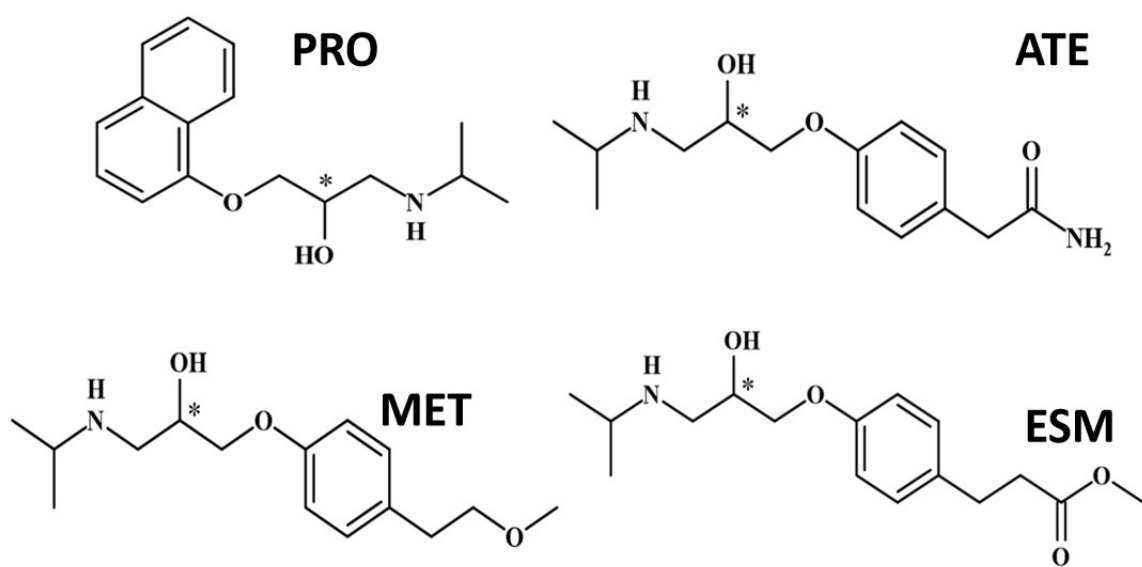


Figure S2 Structures of four analytes

Table S1 Element analyses of bare capillary and L-Cys-GNP-GMA@capillary column by EDS.

element	Bare capillary column					L-Cys-GNP-GMA@capillary column				
	C	Si	O	Au	S	C	Si	O	Au	S
Atom(%)	9.45	39.9	50.65	0	0	53.09	14.93	19.49	10.78	1.71
Element(wt.%)	5.55	54.83	39.62	0	0	17.18	11.30	8.40	61.52	1.61

Table S2 Chiral separation of tested drugs in different columns.

Drugs	Bare capillary column		L-Cys-GNP-APTES@ capillary column		L-Cys-GNP-GMA@ capillary column	
	t ₁ /t ₂ (min)	Rs/α	t ₁ /t ₂ (min)	Rs/α	t ₁ /t ₂ (min)	Rs/α
PRO	16.420/16.744	1.27/1.020	31.404/32.603	2.49/1.038	22.504/24.088	2.91/1.070
ATE	16.874/17.168	1.31/1.017	33.243/34.537	2.21/1.039	22.133/23.707	3.19/1.071
MET	16.371/16.672	1.42/1.018	31.913/33.141	2.49/1.038	21.645/23.162	3.16/1.070
ESM	16.599/16.866	1.27/1.016	32.214/33.468	2.24/1.039	22.580/24.074	2.93/1.066

Conditions : fused-silica capillary, L-Cys-GNP-APTES@capillary, L-Cys-GNP-GMA@capillary, 50 cm (41.5 cm effective length) ×75μm id; BGE, 40 mM borax buffer (40% methanol, v/v) containing 120 mM LA; pH 3.0 ; capillary temperature, 20 °C; applied voltage, 16 kV.

Table S3 Effect of buffer pH on enantiomeric separation

Drugs	Buffer pH									
	6.5		7.0		7.5		8.0		8.5	
	t ₁ / t ₂ (min)	Rs/α	t ₁ / t ₂ (min)	Rs/α	t ₁ / t ₂ (min)	Rs/α	t ₁ / t ₂ (min)	Rs/α	t ₁ / t ₂ (min)	Rs/α
PRO	22.404/	0.71/	21.971/	1.97/	22.504/	2.91/	22.817/	2.81/	23.161/	2.63/
	23.173	1.034	23.044	1.049	24.088	1.070	24.348	1.067	24.752	1.069
ATE	22.214/	1.08/	22.318/	2.07/	22.133/	3.19/	22.103/	2.85/	23.453/	2.77/
	22.687	1.021	23.187	1.043	23.707	1.071	23.753	1.075	24.932	1.063
MET	21.509/	1.16/	21.782/	2.06/	21.645/	3.16/	21.232/	2.81/	22.326/	2.61/
	22.007	1.023	22.738	1.044	23.162	1.070	22.955	1.081	23.767	1.065
ESM	22.645/	0.98/	22.721/	1.94/	22.580/	2.93/	22.407/	2.75/	23.324/	2.63/
	23.061	1.019	23.602	1.041	24.074	1.066	23.920	1.068	25.432	1.090

Conditions: applied voltage, 16 kV; BGE, 40 mM borax buffer (40% methanol, v/v) containing 120 mM LA; buffer pH, 6.5-8.5; other conditions as in Table S2.

Table S4 Effect of lactobionic acid concentration on enantiomeric separation

Drugs	LA concentration(mM)									
	75		90		105		120		135	
	Rs	α	Rs	α	Rs	α	Rs	α	Rs	α
PRO	1.64	1.034	2.20	1.056	2.64	1.066	2.91	1.070	2.75	1.068
ATE	1.58	1.032	2.47	1.053	2.79	1.068	3.15	1.071	2.84	1.070
MET	1.53	1.034	2.36	1.055	2.51	1.065	3.16	1.070	2.80	1.067
ESM	1.28	1.030	2.11	1.055	2.34	1.067	2.93	1.066	2.73	1.064

Conditions: applied voltage, 16 kV; BGE, 40 mM borax buffer (40% methanol, v/v) containing 75-135 mM LA; buffer pH, 7.5; other conditions as in Table S2.

Table S5 reproducibility data for L-Cys-GNP-APTES@capillary and L-Cys-GNP-GMA@capillary

	L-Cys-GNP-APTES@capillary (RSD/ %)			L-Cys-GNP-GMA@capillary (RSD/ %)		
	Rs	t ₁	t ₂	Rs	t ₁	t ₂
Intraday (n=6)	3.2	3.5	3.5	3.0	3.5	3.8
Interday (n=9)	4.4	3.3	3.1	3.9	3.6	3.2
Column-to-column (n=9)	4.2	4.0	3.8	4.5	4.7	4.1
Interbatch (n=9)	4.9	5.2	5.1	4.3	5.0	4.9

Conditions : L-Cys-GNP-APTES@capillary, L-Cys-GNP-GMA@capillary, 50 cm (41.5 cm effective length)

×75µm id; BGE, 40 mM borax buffer (40% methanol, v/v) containing 120 mM LA; pH 3.0 ; capillary temperature, 20 °C; applied voltage, 16 kV.