Electronic Supplementary Information

Nanogold hybrid silica gel and its 1-octadecanethiol self-assembled modified composite as stationary phase for liquid chromatography

Yuhuan Wang[a,c], Ruyan Wang[b], Lei Wang[a], Licheng Wang[a], Yong Guo[a], Xiaojing Liang[a,*], Shuai Wang[a,*]

[a] *Key Laboratory of Chemistry of Northwestern Plant Resources and Key Laboratory for Natural Medicine of Gansu Province, Lanzhou Institute of Chemical Physics, Chinese Academy of Sciences, Lanzhou 730000, China*

[b] *Engineering Technology Institute of Xinjiang Oilfield Company*

[c] *University of Chinese Academy of Sciences, Beijing 100049, China*

*Corresponding author: Xiaojing Liang, Shuai Wang

E-mail: licpws@hotmail.com (Shuai Wang); xjliang@licp.cas.cn (Xiaojing Liang)

Phone: + 86 931 4968266

Fax: +86 931 4968013

SI-Table 1 The results of specific surface area and pore diameter distribution.

Materials	Mean size (μm)	BET surface area ($m^2 g^{-1}$)	Pore volume ($cm^3 g^{-1}$)	Pore size (Å)
Bare silica	5	220	0.5152	97
25vol% sol_{Au}	6	194	0.5651	116
33vol% sol_{Au}	5.5	195	0.5769	118
50vol% sol_{Au}	3~6	194	0.6464	133

SI-Table 2 the retention factor of five alkylbenzenes

EO(*k*) / SPs	Benzene(*k*)	Methylbenzene(*k*)	Ethylbenzene(*k*)	Propylbenzene(*k*)	Butylbenzene(*k*)
Bare silica	0.47	0.65	1.03	1.55	2.05
25VsolAu%	0.48	0.85	1.38	2.45	4.43
33VsolAu%	0.58	1.05	1.81	3.30	6.05

(SPs: stationary phases; EO: elution order; *k*: retention factor)

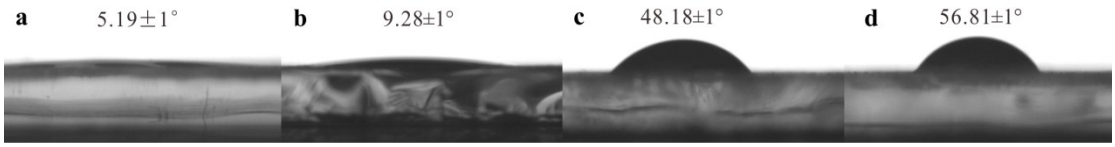
SI-Table 3 the retention factors and asymmetry factors of five bases.

Stationary phase	Bare silica		25Vsol$_{Au}$%		33Vsol$_{Au}$%		50Vsol$_{Au}$%	
Elution order	**Retention factor(k)**	**Asymmetry factor(As)**	**Retention factor(k)**	**Asymmetry factor(As)**	**Retention factor(k)**	**Asymmetry factor(As)**	**Retention factor(k)**	**Asymmetry factor(As)**
xanthine	1.31	2.74	1.24	4.02	1.37	2.54	1.19	2.31
hypoxanthine	2.74	4.11	2.29	3.35	2.48	1.85	2.16	2.42
adenine	4.41	-	3.02	4.42	3.08	2.51	2.85	3.25
guanine	4.57	-	3.82	1.74	4.34	1.14	3.55	10.1

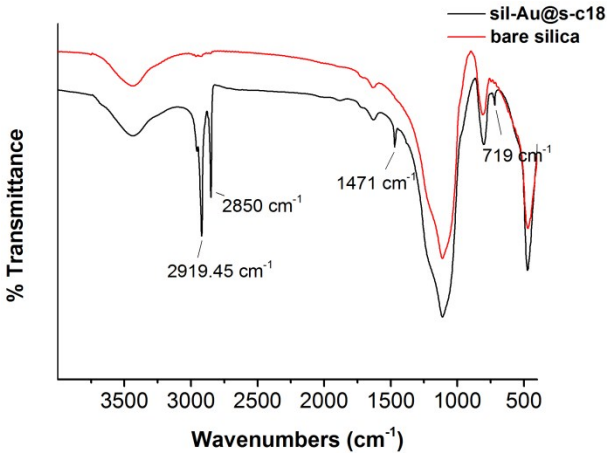
cytosine	6.87	2.63	4.92	2.43	5.24	2.23	4.62	2.01

SI-Table 4 Repeatability and reproducibility of hybridized column.

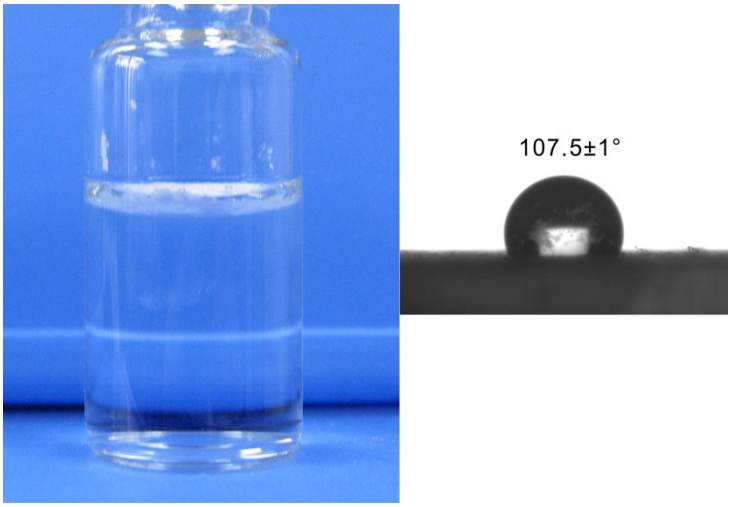
	RSD(%)	
	HILIC	**RP**
Intra-day (n=8)	0.38-0.78	0.14-0.46
Inter-day (n=8)	1.01-1.84	0.45-1.21



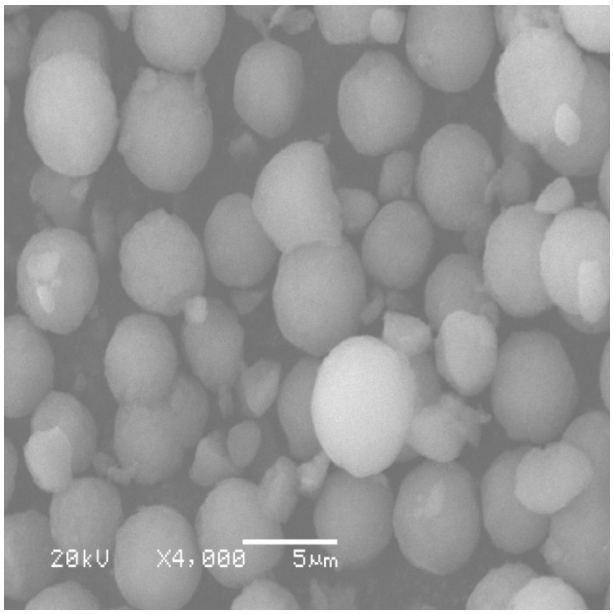
SI-Fig. 1 Contact angle measurements. Bare silica (a), 25 vol% sol $_{Au}$ Au@sil (b), 33 vol% sol $_{Au}$ Au@sil (c), 50 vol% sol $_{Au}$ Au@sil (d).



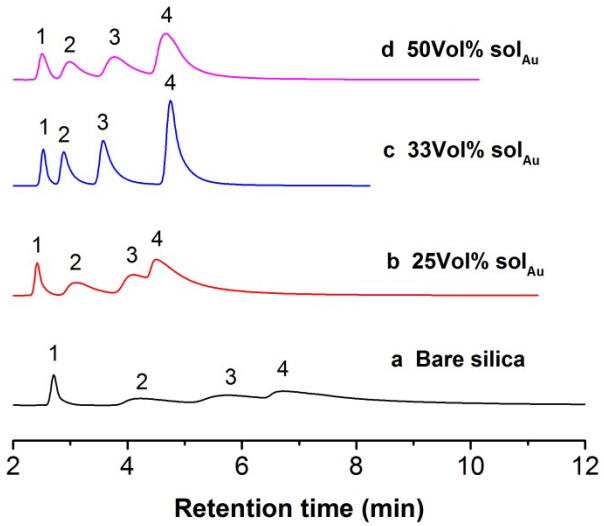
SI-Fig. 2 FTIR spectra of bare silica and C18-Au@sil stationary.



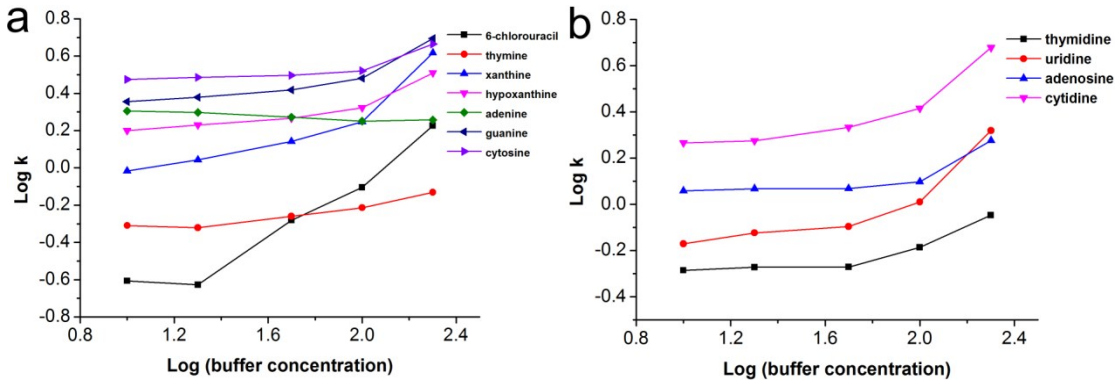
SI-Fig. 3 Images of hydrophobic property of the C18-Au@sil composites.



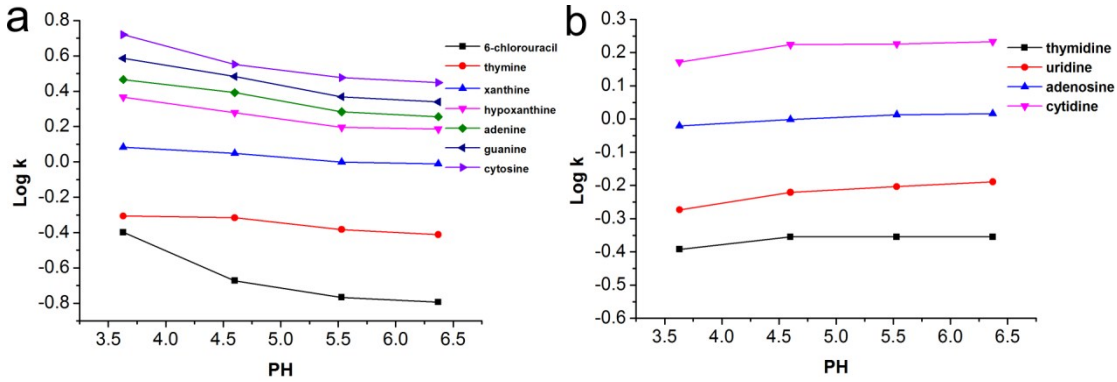
SI-Fig. 4 SEM images of the 50 vol% sol $_{Au}$ Au@sil stationary phase after eluted a period of time.



SI-Fig. 5 The separation of four nucleosides with different sol_{Au} volume ratio hybridized silica and bare silica columns. thymidine (1), uridine (2), adenosine (3), cytidine (4); mobile phase: 85% acetonitrile, 15% 20 mM ammonium acetate, pH = 6.37, flow rate = 1.0 mL min^{-1}, T = 25 °C, UV detection: 254nm.

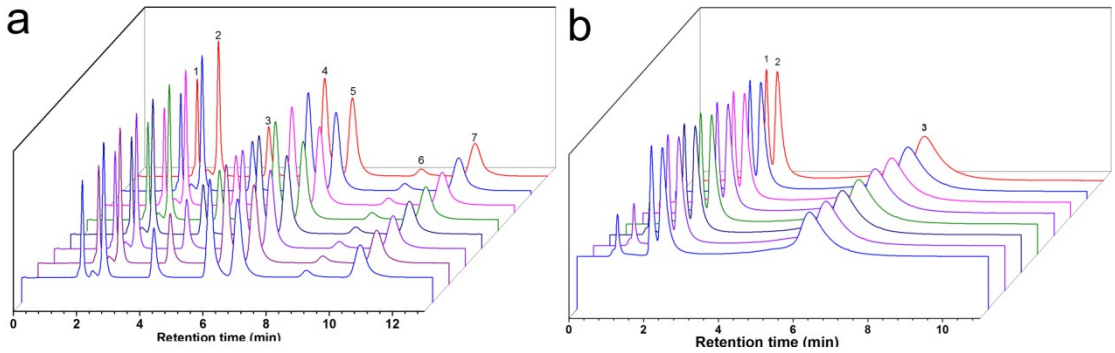


SI-Fig. 6 Effects of buffer concentration on the retention factor (*k*) with the 33 vol% sol_{Au} Au@sil column. Conditions : (a): 90% acetonitrile, 10% ammonium acetate, pH =6.37, T = 25 °C; (b): 85% acetonitrile, 15% ammonium acetate, pH =6.37, T = 25 °C; flow rate =1.0 mL min^{-1}, UV detection: 254 nm.

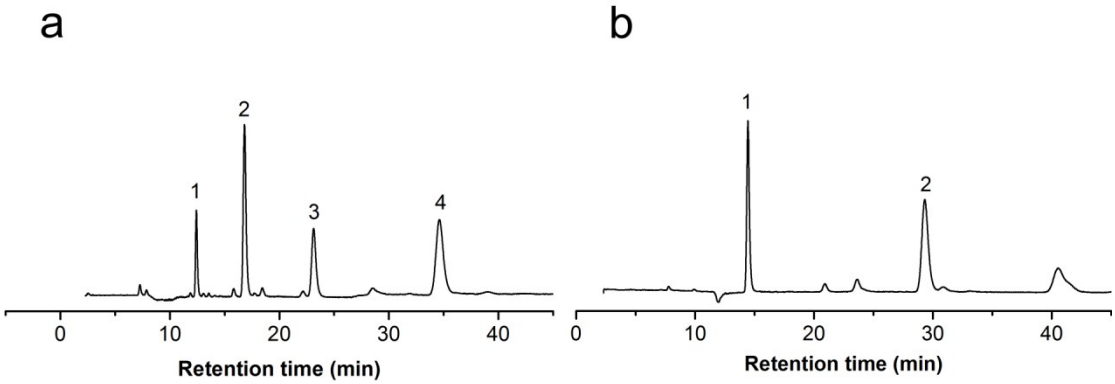


SI-Fig. 7 Effect of pH on the retention factor (*k*) with the 33 vol% sol_{Au} hybridized silica columns. Conditions: (a): 93% acetonitrile: 7% 20 mM ammonium acetate, T =

25 °C; (b): 85% acetonitrile, 15% 20 mM ammonium acetate, T = 25 °C; flow rate =1.0 mL min^{-1}, UV detection: 254 nm.



SI-Fig. 8 (a):the reproducibility test of the 33 vol% sol_{Au} hybridized silica column in the HILIC mode. (1) 6-chlorouracil, (2) thymine, (3) xanthine, (4) hypoxanthine, (5) adenine, (6) guanine, (7) cytosine; mobile phase: 93% acetonitrile: 7% 20 mM ammonium acetate, pH = 6.37, flow rate = 1.0 mL min^{-1}, T = 25 °C, UV detection: 254nm; (b): the reproducibility test of the 33 vol% sol_{Au} hybridized silica columns under the RPLC mode. (1) m-dihydroxybenzene, (2) o-dihydroxybenzene, (3) p-dihydroxybenzene; mobile phase: 100% deionized water, flow rate = 1.0 mL min^{-1}, T = 25 °C, UV detection: 254 nm.



SI-Fig. 9 Chromatograms for the separation of alkylbenzenes (a) and PAHs (b) on the C18 column. (a): (1) Benzene, (2) methylbenzene, (3) ethylbenzene, (4) propylbenzene, (b): (1) Benzene, (2) naphthaline; The experimental conditions were the same as Fig. 8.