Electronic Supplementary Material (ESI) for RSC Advances.

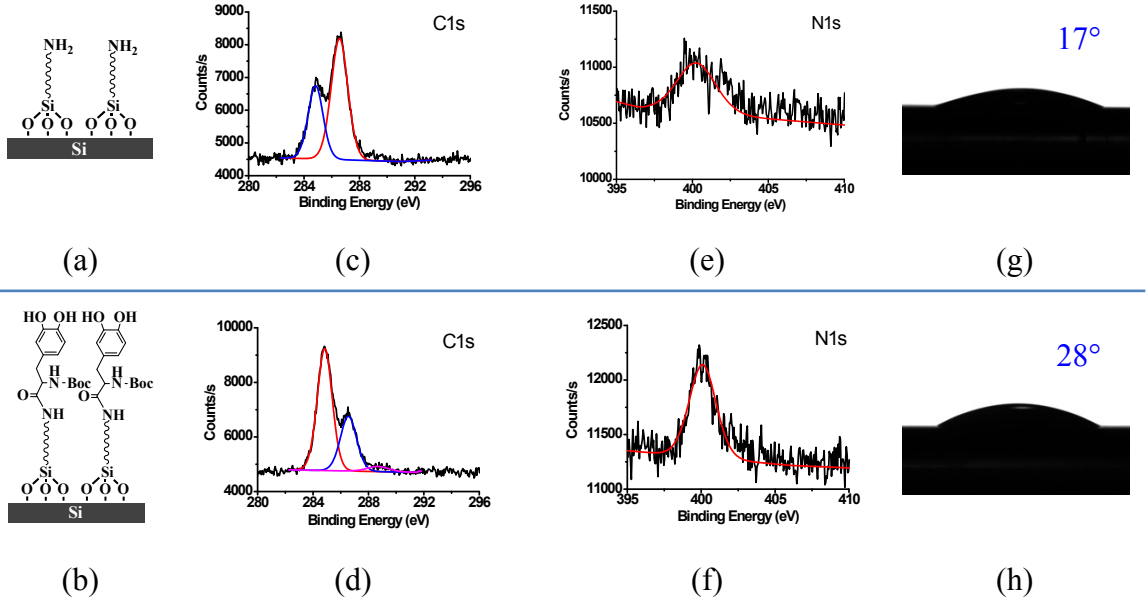

Figure S1. XPS C1s (c, d) and N1s (e, f) spectra and contact angle (g, h) of NH_2−terminated (a) and DOPA−terminated (b) surfaces, respectively.

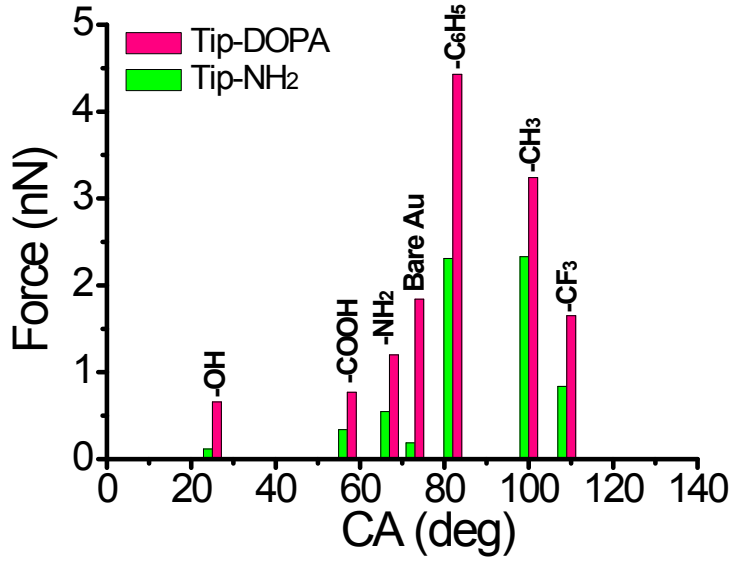

Figure S2. Comparison between average adhesion forces of DOPA−terminated and NH_2−terminated AFM tip on SAM functionalized surfaces.

Table S1. Surface potentials of different surfaces

Different surface	Surface potential (mV)
SAM−OH	-36.18
SAM−COOH	-37.72
SAM−NH_2	-33.91
Bare Au	-40.25
SAM−C_6H_5	-28.43
SAM−CF_3	-36.96
SAM−CH_3	-31.21
DOPA−modified AFM tip	-44.96

Table S2. Fitting parameters of EDLVO model for the interactions between DOPA and bare Au, OH−, COOH−, NH_2− C_6H_5−, CH_3−, and CF_3−terminated surface, respectively.

Parameter	Substrate						
	SAM−OH	SAM−COOH	SAM−NH_2	Au	SAM−C_6H_5	SAM−CH_3	SAM−CF_3
C_1	4.457	1.589	4.653	4.558	8.125×10^{8}	123.8	5.128×10^{3}
λ_1	0.7281	1.063	0.6626	0.5952	4.269	0.3357	3.412
b_1	-4.471×10^{-2}	-0.1512	8.063×10^{-2}	-0.1216	-18.01	90.24	-9.248
C_2	1.192	-0.1109	2.847	1.565	-1.972	2.047	-0.8661
λ_2	1.257	1.117	2.266	2.222	111	3.872	1.016
b_2	0.8332	5.011	-0.1301	-0.1994	-106.7	7.928×10^{-3}	-0.4058
C_3	-1.19	-0.2452	-3.206	-0.3169	-1.907×10^{4}	0.4858	-0.5219
λ_3	27.92	0.9286	15.46	7.362	34.63	17.64	-0.5233
b_3	75.73	3.841	-10.81	4.185	-104	94.18	-16.37
C_4	-1.256	1.444	1.201	1.191×10^{-2}	5.467	0.2744	-5.851
λ_4	32.34	3.091	10.65	0.3858	4.946	19.91	4.851
b_4	44.39	0.7676	0.5817	27.06	-1.539	72.44	-2.053
C_5	1.93	-0.5111	–	8.260×10^{-3}	–	0.7178	5.759
λ_5	48.56	1.387	–	0.8353	–	44.79	3.831
b_5	62.27	2.323	–	35.02	–	37.36	-0.5219
C_6	0.3988	2.598×10^{-2}	–	8.691×10^{-3}	–	3.405	–
λ_6	1.946	6.427	–	3.049	–	1.136	–

b_6	2.154	5.496	–	31.09	–	-0.1108	–
C_7	-968.7	2.149×10^{-3}	–	–	–	-1.252	–
λ_7	164.8	5.184	–	–	–	2.595×10^{4}	–
b_7	-464.8	26.17	–	–	–	1.81×10^{4}	–
C_8	–	1.929×10^{-2}	–	–	–	-0.3242	–
λ_8	–	134.8	–	–	–	5.073	–
b_8	–	6.401	–	–	–	7.984	–

To measure the thickness of self-assembled monolayers, a spectroscopic ellipsometer (M-2000V, J.A. Woollam) has been carried out at an incidence angle of 70° and with a wavelength scan from 370.1 to 999.1 nm. The monolayer thickness of each surface using ellipsometry was in the range of 1.0~1.3 nm (Table S3), so the thickness of the monolayer is approximately the same. The depth of XPS test is 10 nm, and the ratio of peak intensities of S $2p_{3/2}$ and Au elements on each surface was in the range of 0.048~0.055 (Table S3), evaluated by equation (1)[1]. It indicates that the density of the functional groups modified on each surface is almost the same, forming a uniform monomolecular layer, respectively.

$$\frac{N_{\mathrm{S}\,2p_{3/2}}}{N_{\mathrm{Au}}} = \frac{I_{\mathrm{S}\,2p_{3/2}} \times S_{Au}}{I_{Au} \times S_{\mathrm{S}\,2p_{3/2}}} \tag{1}$$

where $I_{\mathrm{S}\,2p_{3/2}}$ and I_{Au} represent each peak intensity; $S_{\mathrm{S}\,2p_{3/2}}$ and S_{Au} are the respective sensitivity factors.

Table S3. Thickness of each monolayer through ellipsometry and atomic ratio of S $2p_{3/2}$ versus Au on each surface.

surface	thickness (nm)	$N_{\mathrm{S}}\,2p_{3/2}/N_{\mathrm{Au}}$
SAM-OH	1.1	0.050
SAM-COOH	1.2	0.048
SAM-NH_2	1.1	0.049
SAM-C_6H_5	1.0	0.052
SAM-CH_3	1.3	0.049
SAM-CF_3	1.2	0.055

(1) Petrovykh, D. Y.; Kimurasuda, H.; Tarlov, M. J.; Whitman, L. J. Quantitative Characterization of DNA Films by X-ray Photoelectron Spectroscopy. *Langmuir* **2004**, *20* (2), 429−440.