Supporting Information

A strategy for constructing anti-adhesion surfaces based on interfacial thiol-ene photoclick chemistry between DOPA derivatives with a catechol anchor group and zwitterionic betaine macromolecules

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Synthesis of N,N'-Bis(acryloyl)cystamine (BAC)

N,N'-Bis(acryloyl)cystamine (BAC) was synthesized similar to the method established by E. Elisa *et al*. Cystamine dihydrochloride (CADH) (11.60 g, 0.05 mol) was added to a four-necked, 500 mL flask containing deionized water (50 mL) which was cooled to 0 – 5 ℃. Then acryloyl chloride (AC) dissolved in dichloromethane solution (10 mL, 10 mol/L) and an aqueous NaOH solution (20 mL, 10 mol/L) were added simultaneously and dropwise under stirring over a total time span of 1 h. Meanwhile, the temperature of the reaction system was kept at 0 – 5 ℃. After the addition was completed, the reaction mixture was stirred for more than 2 h at room temperature and filtrated. The filtrate was extracted three times with 100 mL of dichloromethane and the organic phases were dried over $MgSO_4$ and filtrated. Finally, the solvent was removed in a rotary evaporator at 40 ℃, so obtaining the white powdery solid product. Yield: 60 %.

FTIR (KBr pellet, cm^{-1}): 3252 (N–H, stretch); 3067 (=C–H, stretch); 2925, 2855 ($–CH_3$, $–CH_2–$, stretch); 1667 (C

＝O, stretch); 1653 (C＝C, stretch); 1556 (N–H, in-plane bend); 1466 (–CH_2–, deformation); 1405 (–CH_3, deformation), 1311 (C–H, in-plane bend); 1254 (–CH_3, deformation); 696 (N–H, out-of-plane bend). (ESI, Fig. S1 †)

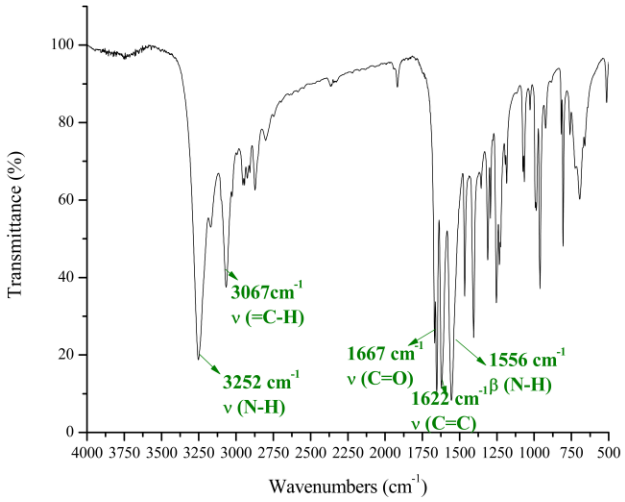

Fig. S1 FTIR spectrum of BAC.

Synthesis of N,N-dimethyl-N-(3-methacrylamidopropyl)-N-(3-sulfopropyl) ammonium betaine (DMAPMAPS)

N,N-dimethyl-N-(3-methacrylamidopropyl)-N-(3-sulfopropyl) ammonium betaine (DMAPMAPS) was synthesized by the ring-opening reaction between DMAPMA and 1,3-PS. A mixture of 1,3-PS (13.18 g, 0.11 mol) and acetone (25 mL) was added dropwise into a three-necked flask containing a mixture of DMAPMA (17.02 g, 0.10 mol) and acetone (25 mL) under stirring over a total time span of 0.5 h. Then the reaction mixture was stirred for more than 24 h at room temperature and filtrated. The residue was washed and vacuum dried at 40 ℃, and then the final white powdery product was obtained. Yield: 94%.

FTIR (KBr pellet, cm^{-1}): 3320 (N–H, stretch); 3030 (＝C–H, stretch); 2976, 2928, 2877 (–CH_3, –CH_2–, stretch); 1653 (C＝O, stretch); 1611 (C＝C, stretch); 1543 (N–H, in-plane bend); 1484 (N^+–C, stretch); 1193 (S＝O, deformation); 1034 (S＝O, deformation). (ESI, Fig. S2†)

^{1}H-NMR δ (400 MHz, D_2O, ppm): 5.66 ppm (s, 1H, C*H*H＝CH–); 5.42 ppm (s, 1H, CH*H*=CH–); 3.40 ~ 3.44 ppm (t, 2H, SO_3–CH_2–CH_2–CH_2–); 3.29 ~ 3.33 ppm (m, 4H, –NH–CH_2–); 3.05 ppm (s, 6H, –N(CH_3)$_2$–); 2.90 ~ 2.94 ppm (t, 2H, –CH_2–SO_3); 2.11 ~ 2.19 ppm (m, 2H, –CH_2–CH_2–SO_3); 1.96 ppm (s, 2H, –CO–C(CH_3)＝). (ESI, Fig. S3†)

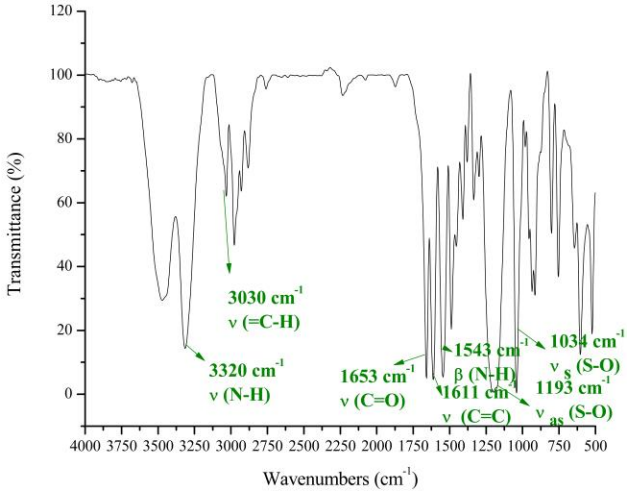

Fig. S2 FTIR spectrum of DMPMAPS.

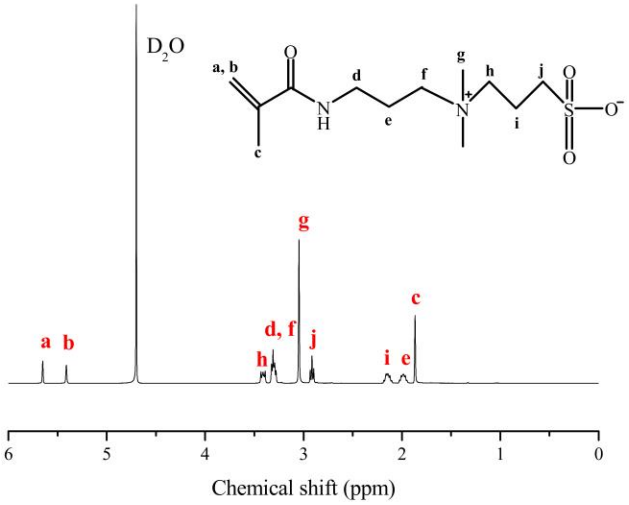

Fig. S3 ^{1}H-NMR spectrum of DMAPMAPS.

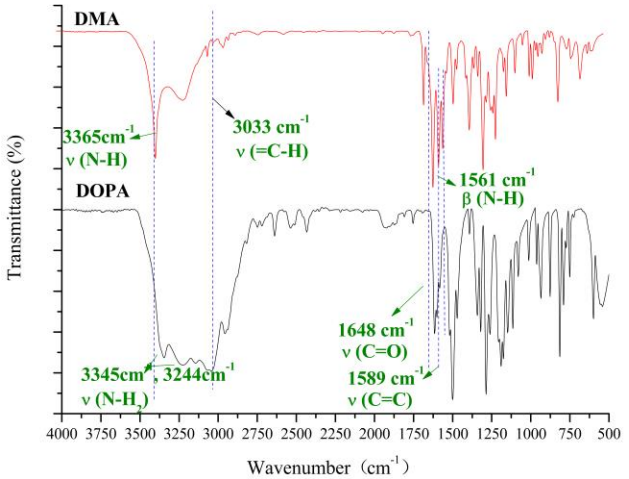

Fig. S4 FTIR spectra of DMA and DOPA.

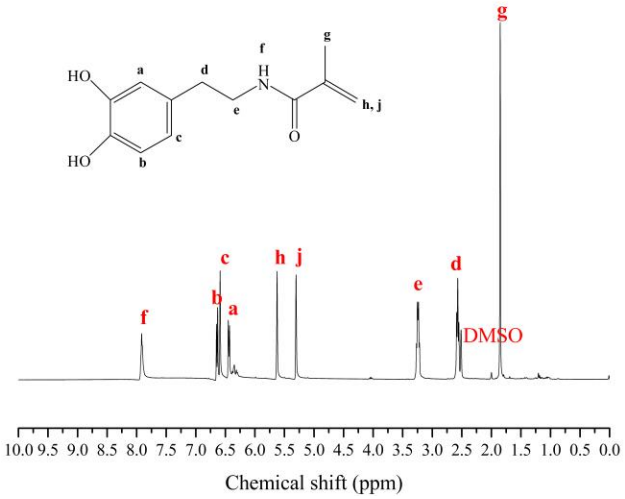

Fig. S5 ^{1}H-NMR spectrum of DMA.

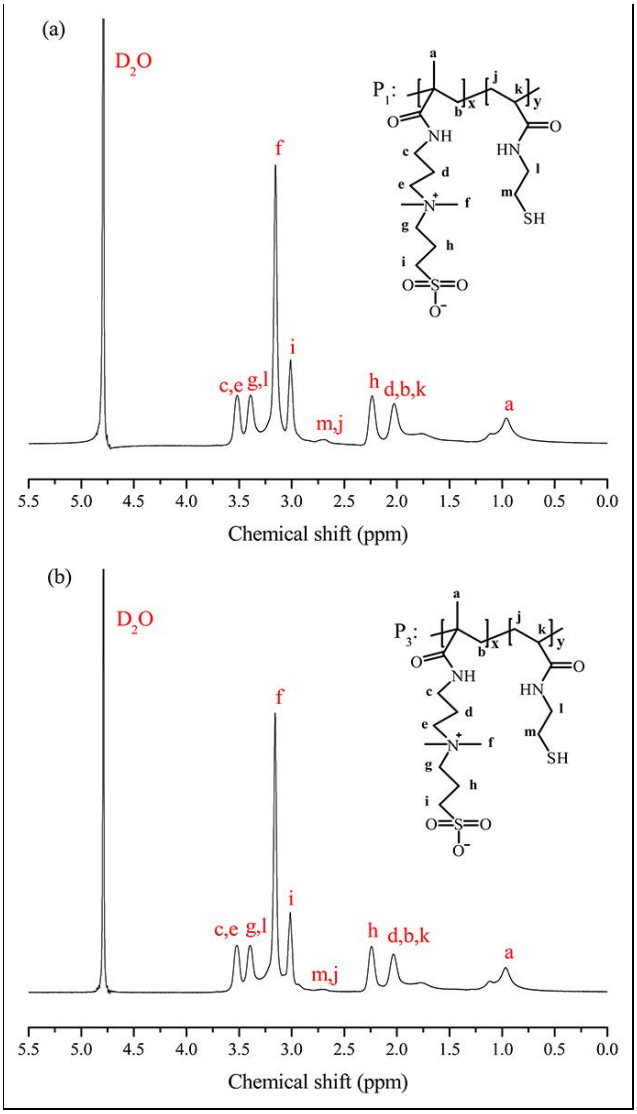

Fig. S6 ^{1}H-NMR spectra of poly (DMAPMAPS-*co*-BAC) sample P_1 (a) and P_3 (b).

Table S1 The data on integral areas of ^{1}H NMR spectra of P_1 and P_3.

Proton peak	Chemical shift (ppm)	Integral area	
		P_1	P_3
a	0.96	1.70	1.63
c, e	3.51	1.00	1.00
d, b, k	2.01	2.32	2.17
f	3.15	1.08	3.96
g, l	3.39	3.57	1.16
h	2.23	1.13	1.14
i	3.01	1.26	1.38
m, j	2.72	0.14	0.07