Electronic Supplementary Material (ESI) for Materials Advances.

Supporting Information

Preparation and Characterisation of Sulfobetaine Zwitterionic Siloxane-based Biostable Polyurethanes

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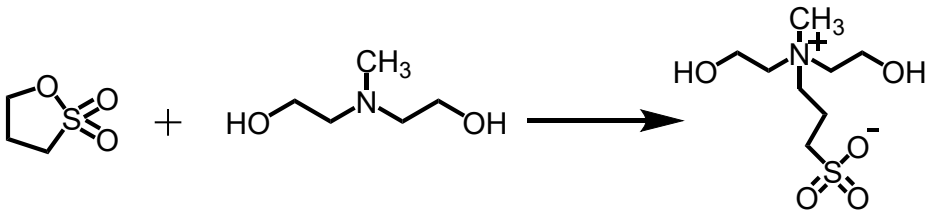
Contents

1. Synthesis and characterization of sulfobetaine diol (SB-MDEA)

SB-MDEA with two hydroxyl groups was synthesised from 1,3-propanesultone (PS) and N-methyldiethanolamine (MDEA) (Scheme S1). In short, in a round bottom flask under magnetic stirring, weigh 10 g (0.084 mol) of MDEA and 10.26 g (0.084 mol) of PS and dissolve them in 150 mL of anhydrous DCE. After injecting nitrogen for 20 minutes, the flask was sealed and the mixture was stirred at 40 °C for 15 hours. Then a rotary evaporator was used to remove the solvent from the reaction mixture and a white precipitate was obtained. The product was washed several times with ether to remove unreacted materials, and SB-MDEA was obtained in high yield. Figure S1 exhibits the FTIR spectrum of SB-MDEA. The free and hydrogen bonded O-H stretching vibration absorption peaks appeared at 3450 cm^{-1} and 3024 cm^{-1}, respectively. The peaks at 3024 cm^{-1}~2866 cm^{-1} were ascribed to the stretching vibrations of CH_2 groups in SB-MDEA. The characteristic stretching vibration absorption peak of C-N at 1541 cm^{-1} and that of the SO_3^- at 1038 cm^{-1} were also clearly observed. The chemical structure was further confirmed by ^{1}H-NMR in D_2O as shown in Figure S2. δ 3.97 ($C\underline{H}_2$-OH), 3.54 (CH_2-$C\underline{H}_2$-N^+), 3.14 (N^+-$C\underline{H}_3$), 2.90 (SO_3^--$C\underline{H}_2$), 2.18 (CH_2-$C\underline{H}_2$-CH_2) ppm. Moreover, mass spectrometry analysis was carried out on a liquid chromatography-mass spectrometer (AGILENT, Q-TOF 6520) equipped with an atmospheric pressure chemical ionisation source (APCI) in positive mode and the solvent used was H_2O and the result is shown in Figure S3. MS ($APCI^+$) calcd for C8H19NO5S: 242.11 for $[M+H]^+$, 483.20 for $[2M+H]^+$, 679.26 for $[3M-CH_2-CH_2-OH+H]^+$ and 724.30 for $[3M+1]^+$, found 242.10, 483.10, 679.29 and 724.08.



Scheme S1. Synthetic pathway of SB-MDEA.

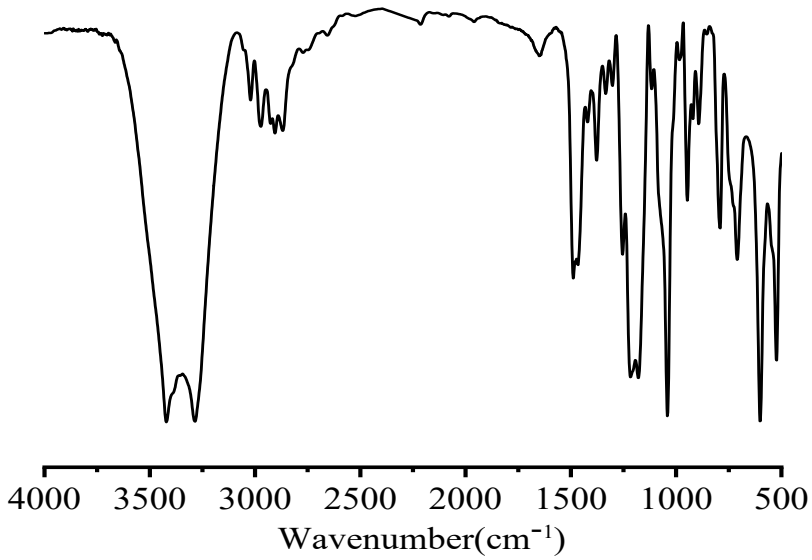


Figure S1. FT-IR spectrum of SB-MDEA.

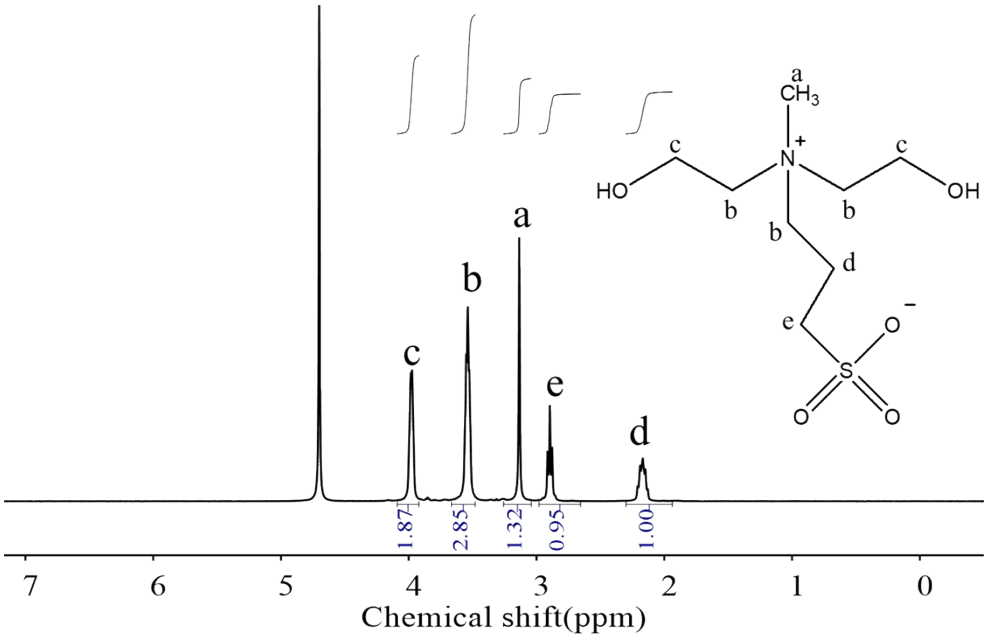


Figure S2. ^{1}H-NMR spectrum of SB-MDEA in D_2O.

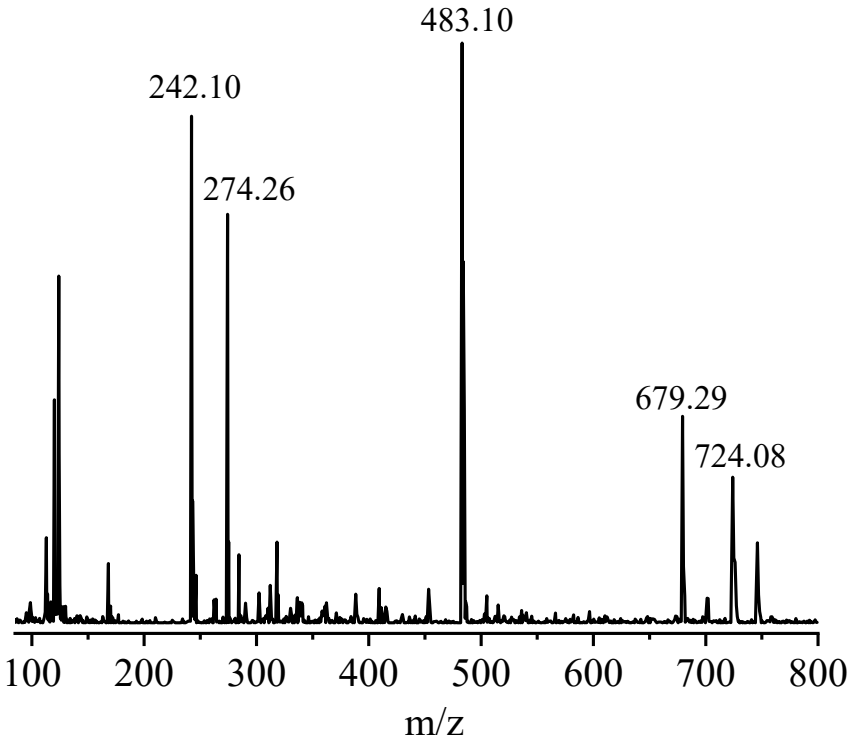


Figure S3. Mass spectrum of SB-MDEA.

2. FTIR spectra of starting materials

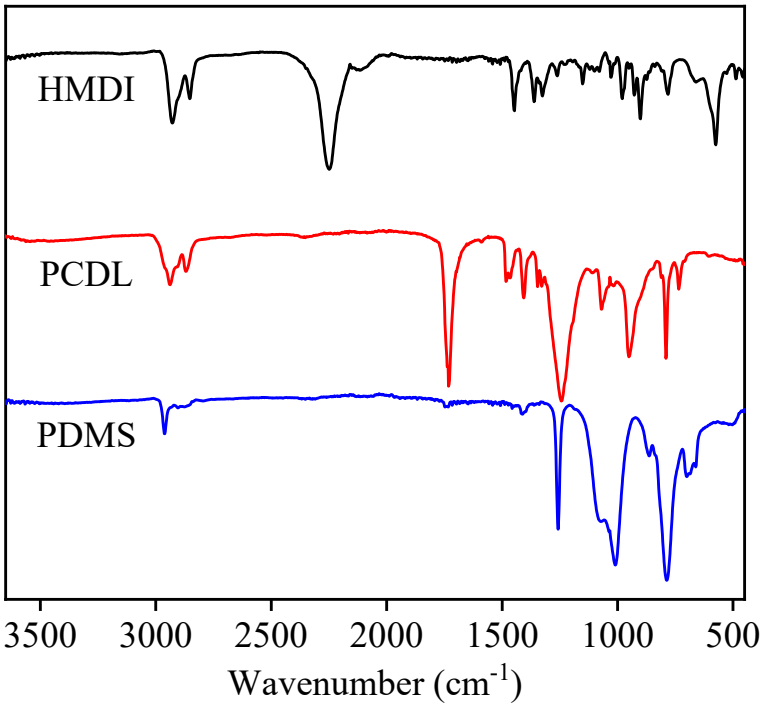


Figure S4. FTIR spectra of HMDI, PCDL and PDMS.

3. ^{1}H NMR spectra of siloxane-based PC PUs and sulfobetaine modified ones

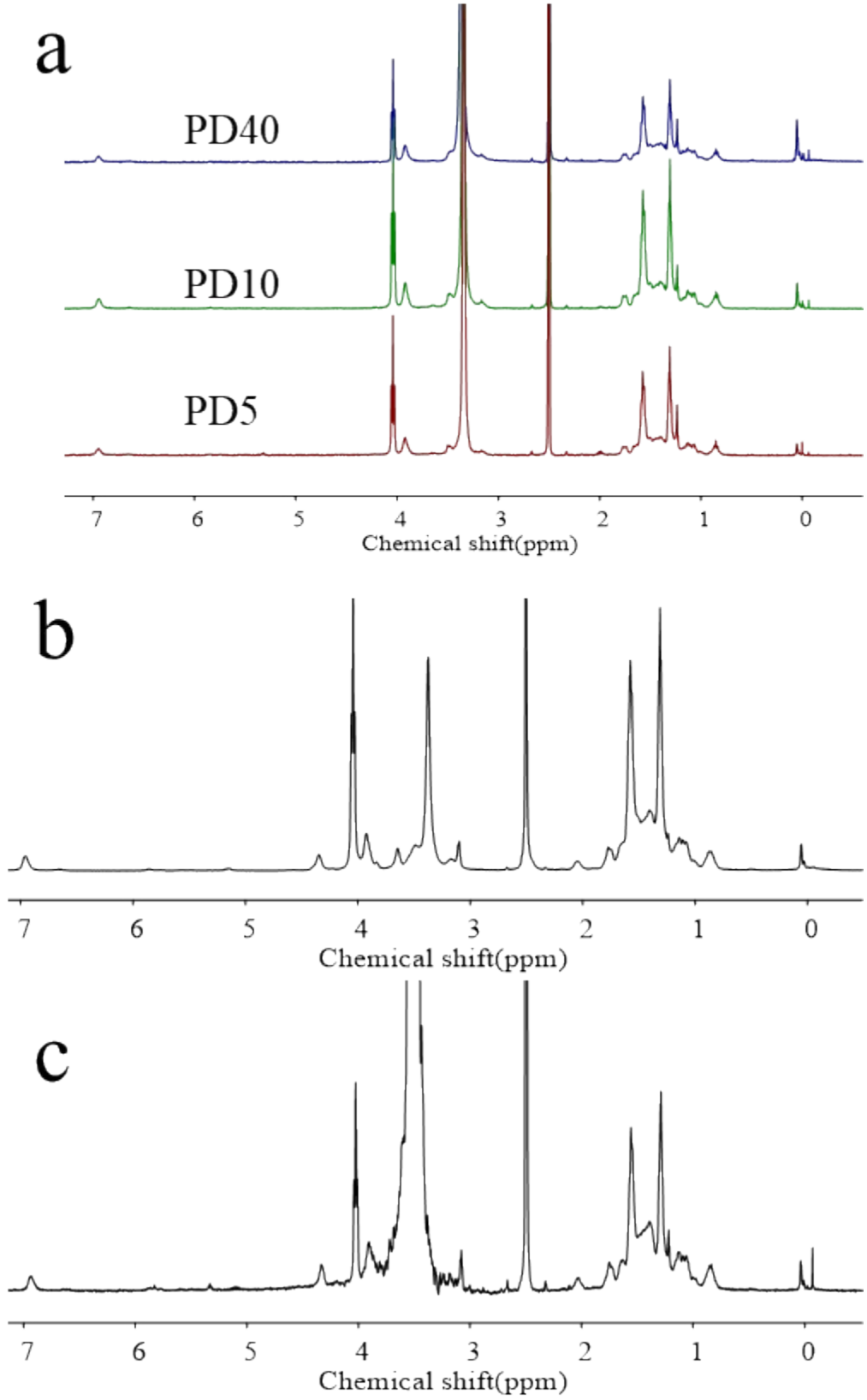


Figure S5. ^{1}H-NMR spectra of PD x (a), S2PD20 (b) and S3PD20 (c).

4. Miscibility of PCDL, PDMS and SB-MDEA in DMAc and DMSO

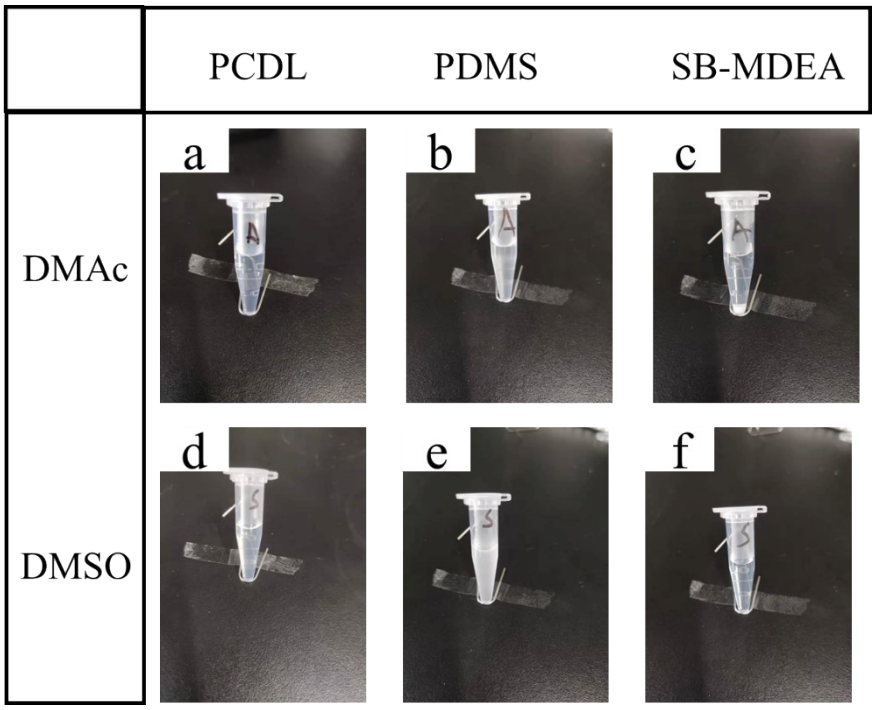


Figure S6. Dissolution of raw materials in different solvents.

5. WCA data of siloxane-based PCUs and sulfobetaine modified ones

Table S1 WCS data (°) of siloxane-based PCUs and sulfobetaine modified ones at 0 s, 10 s, 20 s, 40 s and 60 s

Sample	0 s	10 s	20 s	40 s	60s
PC	94.3±0.6	88.8±1.4	87.6±0.9	86.1±0.7	86.0±1.0
PD5	106.2±0.5	105.0±0.8	104.3±1.3	104.0±0.5	104.0±0.8
PD10	107.3±1.5	106.9±1.5	106.2±0.6	106.6±2.0	105.6±0.7
PD20	111.4±1.5	106.8±1.2	104.9±1.0	103.9±0.8	103.9±1.1
PD40	116.8±0.9	111.2±1.2	110.7±0.8	110.0±1.3	109.6±0.6
S1PD20	93.2±1.0	92.1±0.9	91.9±0.6	91.2±1.0	90.9±0.7
S2PD20	95.5±0.9	93.6±1.2	93.0±0.8	91.8±1.1	91.1±1.5
S3PD20	95.1±1.9	93.7±1.7	93.0±1.2	92.7±1.5	91.9±0.8

Table S2 WCA (°) of sample surfaces of sulfobetaine modified siloxane-based PCUs after the storage under the air atmosphere in different times

Time (d)	S1PD20	S2PD20	S3PD20
0	93.2±1.0	95.5±0.9	95.1±1.9
3	91.9±0.6	93.1±1.4	94.0±0.7
6	92.2±1.5	94.8±0.8	96.7±0.4
10	93.9±0.9	96.3±0.7	94.9±0.7