Supplementary Information

Construction of Antibacterial Adhesion Surface Based on Bioinspired Borneol-Containing Glycopolymers

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1. Materials.

Glycidyl methacrylate (GMA), 3-Aminopropyltriethoxysilane (APTES), thiazolyl blue tetrazolium bromide (MTT), and the free-radical initiator for polymerization, 4,4′-azobis(4-cyanovaleric acid) (ACVA) were obtained from Sigma-Aldrich. Isobornyl acrylate was obtained from TCI. 2-lactobionamidoethyl methacrylamide (LAEMA) was prepared by previously reported methods.[1] The Live/Dead BacLight Bacterial Viability Kit and Micro BCA™ Protein Assay Kit were purchased from Thermo Fisher Scientific. The other chemicals were used as received without further purification.

2. Characterization.

FT-IR spectra were recorded by using a Bruker VERTEX 80V. ^{1}H NMR spectra were acquired with a Bruker AVANCE NMR spectrometer (500 MHz). The surface morphology and roughness of the coatings were characterized by Atomic Force

Microscopy (AFM, SPA-300). Glass transition temperatures (T_g) of polymers were obtained via Differential Scanning Calorimetry (NETZSCH DSC 204) from 20 to 180 °C at a rate of 10 °C min^{-1} under N_2. The thermal stability of polymer was investigated by thermogravimetric analysis (TGA; Q500, TA) from 30 ℃ to 650 ℃ at a heating rate of 10 °C min^{-1} under N_2. The molecular weights and polydispersity index (PDI) of polymers were measured via gel permeation chromatography (GPC). The water contact angles were performed by a JC2000C contact angle measurement instrument.

3. Antibacterial Activity Tests.

Bacterial culture and pre-treatments: *E. coli* were freshly prepared by inoculating a single colony from the Luria-Bertani (LB) plate in 25 mL sterile LB broth. *S. aureus* was prepared by isolating the single colony from tryptic soy agar (TSA) plate and suspend in 25 mL TSB broth. After cultured at 37 °C for 24 h, the bacteria were washed with PBS by centrifugation three times. The harvested bacteria were suspended in PBS and diluted to 8×10^8 cells/mL for further use.

The Plate Colony Counting: 200 μL diluted bacterial suspension (8×10^8 cells/mL) was added to coating surfaces and co-cultured with samples at 37 °C for 3 h, followed by washing all the coating surfaces to remove the suspended bacteria. Then, bacteria adhered on the surface of samples were dispersed into 100 μL sterilized PBS by sonicating. Subsequently, the bacterial suspension was diluted 100 times and then 50 μL of the suspension were pipetted and evenly plated on agar plates for another 24 h incubation. The bacterial inhibition efficiency was calculated using the following formula: The bacterial inhibition ratio (%) = (B − A)/B × 100 %, where A is the number of bacteria on the experimental group, and B is the number of bacteria on the control.

The Live/Dead Staining Assay: After co-culture with bacterial suspension, the samples were rinsed with PBS buffer for 3 times. The sample surfaces were dyed with 100 μL

of Live/Dead stain for 15 min in the dark environment, followed by washing with PBS buffer. The samples were observed by a Zeiss AxioVert microscope on the randomly chosen locations.

***6.* Biocompatibility of the coatings.**

The toxicity of the polymers and coatings was investigated using MRC-5 cells by MTT assay. Different coatings were placed individually into 24-well plates and DMEM culture medium with a volume fraction of 6 cm^2/mL specimen superficial area was added, and the extracts were collected at 24, 48, and 72 h. MRC-5 cells were seeded in 96-well plates in a density of 5000 cells per well with 100 μL DMEM medium and incubated for 24 h in a humidified incubator containing 5% CO_2 at 37 °C. Then the media were replaced with 100 μL DMEM medium containing extracts, and the cells were incubated for another 24 h. Then, 20 μL MTT (5 mg/mL in sterilized PBS) were injected into each well. After incubation for 3 h, the media were discarded, followed by the addition of 100 μL of dimethyl sulfoxide / isopropanol (1:1 v/v) solution to dissolve the formazan crystals. The absorbance at 570 nm was measured with a TECAN Genios pro microplate reader and percent cell viability was calculated by comparing OD values of cells treated with/without extracts.

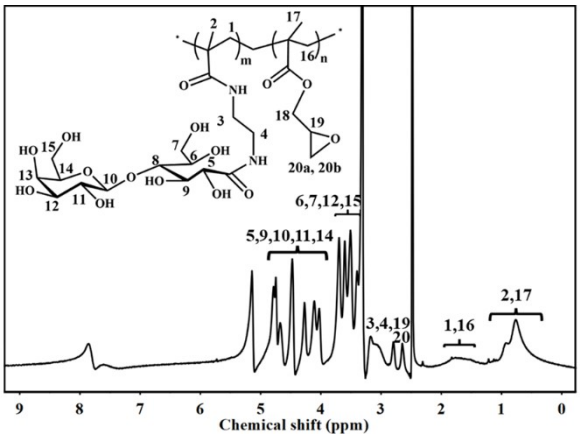

Figure S1. ^{1}H NMR spectrum of the polymer PLG.

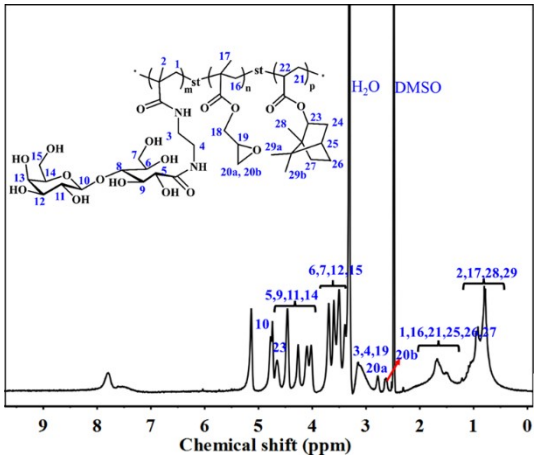

Figure S2. ^{1}H NMR spectrum of the polymer PLGB-1.

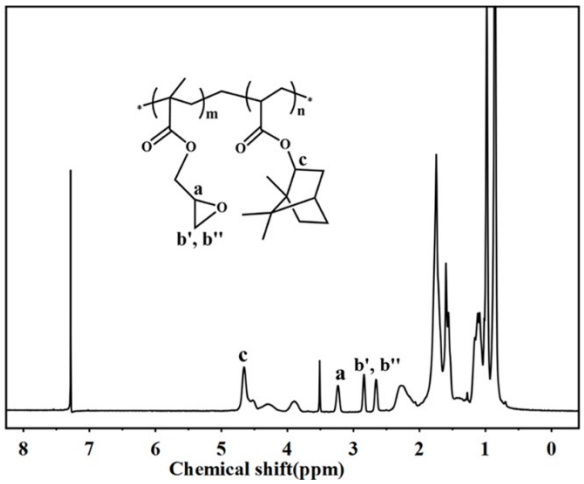

Figure S3. ^{1}H NMR spectrum of the polymer PGB.

Figure S4. The image of the samples (silicon wafer, APT-Si, APT-PLG, APT-PLGB-1, APT-PLGB-2, and APT-PGB).

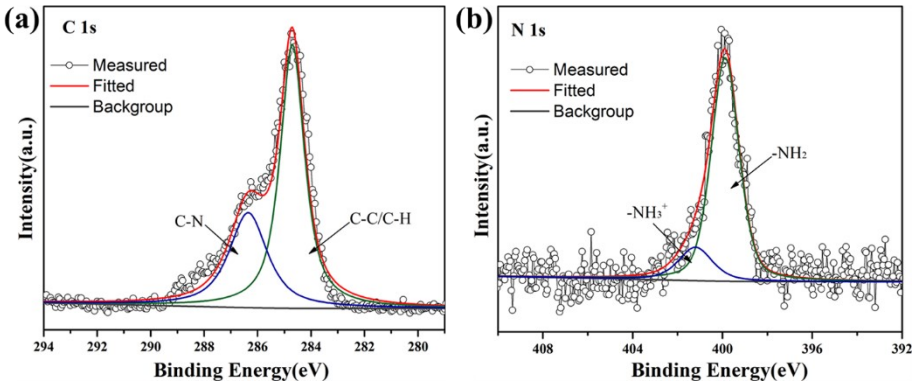

Figure S5. (a) high resolution C 1s XPS profiles of the APT-Si surface; (c) high resolution C 1s XPS profiles of the APT-Si surface.

REFERENCES

1. Narain, R.; Armes, S. P., Direct Synthesis and Aqueous Solution Properties of Well-Defined Cyclic Sugar Methacrylate Polymers. *Macromolecules* **2003,** *36* (13), 4675-4678.