Supporting Information

Antibacterial plasticizers based on bio-based engineering elastomers for medical PVC: synthesis, characterization and properties

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EXPERIMENTAL SECTION

Morphology of Platelet Adhesion and Activation of PVC samples

PVC samples were cut into squares with a side length of 5 mm. Fresh rat blood was centrifuged at l500 rpm for 15 min and the top layer of platelet rich plasma (PRP) was collected. Afterward, each PVC sample was immersed in 200 μL of PRP in the 96-well plate and then incubated for 2 h at 37 °C. Then the samples were carefully rinsed with normal saline in order to remove nonfirmly adsorbed platelets. After fixed with 2.5 % glutaraldehyde solution for 24 h, the platelets adsorbed on the surfaces were dehydrated with increasing concentrations of ethanol (25 % and 50 % for 2 min, 75 %, 87.5 %, 100%, 100 % and 100% for 3 min, respectively). After natural drying, the obtained samples were observed with SEM.

Cellular Toxicity Evaluation of PVC samples.

L929 cells were seeded into a 96-well plate (100 μL, 1×10^5 cfu/mL). After the PVC extraction solutions were obtained, each cell culture solution in 96 well plate was replaced by 100 μL of extraction solution. The positive and blank controls were

the minimum essential medium (MEM) cell culture solution with 10% DMSO and MEM cell culture solution, respectively. After incubation at 37 °C for 24 h, the extraction solution, cell culture solution and DMSO solution were replaced by 50 μL MTT solution, respectively. After another culturing for 2 h, MTT solution was replaced by 100 μL of isopropanol and cells and isopropanol were mixed evenly. The corresponding absorbance at 570 nm was recorded.

In Vivo Anti-Infection Assay.

The mice were anesthetized with isoflurane and the hair on the back of the mice was shaved off. Two 0.8 -1.0 cm incisions were cut on both sides of the back, which were parallel to the spine of the mice. *S. aureus* suspension (1 μL, 1×10^9 cfu/mL) was inoculated on each PVC sample and then PVC sample with 1×10^6 CFU *S. aureus* was implanted subcutaneously into each incision of the mice (Figure S9). Two incisions of the same mouse were implanted with the same PVC samples. The incision was closed with 4-0 suture. After 1 day the mice were sacrificed and the samples were removed for characterization. The infectious tissues were weighed, collected in normal saline (10 mg/mL) and homogenized. After the dilution for 500 times, 50 μL of the diluted tissue homogenates were plated on LB-agar and incubated at 37 °C for 24 h to get a single colony. The PVC samples were placed in normal saline solution, and stained with live/dead Bac Light Bacterial Viability Kit and the bacteria were imaged by CLSM. The blood of mice was collected from eyes for blood test. Cells on the surface of PVC samples were dehydrated by ethanol of different concentrations (25 %, 50 %, 75 %, 87.5 %, 100 %). The subcutaneous tissues of mice were excised and fixed with 4% paraformaldehyde solution, embedded in paraffin, cut into slices with a thickness of 5 μm and stained with hematoxylin-eosin (H&E) according to the standard protocols. Finally, the obtained sections were observed under an optical microscope.

Statistical Analysis.

Each experiment was repeated at least three times, where data are shown as means ± standard deviation.

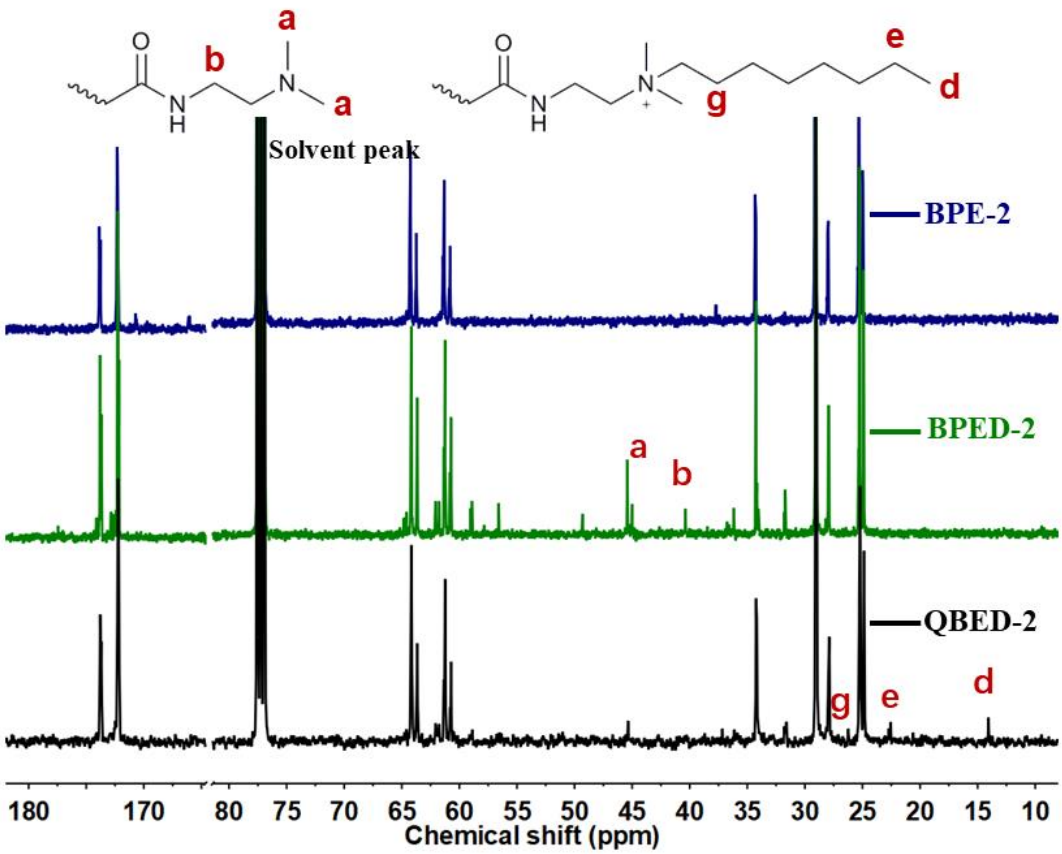

Figure S1. Quantitative ^{13}C NMR spectra of BPE-2, BPED-2 and QBED-2.

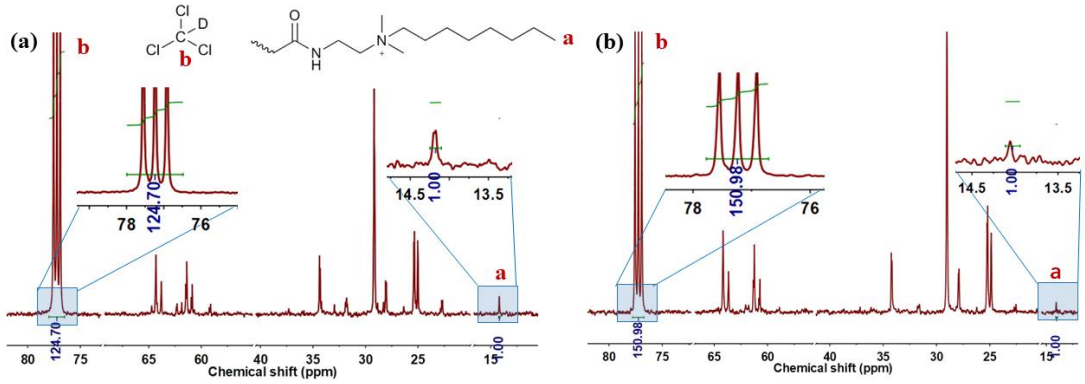

Figure S2. (a) Analysis of quantitative ^{13}C NMR spectrum of QBED-1, (b) analysis of quantitative ^{13}C NMR spectrum of QBED-2.

$$\text{wt.\%} = \left(\frac{m_{CDCl_3}/M_{CDCl_3})/(A_b/A_a)\times M_{QDED}}{m_{QBED}} \times 100\%\right.$$

$m_{1\,CDCl_3}$ = 0.8674 g

m_{QBED-1} = 0.1092 g

$m_{2\,CDCl_3}$=0.8792 g

m_{QBED-2}=0.1083 g

M_{CDCl_3} = 120.38 g/mol

M_{QDED} = 281.28 g/mol g

A_{b1}/A_{a1} = 124.7

A_{b2}/A_{a2} = 150.98

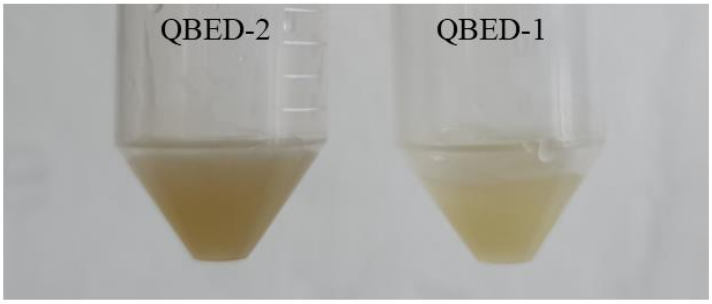

Figure S3. Images of QBED-1 and QBED-2.

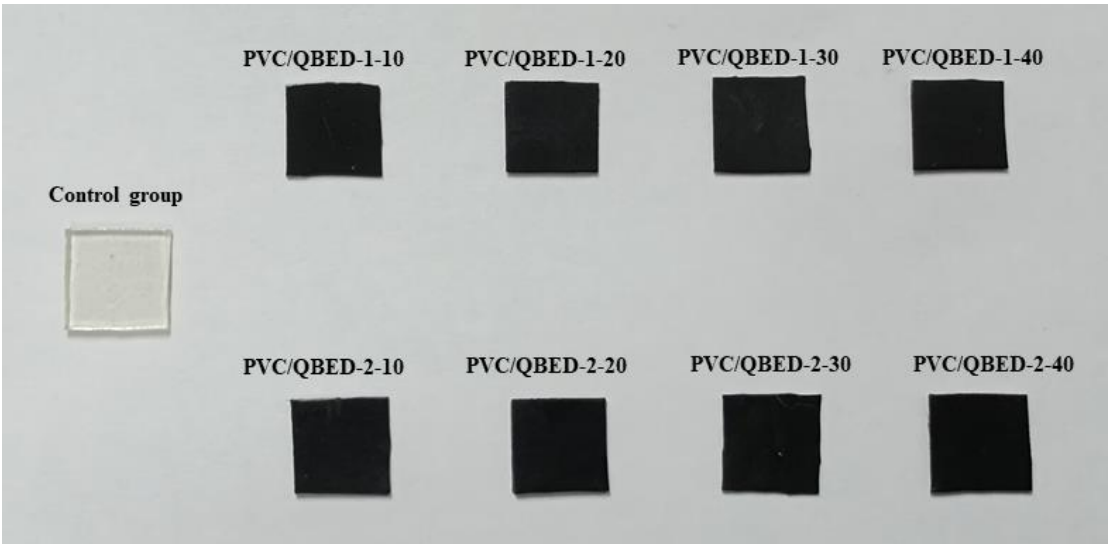

Figure S4. Images of PVC samples.

Table S1. Log reduction of PVC samples against *S. aureus*

Immersing time in PBS (Days)	Log reduction							
	PVC/QBED-1-n				PVC/QBED-2-n			
	10	20	30	40	10	20	30	40
0	> 3	> 3	> 3	> 3	> 3	> 3	> 3	> 3
1	2.0	> 3	> 3	> 3	> 3	> 3	> 3	> 3
3	2.5	> 3	> 3	> 3	> 3	> 3	> 3	> 3
5	1.1	1.8	2.0	1.9	> 2	1.6	1.6	2.0
7	0.2	1.4	1.2	1.3	0.8	1.3	1.4	1.5

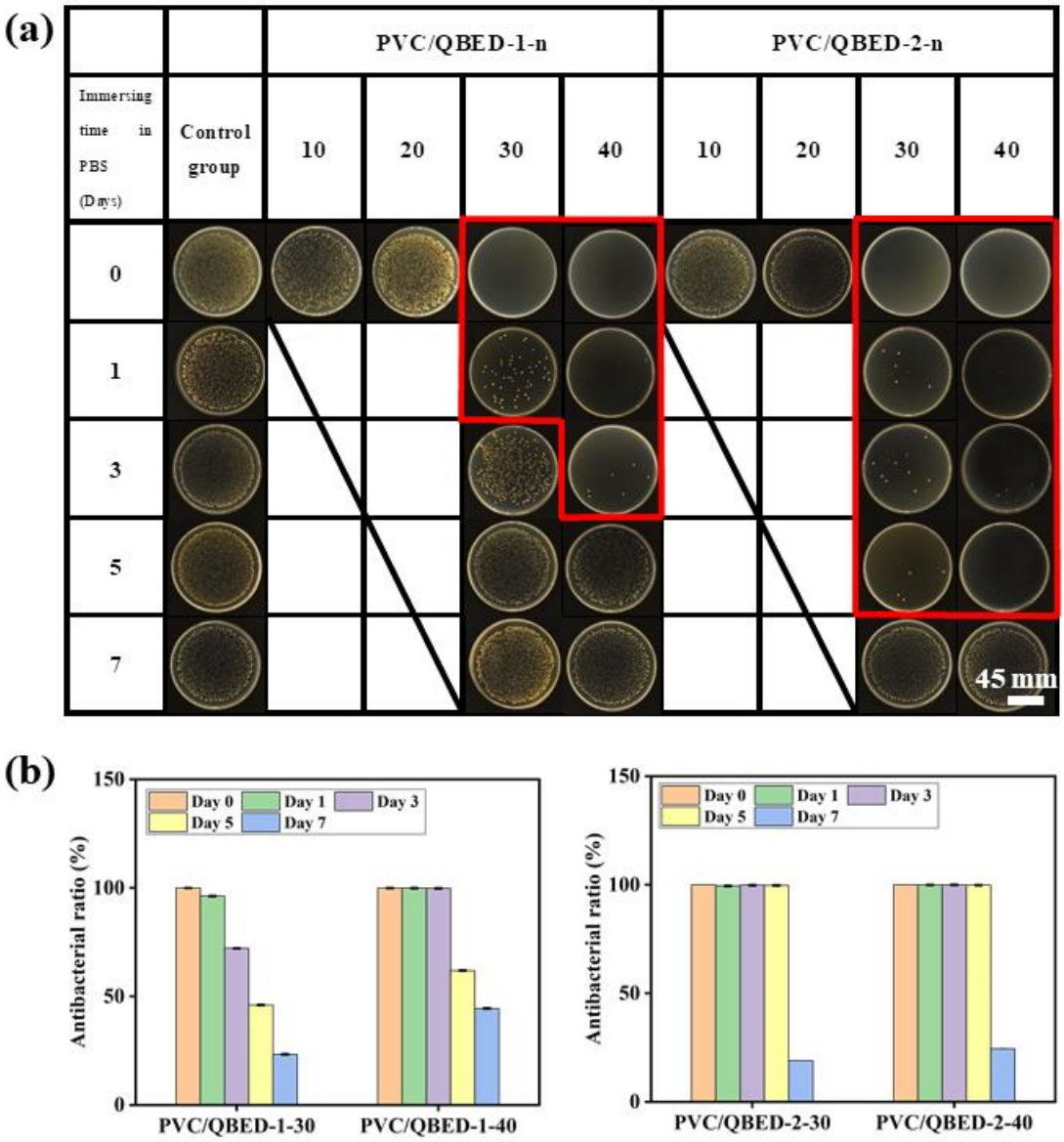

Figure S5. Antibacterial effect against *E.coli* of PVC samples after immersions in PBS for 0, 1, 3, 5, 7 days, respectively, *in vitro*, (a) figures of LB agar plates and (b) antibacterial ratio of PVC samples against *E.coli*.

Table S2. Log reduction of PVC samples against *E.coli*

Immersing time in PBS (Days)	Log reduction			
	PVC/QBED-1-n		PVC/QBED-2-n	
	30	40	30	40
0	> 3	> 3	> 3	> 3
1	1.4	> 3	2.3	3.1
3	0.6	2.6	2.8	3.2
5	0.3	0.4	2.5	2.9
7	0.1	0.3	0.1	0.1

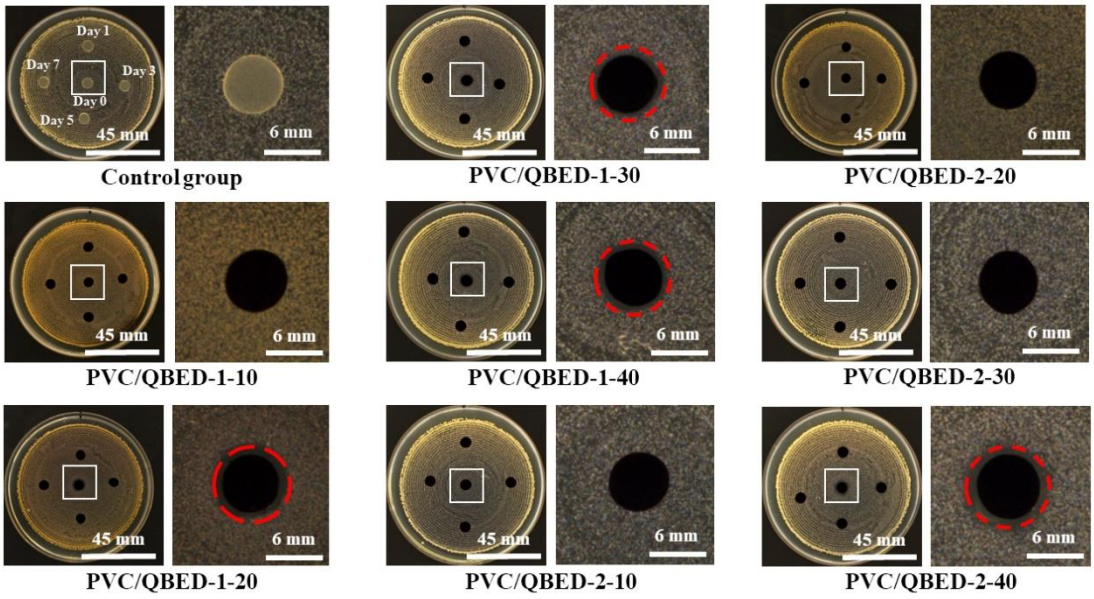

Figure S6. Photographs of the zones of inhibition of PVC samples against *S.aureus* after immersions in PBS for 0, 1, 3, 5, 7 days, respectively.

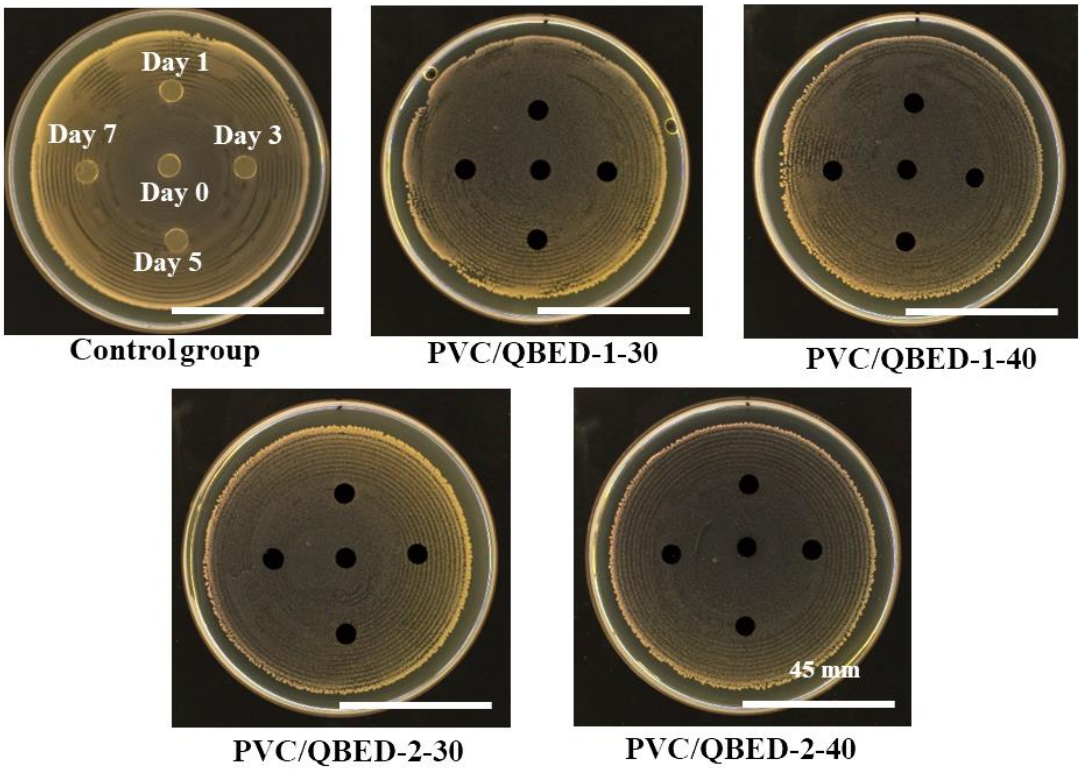

Figure S7. Photographs of the zones of inhibition of the control group, PVC/QBED-1-30, PVC/QBED-1-40, PVC/QBED-2-30 and PVC/QBED-1-40 against *E. coli* after immersions in PBS for 0, 1, 3, 5, 7 days, respectively.

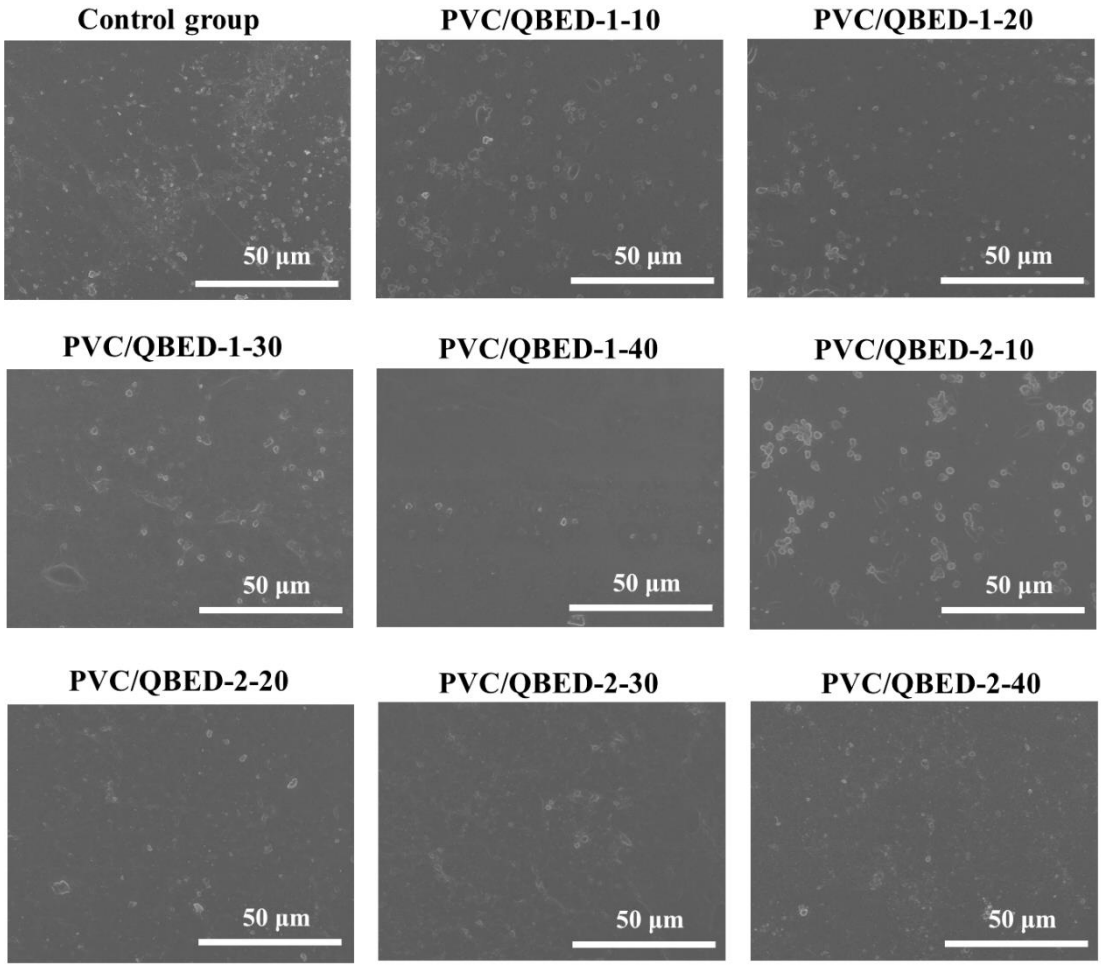

Figure S8. Morphology of adherent platelets on the surfaces of PVC samples observed by SEM.

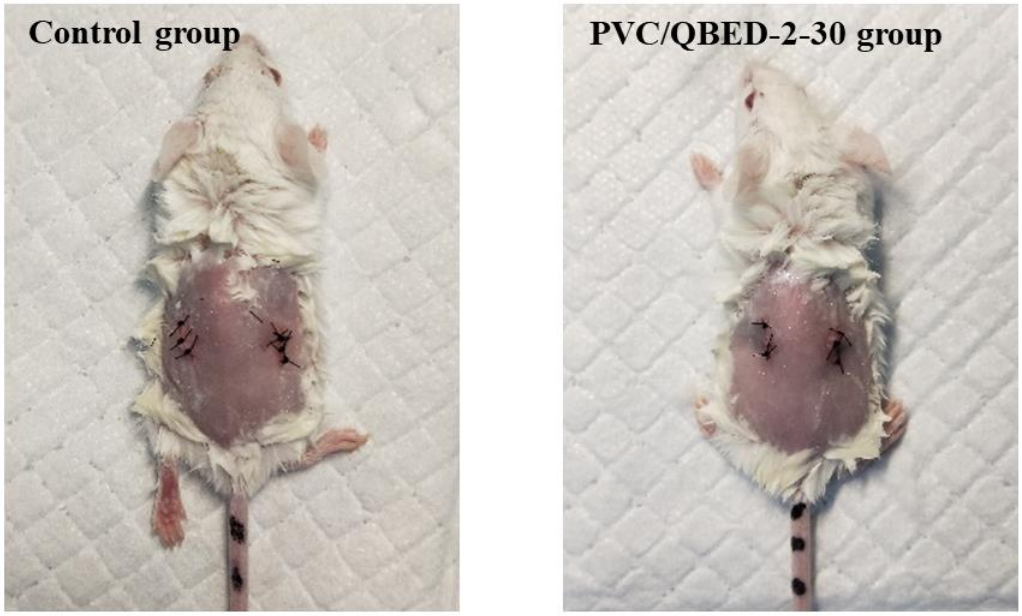

Figure S9. Overview of the animal model with PVC samples infection.