Support information

2,3-Dialdehyde nanofibrillated cellulose as a potential material for the treatment of MRSA infection

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This Supporting information includes:

Morphological investigation

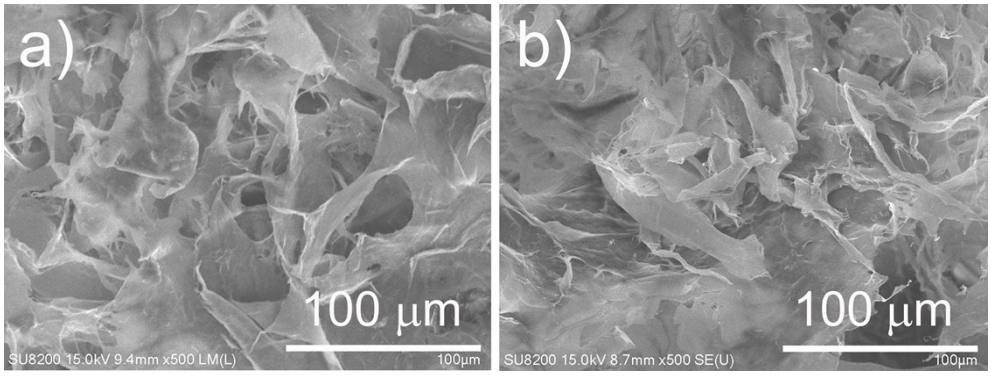

Fig. S1 The SEM images of NFC and DANFC3. a) The SEM image of NFC; b) The SEM image of DANFC3.

Antimicrobial activity of samples

Firstly, samples (1.0 cm×1.0 cm) were placed in 1 mL bacteria suspension at 37 °C for 24. After that, the bacteria suspension in the tube was coated on the nutrient agar in petri dishes, and then it was incubated at 37 °C for 24 h. The result is shown in Fig. S2. For *S. aureus*, the liquid in the DANFC5 group is much clear than other groups, and the same result was obtained for MRSA. Moreover, growth of bacteria on nutrient agar was not observed for DANFC5 groups. Although DANFC3 displayed good antimicrobial properties in bacteria growth curve experiment, the additional experiments showed that the antimicrobial activity of DANFC5 is much better than that of DANFC3 under stringent conditions, which is due to the lower pH value introduced by aldehyde groups.

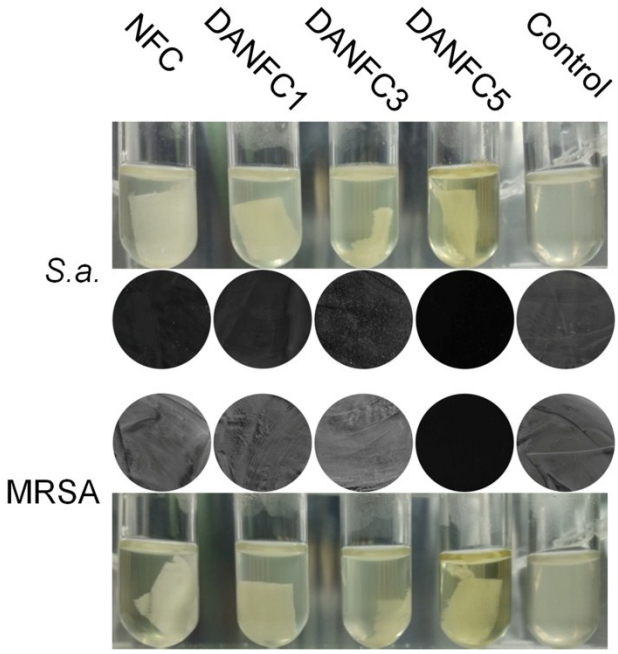

Fig. S2 The antimicrobial activities of DANFC to *S. aureus* and MRSA.

Bacteria-growth curve of *E. coli*

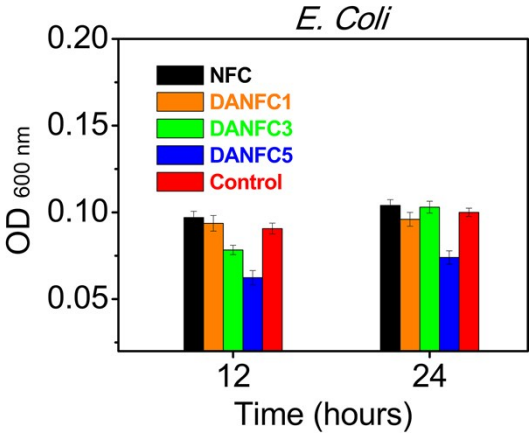

Fig. S3 Antibacterial performance of NFC and DANFC. Bacteria growth curve of NFC and DANFC against *E. coli*.

Colony counts method

Table S1 Bacteria colony count (CFU) for NFC and DANFC after 12 h.

Bacteria	NFC	DANFC1	DANFC3	DANFC5	Control
Sa	1.37×10^5	8.50×10^4	0	0	2.81×10^5
MRSA	1.23×10^5	5.00×10^4	0	0	2.75×10^5

Table S2 Bacteria colony count (CFU) for NFC and DANFC after 24 h.

Bacteria	NFC	DANFC1	DANFC3	DANFC5	Control
Sa	2.30×10^5	2.16×10^5	0	0	3.04×10^5
MRSA	2.50×10^5	2.18×10^5	0	0	2.96×10^5

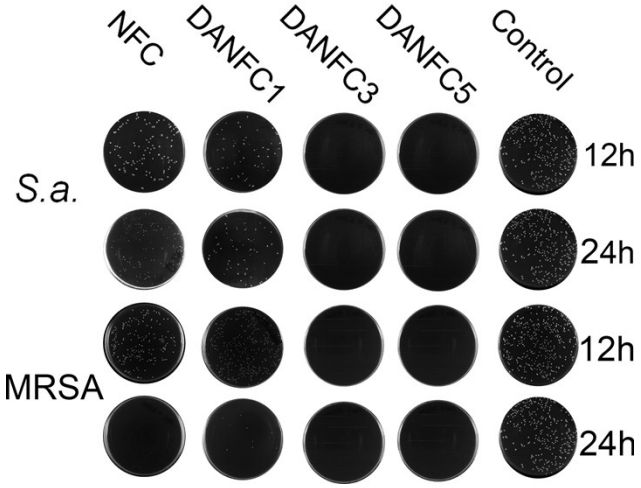

Fig. S4 Bacteria colony count for NFC and DANFC after 12 h and 24 h.

Hemolysis

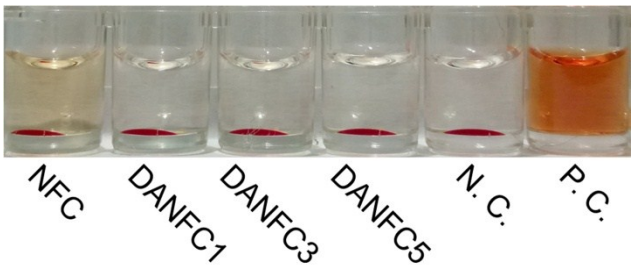

Fig. S5 The hemolysis of samples, normal saline and triton were set as negative control (N. C.) and positive control (P. C.), respectively.

Cytotoxicity to HUVEC cell

We also measured the cytotoxicity of DANFC to HUVEC cell. The result is shown in Fig. S6. When the concentration of sample is 0.5 mg/mL, the cell viability of NFC and three kinds of DANFC are more than 90% for 24 h. When the concentration increased to 1 mg/mL, the cell viability of all samples decreased slightly, but the cell viability are all still above 85%. However, when the concentration further increased to 2 mg/mL, the cell viability of three kinds of DANFC decreased obviously, especially for DANFC3 and DANFC5 groups. The cytotoxicity increased with the increase of concentration and oxidation time of DANFC. It is probably caused by local acidity that introduced by content of aldehyde group.

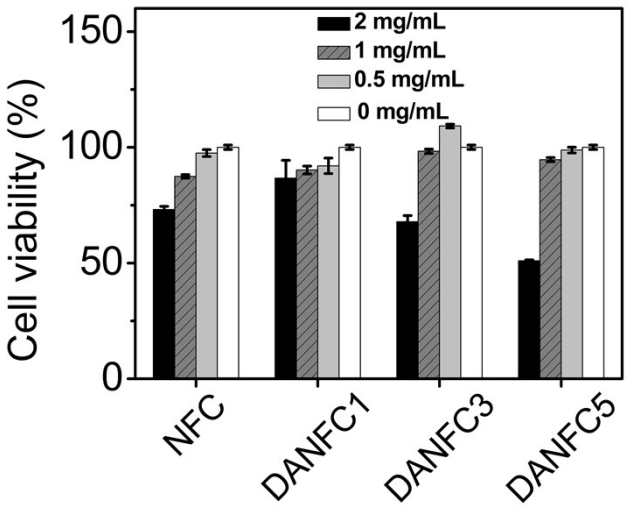

Fig. S6 Cytotoxicity of NFC and DANFC to HUVEC.