

Supporting Information

Microfluidic Preparation and Antibacterial Property of Polyvinyl Alcohol Hydrogel Microfibers Loaded with MOF Microparticles

Ning Zhao^{a#}, Shi-Yu Liu^{a#}, Zhuang Liu^{a,b}, Xiao-Jie Ju^{a,b}, Rui Xie^{a,b}, Wei Wang^{a,b}, Da-Wei Pan^{a,b*}, and Liang-Yin Chu^{a,b}*

^aSchool of Chemical Engineering, Sichuan University, Chengdu, Sichuan 610065, P. R. China

^bState Key Laboratory of Polymer Materials Engineering, Sichuan University, Chengdu, Sichuan 610065, P. R. China

Procedures for standard curve fitting for bacteria

In the experiment, the concentrations of bacteria in the solution were determined by measuring their optical density at a UV wavelength of 600 nm (OD_{600}) using the UV spectrophotometer. To establish the quantitative relationship between OD_{600} and the concentrations of bacteria, the standard curves for bacteria were obtained as follows.

(1) Briefly, 10 g TSA was added to 250 mL of deionized water, which was then stirred in an oil bath at 105 °C for 45 min. Following the sterilization, the TSA solution was cooled to a specific temperature range (35 °C~45 °C), and then dispensed into ten sterile petri dishes, with each dish containing approximately 20~25 mL of such solution. Next, the solution was cooled and solidified at room temperature to form a solid medium. Such solid medium was subsequently transferred to a 37 °C incubator for 10~12 h to eliminate excess moisture.

(2) The activated *E. coli* O157:H7 bacterial suspension (1 mL) was added to 100 mL of Luria-Bertani (LB) liquid medium, which was then cultivated at 100 rpm and 37 °C for 12 h to achieve secondary activation. Such secondarily activated bacterial suspension was diluted using the sterile LB liquid medium with different dilution factors. The OD_{600} values of these diluted solutions at a wavelength of 600 nm were measured, with the sterile LB liquid medium as the blank control, as summarized in **Table S1**.

(3) Bacterial suspensions (100 μ L) with dilution factors of 10^{-4} , 10^{-5} , and 10^{-6} were respectively dropped onto the center of solid media plates, and then evenly spreaded over the surface of the solid media. After that, the inoculated media plates were

inverted and placed in a 37 °C incubator for 24 h cultivation. Such a process for the each bacterial suspension was repeated three times.

(4) After the 24 h incubation, the number of colonies in the solid media plates were counted. Data with colony counts ranging from 30 to 300 were recorded, and the average value for the three plates was calculated (**Table S2**). The colony concentration in the solution at a specific dilution factor was obtained by dividing the colony counts by the volume of the bacterial suspension plated. Furthermore, based on the relationship between the dilution factors, the colony concentrations in the solutions at the remaining dilution factors were derived. Finally, the standard curve for *E. coli* O157:H7 that describes the relationship between their calculated colony concentration (CFU/mL) and the OD_{600} was obtained. Similarly, a standard curve for *S. aureus* was obtained (**Fig. S2**), with the data summarized in **Tables. S3** and **S4**.

Tables S1-S4**Table S1** OD_{600} for E. coli O157:H7 solutions with different dilution factors

Dilution factor	OD_{600}
1×10^0	0.681
8×10^{-1}	0.574
5×10^{-1}	0.384
3×10^{-1}	0.259
1×10^{-1}	0.132
8×10^{-2}	0.105
5×10^{-2}	0.081
3×10^{-2}	0.062
1×10^{-2}	0.038

Table S2 Number of colonies for E. coli O157:H7 with different dilution factors

Dilution factor	Plates	Number of colonies	Average
10 ⁻⁴	1	-	
	2	-	
	3	-	
10 ⁻⁵	1	196	
	2	141	210
	3	293	
10 ⁻⁶	1	16	
	2	10	16.33
	3	23	

Table S3 OD_{600} for S.aureus solutions with different dilution factors

Dilution factor	OD_{600}
1×10^0	0.783
8×10^{-1}	0.644
5×10^{-1}	0.407
3×10^{-1}	0.251
1×10^{-1}	0.119
8×10^{-2}	0.095
5×10^{-2}	0.069
3×10^{-2}	0.049
1×10^{-2}	0.016

Table S4 Number of colonies for S.aureus with different dilution factors

Dilution factor	Plates	Number of colonies	Average
10^{-5}	1	-	
	2	-	
	3	-	
10^{-6}	1	157	
	2	144	156.33
	3	168	
10^{-7}	1	30	
	2	28	24
	3	14	

Figures S1-S2

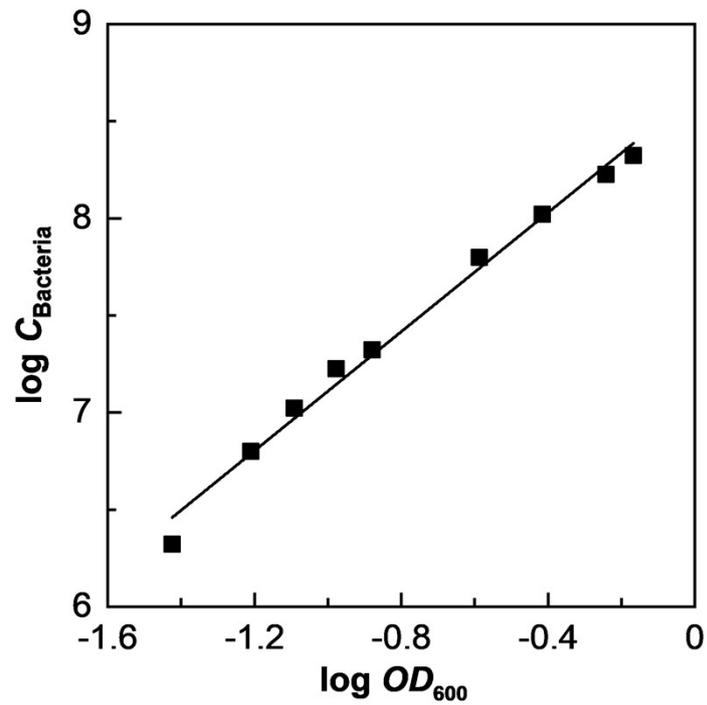


Fig. S1 Relationship between OD_{600} and the concentration of *E. coli* O157:H7

(C_{Bacteria}) in the solution. Such a relationship can be quantitatively described as:

$$\log(C_{\text{Bacteria}}) = 1.533 \times \log(OD_{600}) + 8.642$$

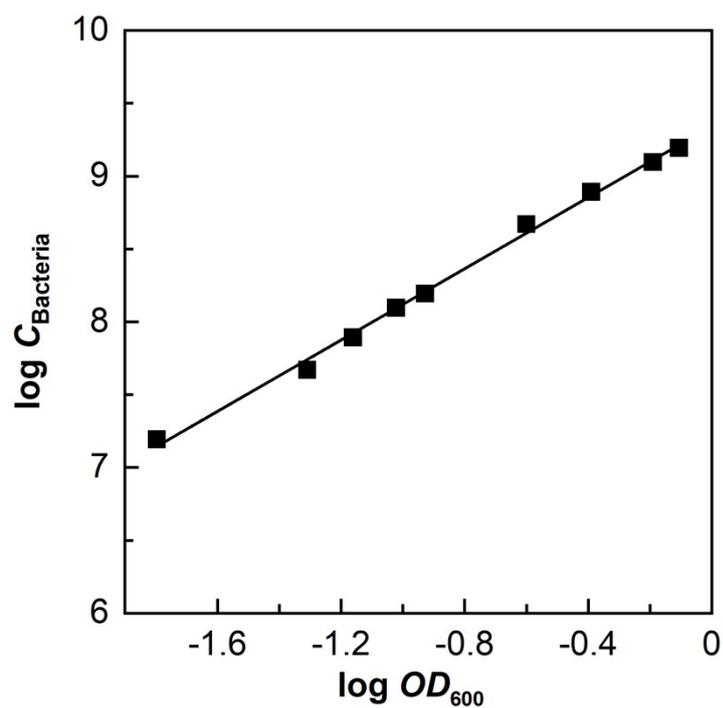


Fig. S2 Relationship between OD_{600} and the concentration of S.aureus ($C_{Bacteria}$) in the solution. Such a relationship can be quantitatively described as follows:

$$\log(C_{Bacteria})=1.224\times\log(OD_{600}) + 9.344$$