

Supporting Information

Antibacterial Thyme Oil-Loaded Zwitterionic Emulsion Hydrogels

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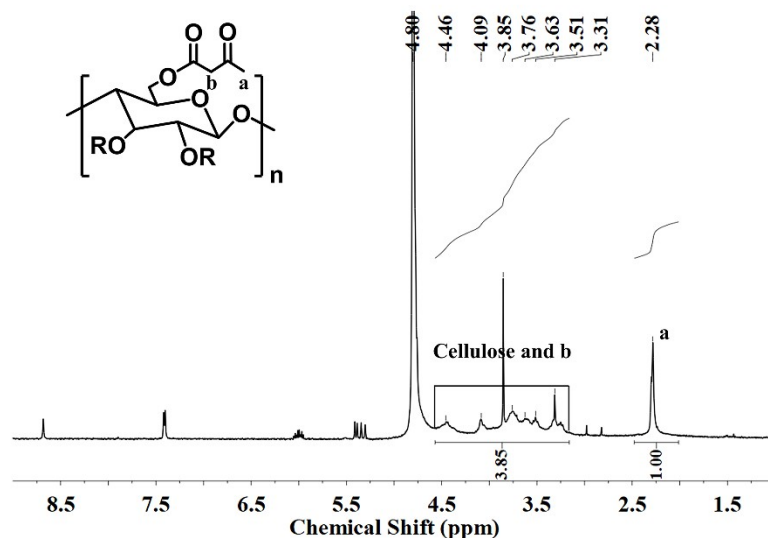


Fig. S1 ^1H NMR spectrum of CAA

^1H NMR spectra

First, the CAA was dissolved in 0.55 mL D_2O . And then, NMR spectra were conducted with a Bruker DRX-400 MHz spectrophotometer in the proton noise-decoupling mode with a standard 5 mm probe.

The signal at $\delta = 2.28$ ppm is attributed to the methyl group of acetoacetate. The signal in the range of $\delta = 3.2\text{--}4.5$ ppm is attributed to the backbone of the anhydroglucose ring and the methylenes of acetoacetate.

The degree of substitution (DS) of CAA is calculated according to improved Equation (1) as follows:

$$DS = \frac{I_1 \times 9}{I_2 \times 3} = \frac{3I_1}{I_2}$$

where I_1 is the integral value of methyls of acetoacetate and I_2 is the integration value of backbone of the anhydroglucose ring and the methylenes of acetoacetate in CAA.

Table. S1 Compositions of O/W emulsion hydrogels

Sample code	CAA (mL)	SBMA (g)	MBA (mg)	H_2O_2 (μL)	HRP (mg)	Thyme oil (mL)
H-0%	1.4	0.6	6	4	0.4	0
H-20%	1.4	0.6	6	4	0.4	0.35
H-40%	1.4	0.6	6	4	0.4	0.934

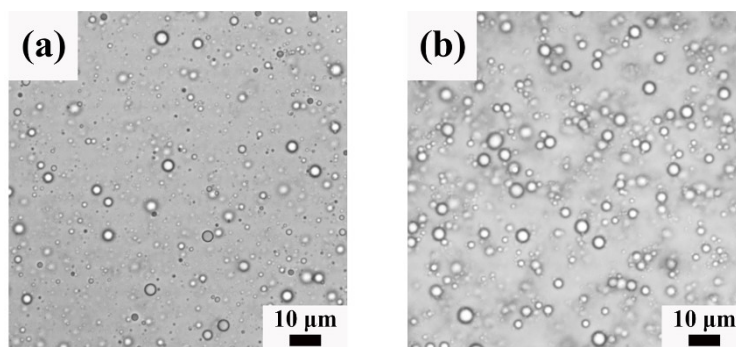


Fig. S2 Optical micrographs of the fresh O/W emulsions with the thyme oil phase fraction of (b) 20% and (c) 40% (The diluted version of **Fig. 3b&c**).

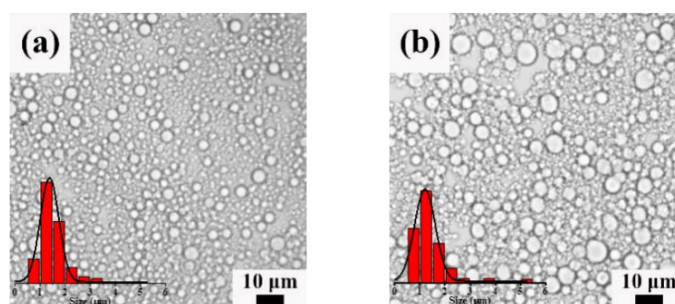
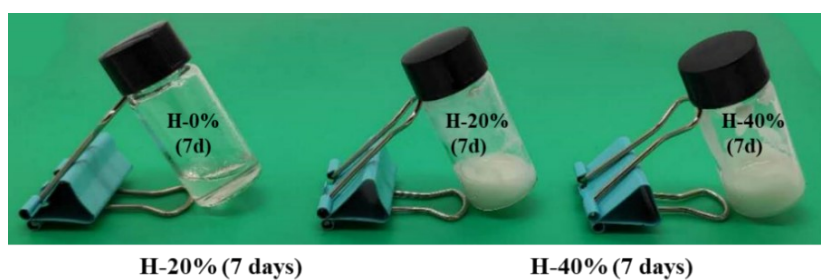


Fig. S3 Digital photographs and optical micrographs of O/W emulsions stored for one week with the thyme oil phase fraction of (a) 20% and (b) 40%.

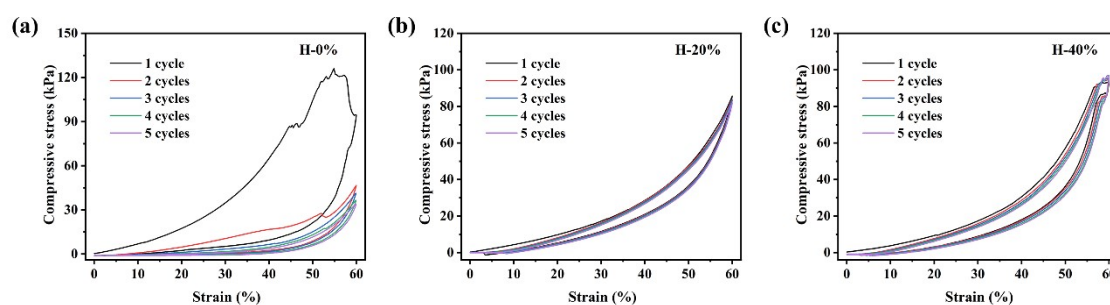


Fig. S4 Compressive stress-strain curves of (a) H-0%, (b) H-20%, and (c) H-40% with 5 cycles.

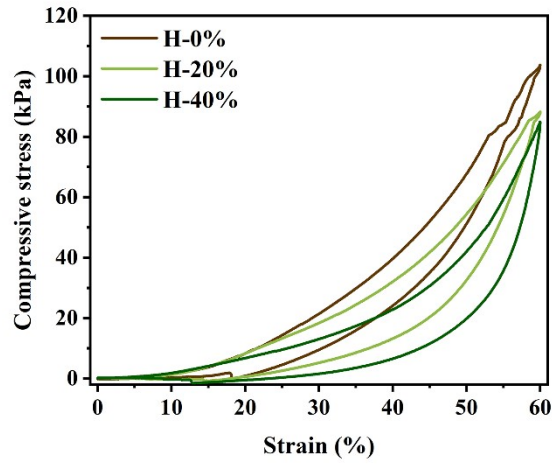


Fig. S5 Compressive stress-strain curves of H-0%, H-20%, and H-40% after swelling and releasing thyme oil in PBS solution for 48 hours.

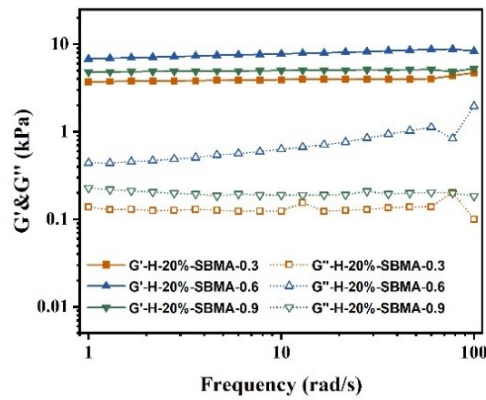


Fig. S6 Rheological behavior of H-20% hydrogel with different SBMA content during oscillatory frequency sweep.

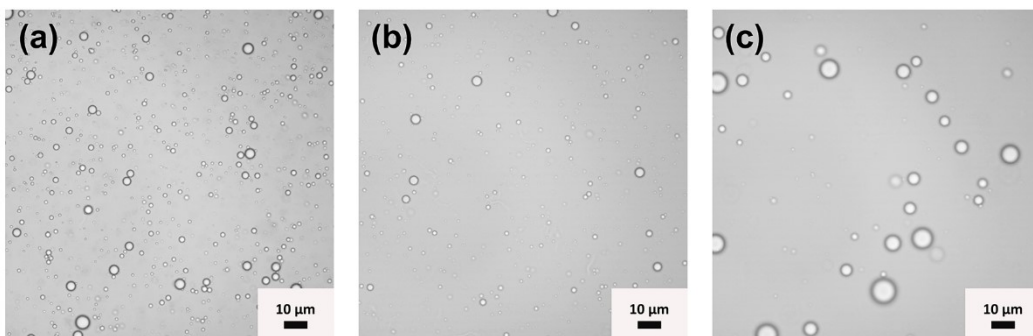


Fig. S7 Optical micrographs of O/W emulsions with the SBMA dosage of (a) 0.3g, (b) 0.6g and (c) 0.9g

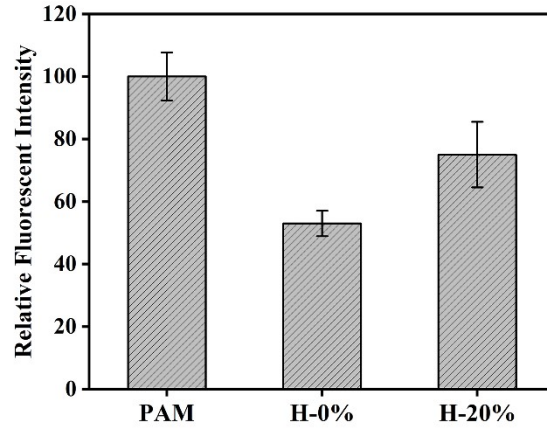


Fig. S8 The fluorescence intensity data of PAM, H-0%, and H-20%.

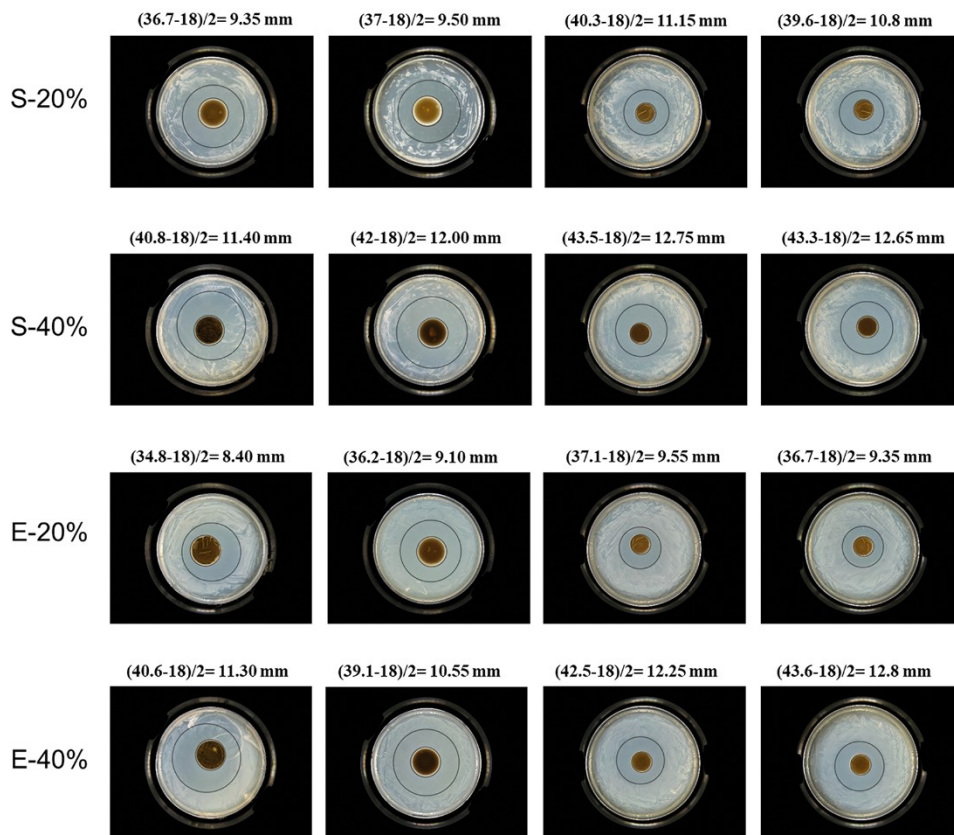


Fig. S9 The pictures of repeatable antibacterial experimental results against *S. aureus* and *E. coli*, and the corresponding statistical analysis of ZOI value.