

## Electronic Supplementary Information

# Green liquid marble-based hydrogels as pesticidal pyrethroid slow-release carriers

*Qin Li,<sup>a, 1</sup> Changhong Wang,<sup>a, 1</sup> Jiayuan He,<sup>a</sup> Dandan Yang,<sup>a</sup> Ting Li,<sup>a</sup> Huixian Xu,<sup>a</sup>*

*Weifeng Shen,<sup>a</sup> Liandi Zhou,<sup>\*b</sup> Saimeng Jin,<sup>\*a</sup> Qihui Zhang<sup>\*a</sup> and James H. Clark<sup>c</sup>*

<sup>a</sup> School of Chemistry and Chemical Engineering, Chongqing University, Chongqing 400044, China;

<sup>b</sup> Chongqing College of Traditional Chinese Medicine, Chongqing 402760, China;

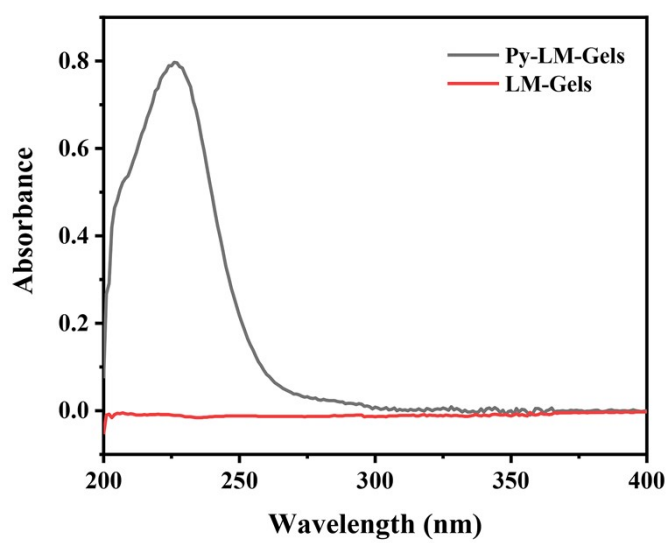
<sup>c</sup> Green Chemistry Centre of Excellence, University of York, York YO105D, U.K.

<sup>1</sup>Co-first author: These authors contributed equally to the article.

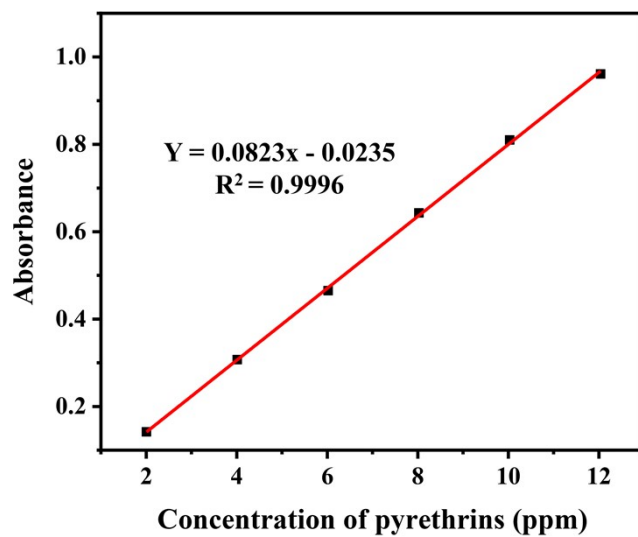
## **Contents**

1. Supporting Figures .....	S1
2. Supporting Tables.....	S8

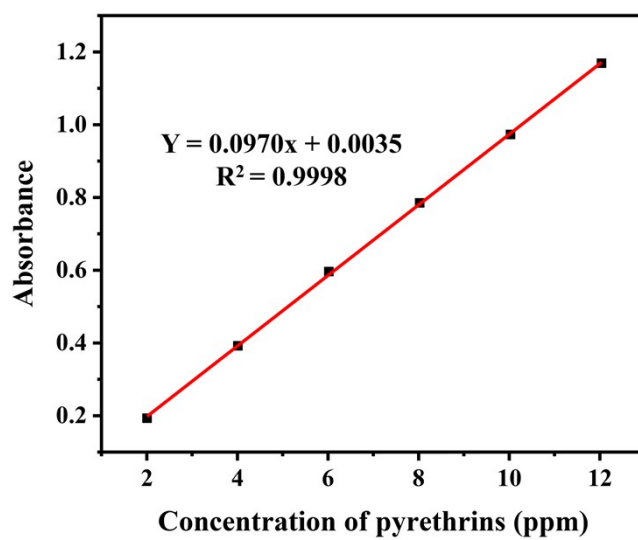
## 1. Supporting Figures



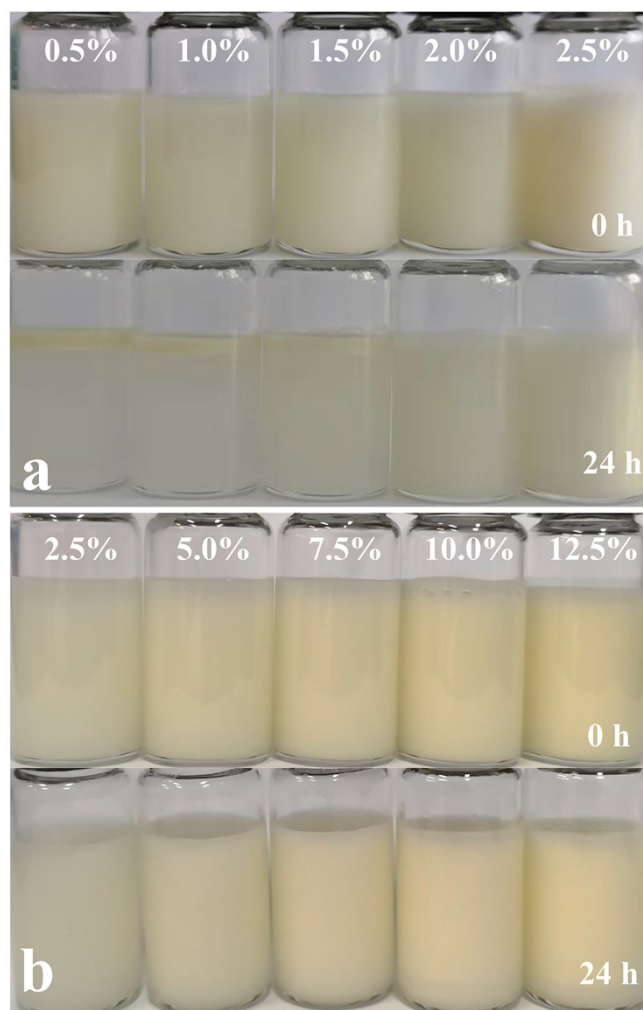
**Figure S1.** The UV spectroscopy scanning of LM-Gels and Py-LM-Gels.



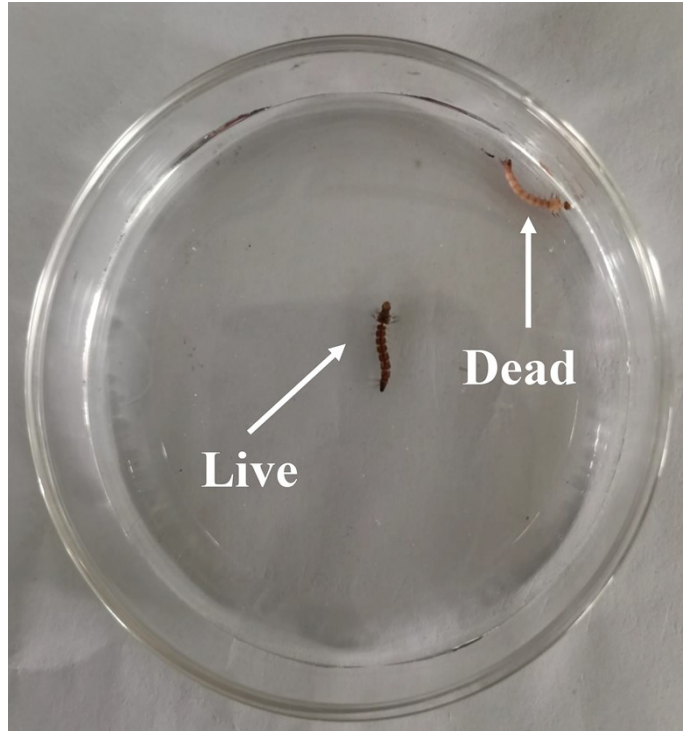
**Figure S2.** The standard curve of pyrethrin (Methanol as a solvent).



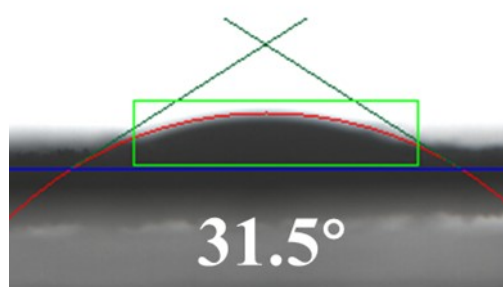
**Figure S3.** The standard curve of pyrethrin (Methanol-water as a solvent).



**Figure S4.** Photograph of the effect of the concentration of (a) SA-GE and (b) pyrethrin on the stability of pyrethrin before and after 24 h.

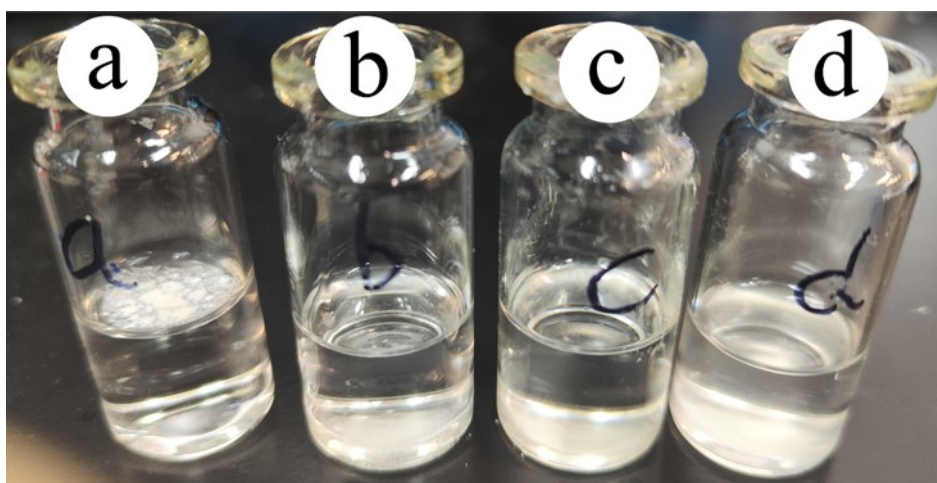


**Figure S5.** Photograph of the live and dead *aedes albopictus* larvae.



**Figure S6.** contact angle of silanized cellulose with formamide.





**Figure S7.** Dispersion of silanized cellulose in (a) water (b) ethanol (c) toluene (d) acetone.

## 2. Supporting Tables

**Table S1.** Optimization of modified cellulose.

The concentration of Ethanol (wt%)	The volume of NaOH (mL)	The ratio of cellulose and VTES	Time (min)
40	6	1:3	60
40	9	1:3	60
40	12	1:3	60
40	15	1:3	60
40	18	1:3	60
40	9	1:3	30
40	9	1:3	60
40	9	1:3	90
40	9	1:3	120
40	9	1:3	150
40	9	1:1	90
40	9	1:2	90
40	9	1:3	90
40	9	1:4	90
40	9	1:5	90
40	9	1:1	90
60	9	1:1	90
80	9	1:1	90
100	9	1:1	90

**Table S2.** The influence of the concentration of SA-GE and pyrethrin on the emulsion stability.

The concentration of SA-GE (%)	The concentration of pyrethrins (%)	Stability time (h)
0.50	2.5	8
1.00	2.5	16
1.50	2.5	18
2.00	2.5	>24
2.50	2.5	>24
2.50	2.5	>24
2.00	5.0	>24
2.00	7.5	>24
2.00	10.0	>24
2.00	12.5	>24

**Table S3.** Kinetic parameters of of pyrethrin released from Py-LM-Gel in different conditions.

Kinetic model	R <sup>2</sup>				
	The concentration of pyrethrin			Temperature	
	2.5%	5.0%	7.5%	20 °C	30 °C
Zero-order	0.7026	0.9435	0.6926	0.7630	0.6479
First-order	0.9872	0.9983	0.9731	0.9883	0.9809
Higuchi	0.8743	0.9866	0.9385	0.9718	0.8650
Ritger-Peppas	0.8723	0.9813	0.9310	0.9091	0.8484