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Supporting Information

Fabricating poly (vinyl alcohol) / gelatin composite sponge with high absorbent and water-triggered expansion for noncompressible hemorrhage and wound healing

Xiao Yang¹, Miao Chen², PengPeng Li², Zhixiao Ji¹, Mingshan Wang³, Yakai Feng^{*},

^{4,5}, Changcan Shi^{*,1}

¹ Wenzhou Institute of Biomaterials and Engineering, Wenzhou Institute, University of Chinese Academy of Sciences, Wenzhou, Zhejiang 325011, China

² Eye hospital of Wenzhou Medical University, Wenzhou Medical University, Wenzhou, Zhejiang 325011, China

³ The First Affiliated Hospital of Wenzhou Medical University, Wenzhou Medical University, Wenzhou, Zhejiang 325000, China

⁴ Collaborative Innovation Center of Chemical Science and Chemical Engineering (Tianjin), Tianjin 300350, China

⁵ Key Laboratory of Systems Bioengineering (Ministry of Education), Tianjin University, Tianjin 300072, China

Corresponding authors:

Prof., Ph. D., Yakai Feng

School of Chemical Engineering and Technology, Tianjin University, China

E-mail: yakaifeng@tju.edu.cn; Tel: +86 22 2740 1999

Prof., Ph.D., Changcan Shi

Wenzhou Institute of Biomaterials and Engineering, Wenzhou Institute, University of

Chinese Academy of Sciences, Wenzhou, Zhejiang 325011, China

E-mail: <u>shicc@wiucas.ac.cn;</u> Tel: +86-577-88017500

Materials and Methods

Degradation of sponge in vitro

Firstly, the sample was weighed and recorded as M_0 . Then it was immersed in the simulated body fluid (SBF) and continuously shaken in a water bath with 100 rpm at 37 °C. The immersion solution was changed daily. At the specified time, sample was rinsed with deionized water and freeze-dried. The final weight of each sample was measured and recorded as M_t . The weight loss rate was calculated from the following equation:

Weight loss ratio(%) =
$$\frac{M_0 - M_t}{M_0} \times 100\%$$

Results



Figure S1. Water absorption speed test device. From left to right is funnel, U-type tube and pipette in sequence. Water is added to the instrument beforehand. By adjusting the height of the separating funnel, small quantity of water appears at the bottom of the funnel.



Figure S2. The morphologies of PVA@Gel-Sp2 without foaming process. The bar: 10



μm.

Figure S3. The volumetric expansion ratio of PVA-Sp and PVA@Gel-Sp. Error bar indicates s.d. (n = 3)



Figure S4. Photographs of all sponges in BCI test.



Figure S5. Photographs of all sponges in blood clotting time test. (1: Blank control, 2: MPVA-Sp, 3: Gel-Sp₁, 4: Gel-Sp₂, 5: PVA-Sp, 6: PVA@Gel-Sp₁, 7: PVA@Gel-Sp₂, 8: PVA@Gel-Sp₃.)



Figure S6. The change of PVA@Gel-Sp₂ before and after SD rats liver noncompressible hemorrhage.



Figure S7. Weight loss curves of all samples in SBF.

As shown in Fig.S7, the weight loss of four sponges were almost unchanged after two weeks. Noteworthily, it was analyzed that the negative value of weight loss of sponge may be resulted from residual SBF components.



Figure S8. H&E staining evaluation of wound healing (magnified images of Fig.7d).

Table S1.	The water	absorption	capacity	of three	commercially	available	hemostatic

sponges.		
Maximum water absorption ratio	Water absorption speed	
(%)	(mL/min)	
854±35%	0.36±0.02	
940±62%	<0.1	
1328±126%	<0.1	
	Sponges. Maximum water absorption ratio (%) 854±35% 940±62% 1328±126%	

Sample ID	The mass before (g)	The mass after (g)
MPVA-Sp	0.029	0.11±0.006
Gel-Sp ₁	0.012	0.07±0.014
Gel-Sp ₂	0.008	0.07±0.010
PVA-Sp	0.014	0.19 ± 0.007
PVA@Gel-Sp ₂	0.012	0.15±0.016

Table S2. The mass of different sponge before and after liver noncompressible

hemorrhage in SD rats.