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# Supporting information for

# A bi-layered scaffold of poly (lactic-co-glycolic acid) nanofibers and alginate-gelatin hydrogel for wound healing

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## Results and discussion

### Preparation of PLGA nanofibers

In this work, the fabrication parameters for PLGA nanofibers were extensively studied by adjusting the flow rate from 0.05 to 0.3 mL/h, high voltage from 10 to 20 kV, and receiving distance from 10 to 20 cm, and the SEM images of different samples were exhibited in Fig.S1. As can be seen, under most of the conditions, microspheres appeared, which were not what we wanted. And the parameters (15 % (w/v) PLGA, flow rate of 0.05 mL/h, receiving distance of 15 cm and high voltage of 20 kV) were chosen to prepare the PLGA nanofibers for the best form of fibers were observed under this condition, other fibers were either too large or had uneven size.

### The chemical structure of ADA and hydrogel

Proton nuclear magnetic resonance ($^1$H NMR) spectra and Fourier transform infrared (FT-IR) spectroscopy of ADA and hydrogel were exhibited in Fig. S1 and Fig. S2. In the $^1$H NMR spectrum of alginate, the signals at the range of 4.52–4.93 ppm match to anomeric protons of G-5, M-1, and G-1. The signals of the protons of G-4, M-3, M-5, M-4, G-2, G-3 and M-2 appear at a range of 3.77-4.2 ppm. Compared with alginate, there were some differences appeared in the ADA. On account of the oxidizing reaction, the signal intensity of the protons of M-3, M-5 and G-4 at 3.77 ppm was decreased. The

new signal at 4.29 ppm matched to the proton of G-5 of the oxidized G units. Another two new signals at 5.67 and 5.42 ppm were attributed to the protons of hemiacetals formed by hydroxyl groups (-OH) and aldehyde groups (-CHO).[1] Compared with alginate, the FTIR spectrum of ADA showed a characteristic peak at 1730 $cm^{-1}$ which demonstrated the aldehyde groups (-CHO) were successfully formed. These results all showed that ADA was successfully synthesized.

The FTIR spectrum of ADA5–GEL5 in Fig. S2 showed the characteristic peaks at 1640 $cm^{-1}$ and 1552 $cm^{-1}$ refers to *v* (C=N), indicating the successful formation of Schiff base.[2] Moreover, the characteristic peak of gelatin at 1543 $cm^{-1}$ due to amide II was entirely absent in the spectrum of ADA5–GEL5, which also supports the involvement of amide II in the crosslinking reaction.

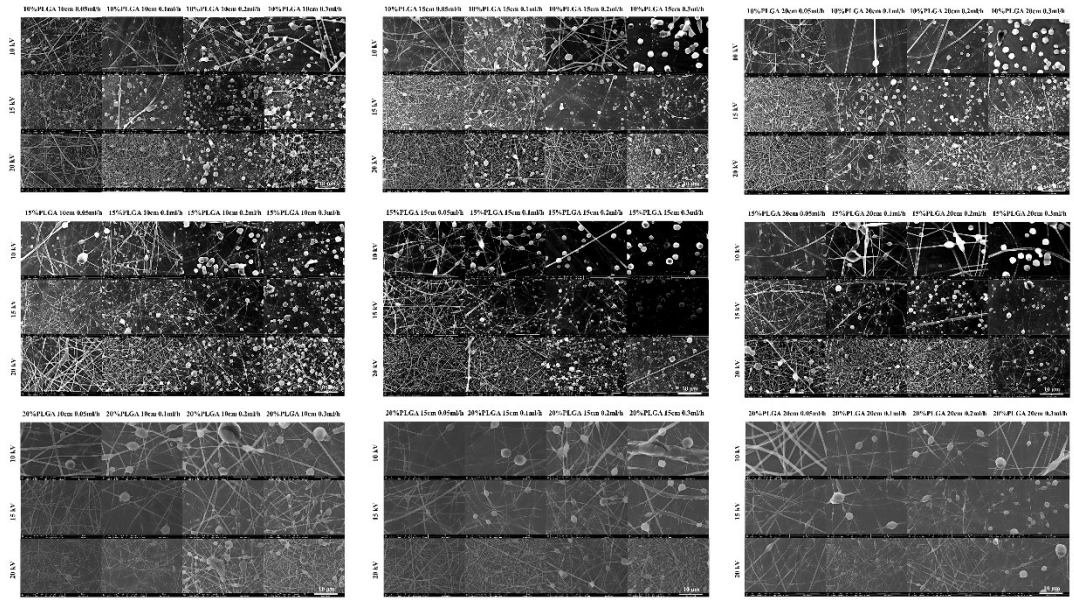

Fig. S1. SEM images of samples under different electrospinning parameters

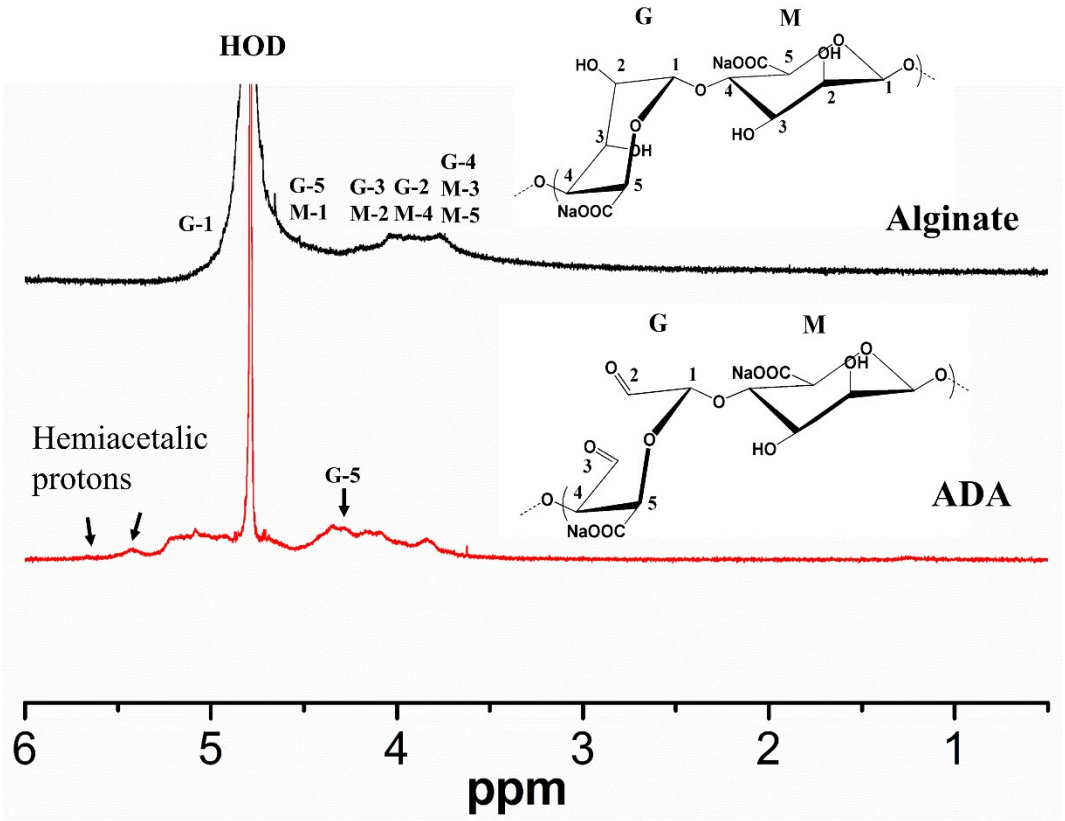


Fig. S2. $^{1}$H NMR spectra of alginate and ADA.

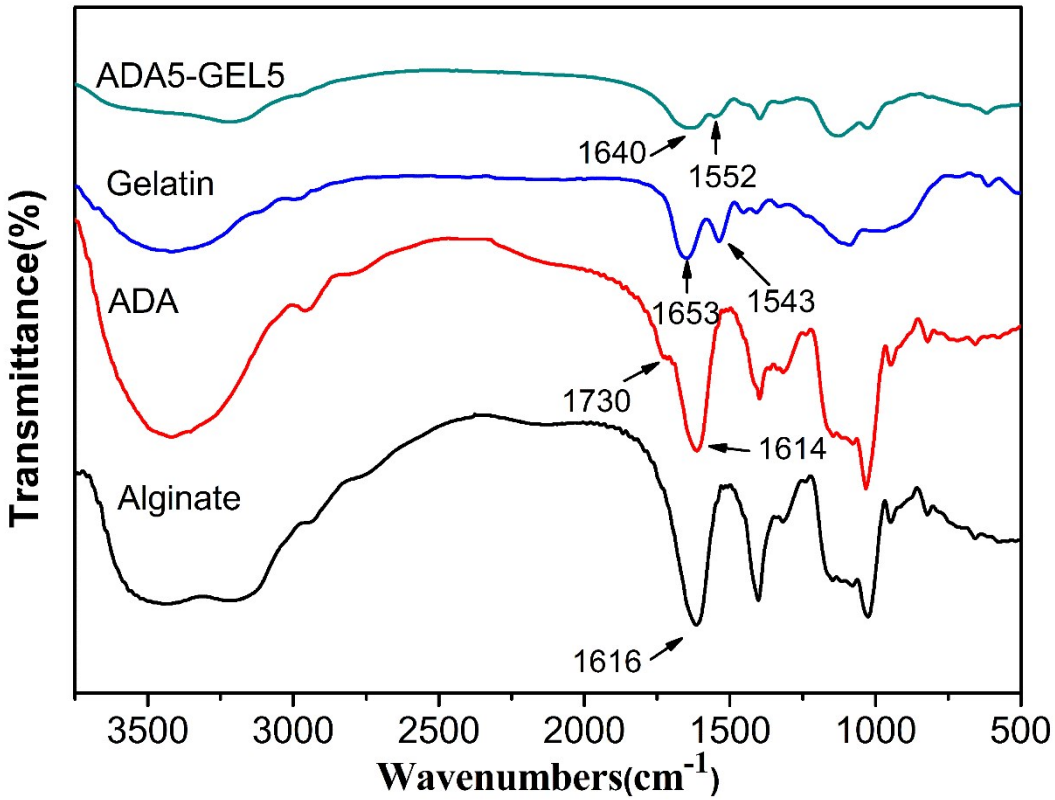


Fig. S3. FT-IR spectra of alginate, ADA, gelatin and ADA5-GEL5.

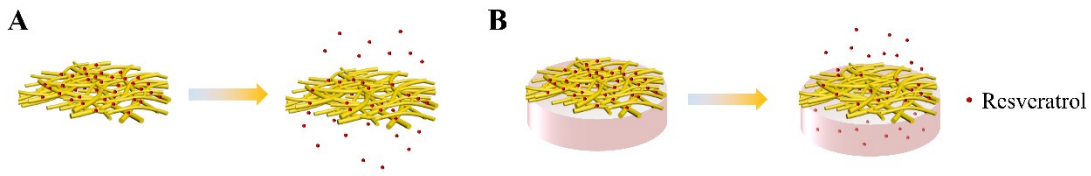


Fig. S4. Schematic of the drug release process of the Res-PLGA nanofibers (A) and RBS (B).

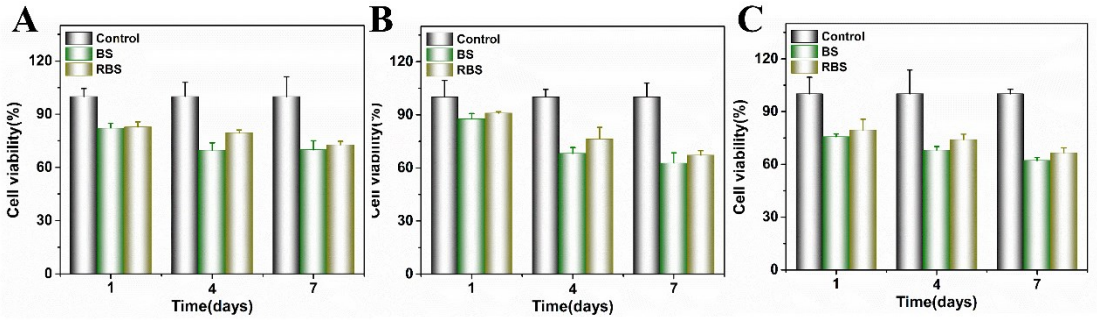


Fig. S5. *In vitro* cell viability of ESF (A), HaCaT cells (B) and co-culture of HaCaT cells and ESF (C) measured by CCK-8 assays on day 1, 4 and 7. The value was calculated by the following equation:

Cell viability (%) = optical density value of sample at 450 nm/ optical density value of control group at 450 nm × 100

**References**

1. C. G. Gomez, M. Rinaudo and M. A. Villar, *Carbohydr Polym*, 2007, **67**, 296-304.
2. J. Ye, J. Xiong and R. Sun, *Carbohydr Polym*, 2012, **88**, 1420-1424.