Electronic Supplementary Information (ESI)

Hierarchically designed injectable hydrogel from oxidized dextran, amino gelatin and 4-arm poly(ethylene glycol)-acrylate for tissue engineering application

Xiaohua Geng[a,b], Xiumei Mo[a,b*], Linpeng Fan[b], Anlin Yin[b], and Jun Fang[a,b]

[a] *State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, College of Materials Science and Engineering, Donghua University, Shanghai 201620, China.*

[b] *Biomaterials and Tissue Engineering Lab, College of Chemistry, Chemical Engineering and Biotechnology, Donghua University, Shanghai 201620, China.*

*Corresponding author Tel: +86 021 67792653 Email: xmm@dhu.edu.cn

Fig.SI-10 Bright-field microscopy pictures of cells cultured within IPN hydrogels for 4 days. Pictures at different layers of P-D-G-2 hydrogel was obtained by alter the height of the platform. a, b, c, and d are taken from top to bottom of the hydrogel. The cell labeled as Ⅰ appeared at layer b, and disappeared at layer d. The cell labeled as Ⅱ appeared at layer d and became obscure at layer a and b. The fact indicates that the two different cells belong to different layer of the hydrogel. Scale bar represents 100 μm.

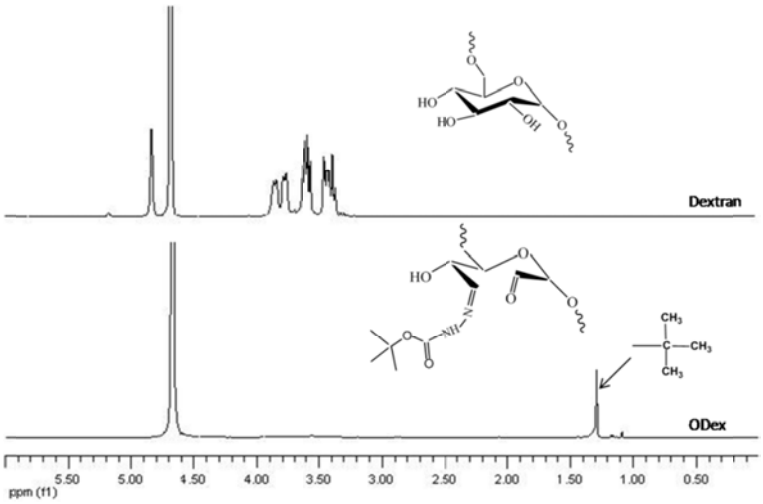


Fig.SI-1 ^{1}H NMR spectra of dextran and ODex treated with tert-butyl carbazate.

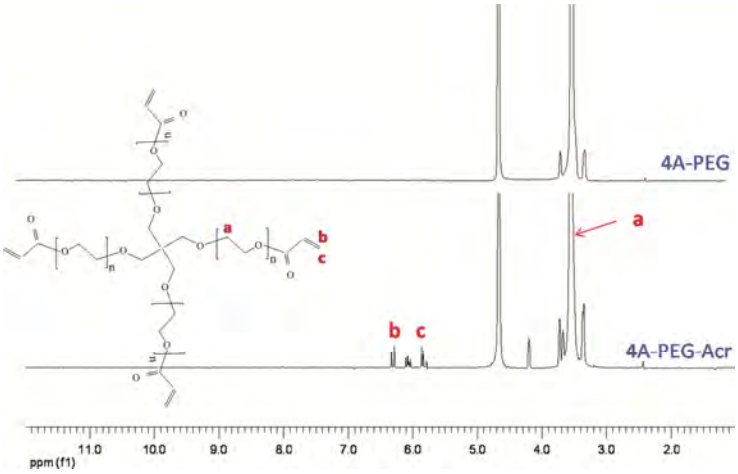


Fig.SI-2 ^{1}H NMR spectra of 4A-PEG and 4A-PEG-Acr.

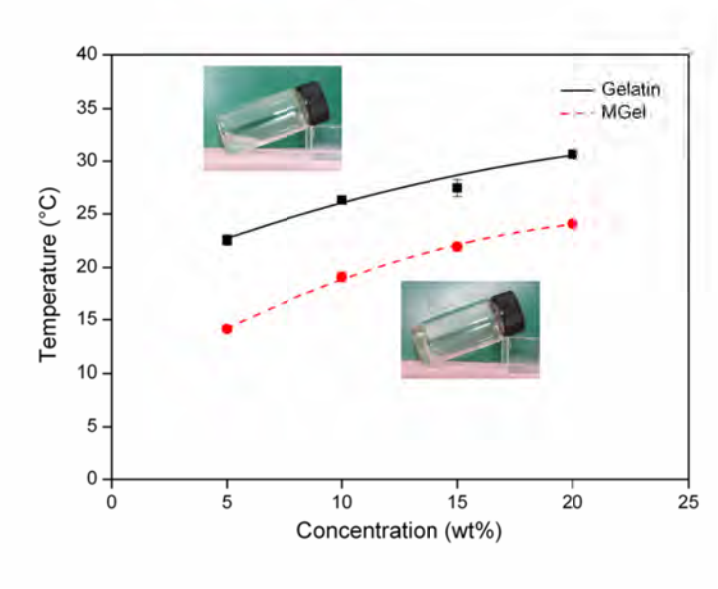


Fig.SI-3 Phase diagram of gelatin and MGel. Conditions of flow (sol) or no flow (gel) were determined by the vial-inverting approach. MGel with different concentrations show obviously lower sol-gel transition temperature than gelatin.

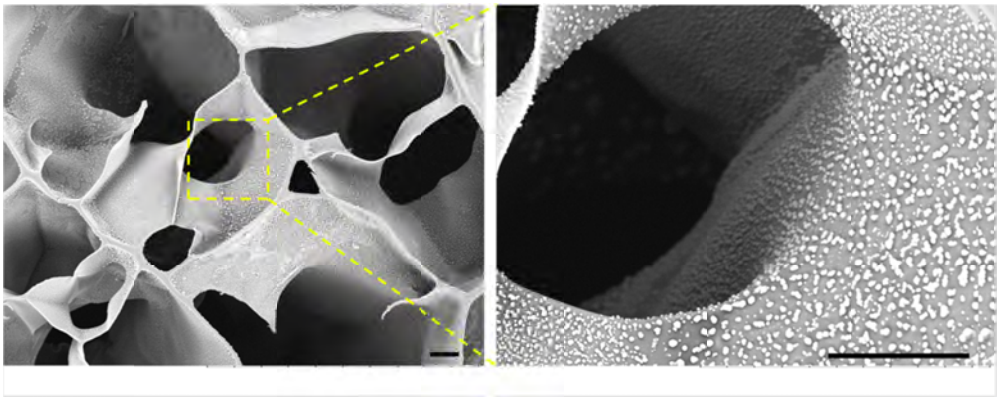


Fig.SI-4 The Scanning electron microscopy pictures of cross-section of hydrogels incubated in 37℃ for degradation. The white particles represent the PBS salt sediments. Scale bar represents 50 μm.

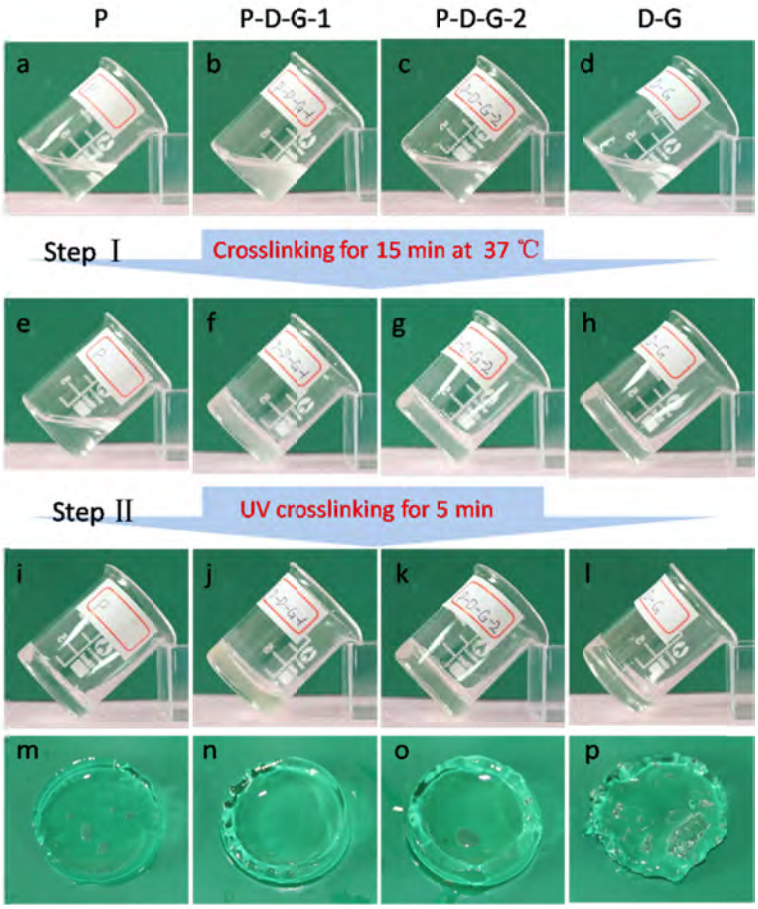


Fig.SI-5 Behaviour of different solutions during the two-step crosslinking method. For P, P-D-G-1, P-D-G-2, and D-G hydrogels, a, b, c, and d are the initial states of them; e, f, g, and h are the states after they were crosslinked for 15 min at 37℃; i, j, k, and l are the states after they were crosslinked by UV light for 5 min, and m, n, o, and p are the hydrogels in the vials.

`

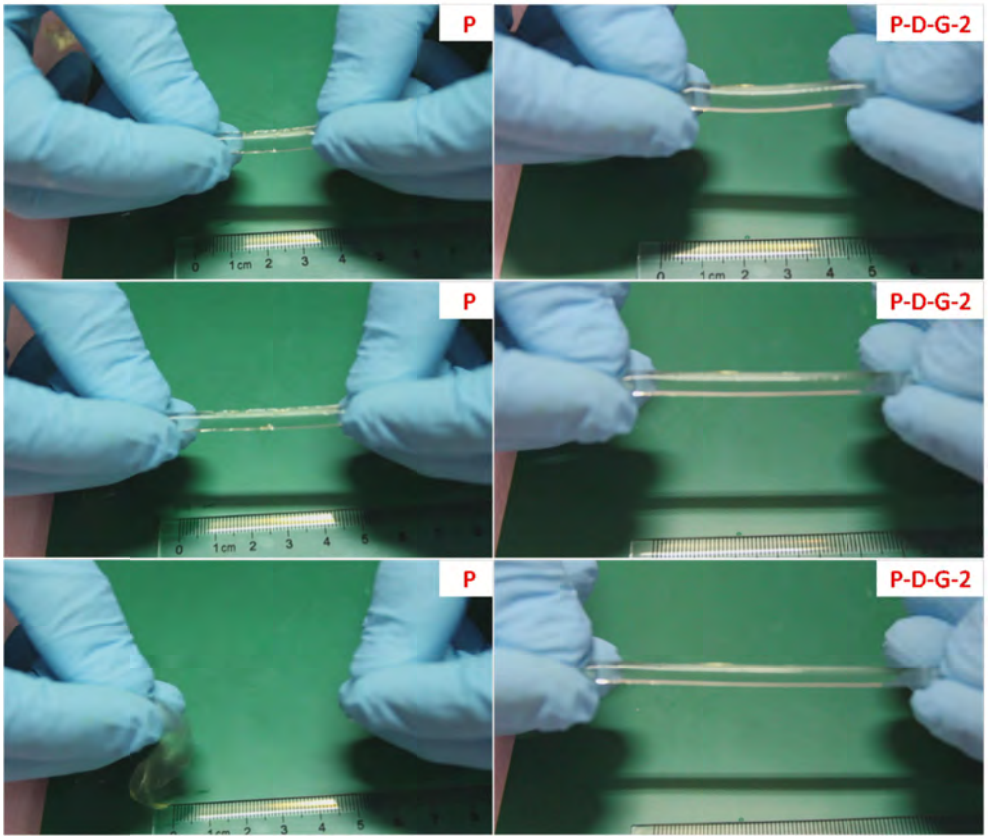


Fig.SI-6 Photographs for tensile testing of P and P-D-G-2 hydrogel. P hydrogel become fracture when it is stretched to double of its original length. P-D-G-2 hydrogels can still maintain elasticity at the double of elongation state.

Table.SI-1 Composition of P', P-D-G-2, and D-G' hydrogels.

Sample	Concentrations (mg ml^{-1})			
	4A-PEG-Acr	ODex	MGel	Total
P'	120	0	0	120
P-D-G-2	40	30	50	120
D-G'	0	48	72	120

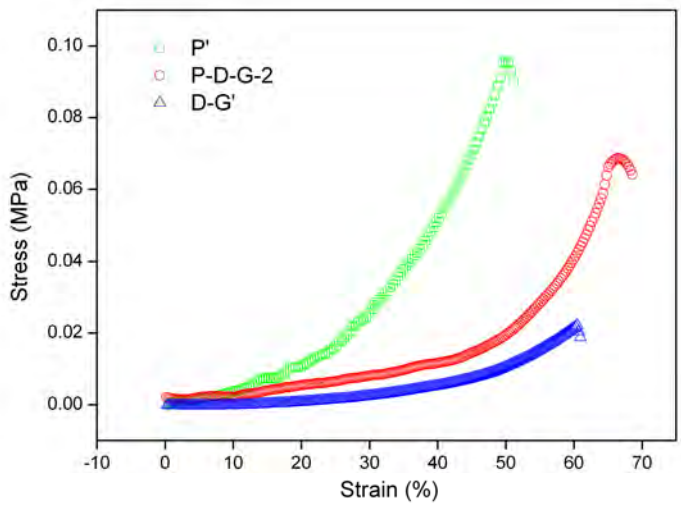


Fig.SI-7 Representative stress-strain curves of P',P-D-G-2, and D-G' hydrogels at room temperature.

\

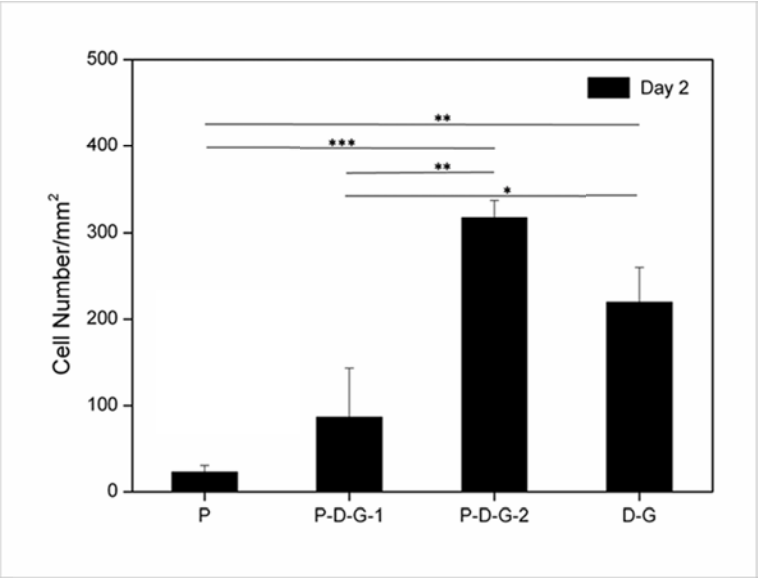


Fig.SI-8 The cell density on the hydrogel surface after 2 days culture. *P<0.05, **P<0.001, and ***P<0.0001 (n=3).

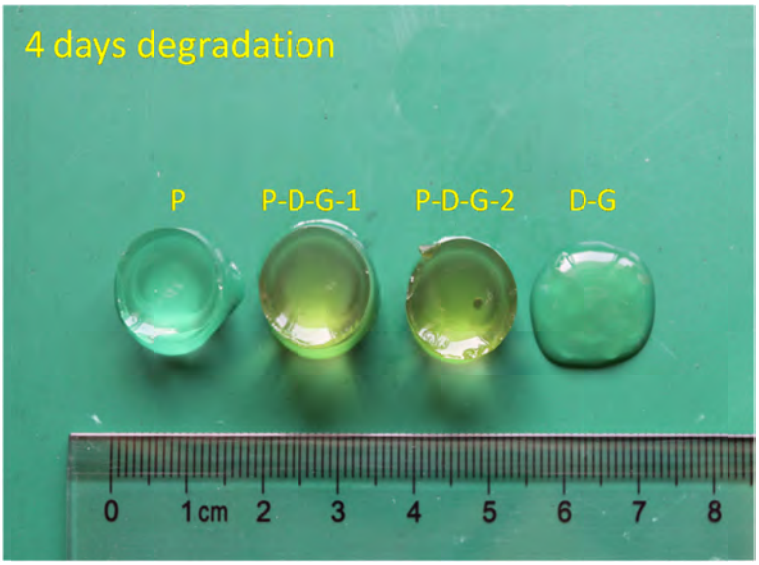


Fig.SI-9 Representative optical images of P, P-D-G-1, P-D-G-2, and D-G hydrogels (from left to right) after 4 days degradation in PBS (PH=7.4).

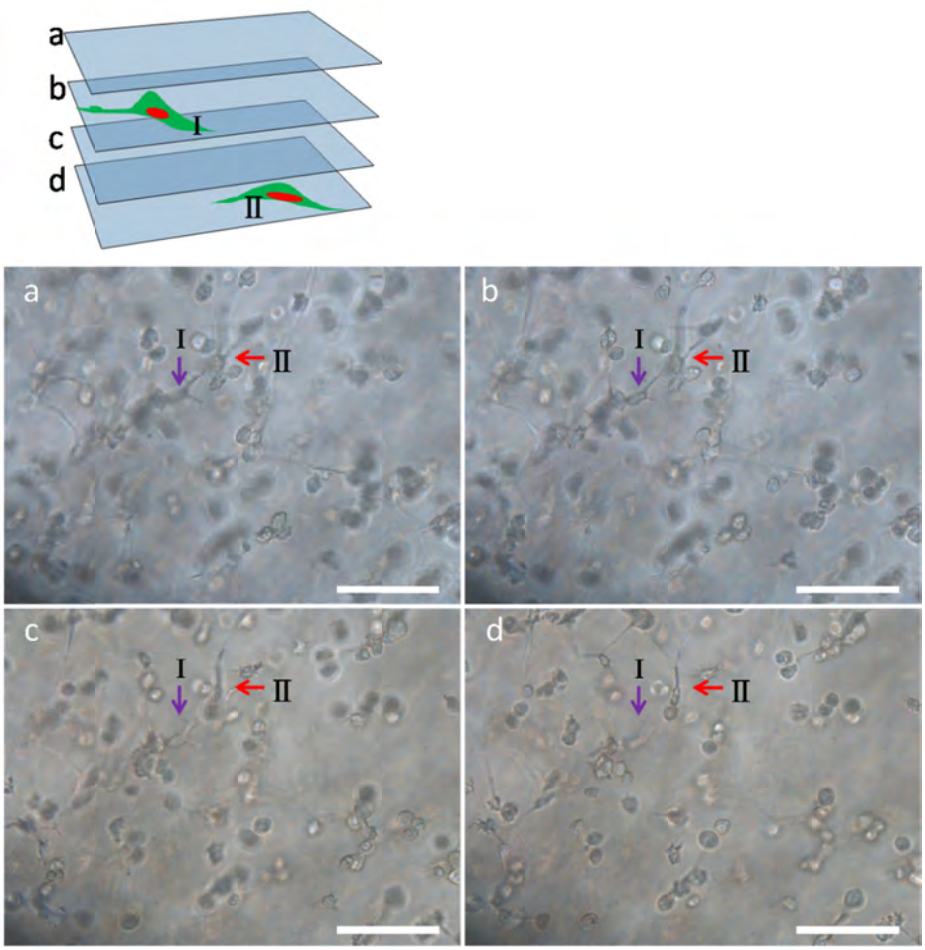
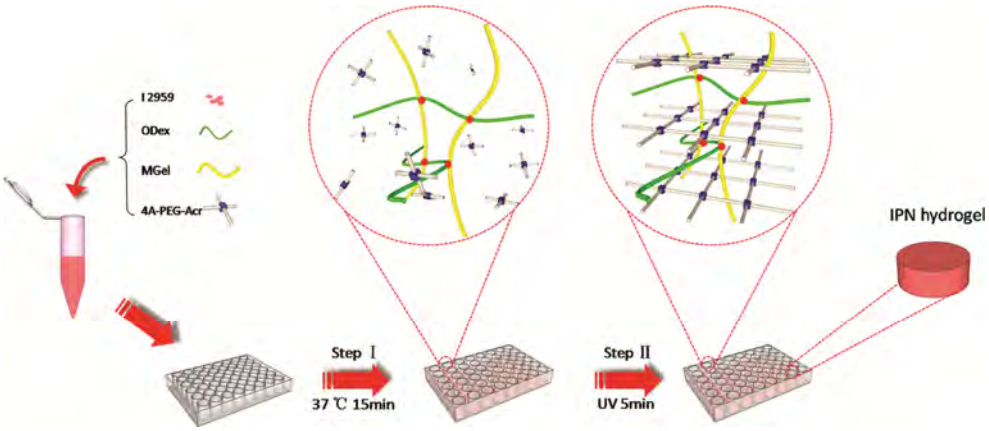


Fig.SI-10 Bright-field microscopy pictures of cells cultured within IPN hydrogels for 4 days. Pictures at different layers of P-D-G-2 hydrogel was obtained by alter the height of the platform. a, b, c, and d are taken from top to bottom of the hydrogel. The cell labeled as I appeared at layer b, and disappeared at layer d. The cell labeled as II appeared at layer d and became obscure at layer a and b. The fact indicates that the two different cells belong to different layer of the hydrogel. Scale bar represents 100 μm.

Table of Content



ODex/MGel/4A-PEG-Acr IPN Hydrogels were prepared through the Schiff-based reaction (step I) and UV crosslinking (step II) with the existence of photoinitiator.