Electronic Supplementary Material (ESI) for Biomaterials Science.

A paintable ophthalmic adhesive with customizable properties based on symmetrical/asymmetrical cross-linking

Changzheng Wei [a], Jialin Song [a], Haoqi Tan [a,*]

a Shanghai Qisheng Biological Preparation Co., Ltd, Shanghai, 201106, China

** Corresponding Author*

Email: 454982313@qq.com; Tel: +86-21-62202533.

1. Experimental section

1.1. Transmittance measurement of hydrogel

The transmittance of PEG-PLL-Lys (10:6:4) hydrogel was calculated based on the measured absorbance. First, 400 μL of hydrogels were formed within the wells of a 48-well plate. Absorbance of the hydrogels was measured between 300 nm and 800 nm by universal microplate reader (Model 550, Bio-Rad, USA) and PBS solution was used as the blank. The transmittance was calculated according to the format: $T (\%) = 1/10^{A} \times 100$, where A is the absorbance.

1.2. pH measurement of hydrogel

Gel-forming solution measurement: Firstly, the prepared gel-forming precursor A and B solutions were quickly mixed to form a homogeneous gel-forming solution (about 5 s) according to the previously described method, and then the pH probe was immediately inserted into the gel-forming solution for real-time measurement. Gel measurement: The prepared hydrogels were first crushed, and then mixed with the same volume of physiological saline (0.9% NaCl). The pH was determined after vortex shaking for 10 min and overnight soaking.

1.3. Cell cultured and cell implantation

Fibroblast cells (L929) were purchased from the American Type Culture Collection (ATCC, VA, USA). L929 cells were grown in Dulbecco's modified Eagle's medium (DMEM) with 10% fetal bovine serum (FBS) and 100 U/mL penicillin and 100 μg/mL streptomycin respectively and cultured in 75 cm^2 tissue culture flasks in a humidified 5% CO_2 environmental incubator at 37 ℃ and cultivated at 80% confluency.

The cultured L929 cells were harvested with 0.05/0.02% trypsin/EDTA, centrifuged at 800 rpm for 4 min and resuspended in the culture medium. Cells were seeded onto the substrate of plate by evenly dropping the cells suspension.

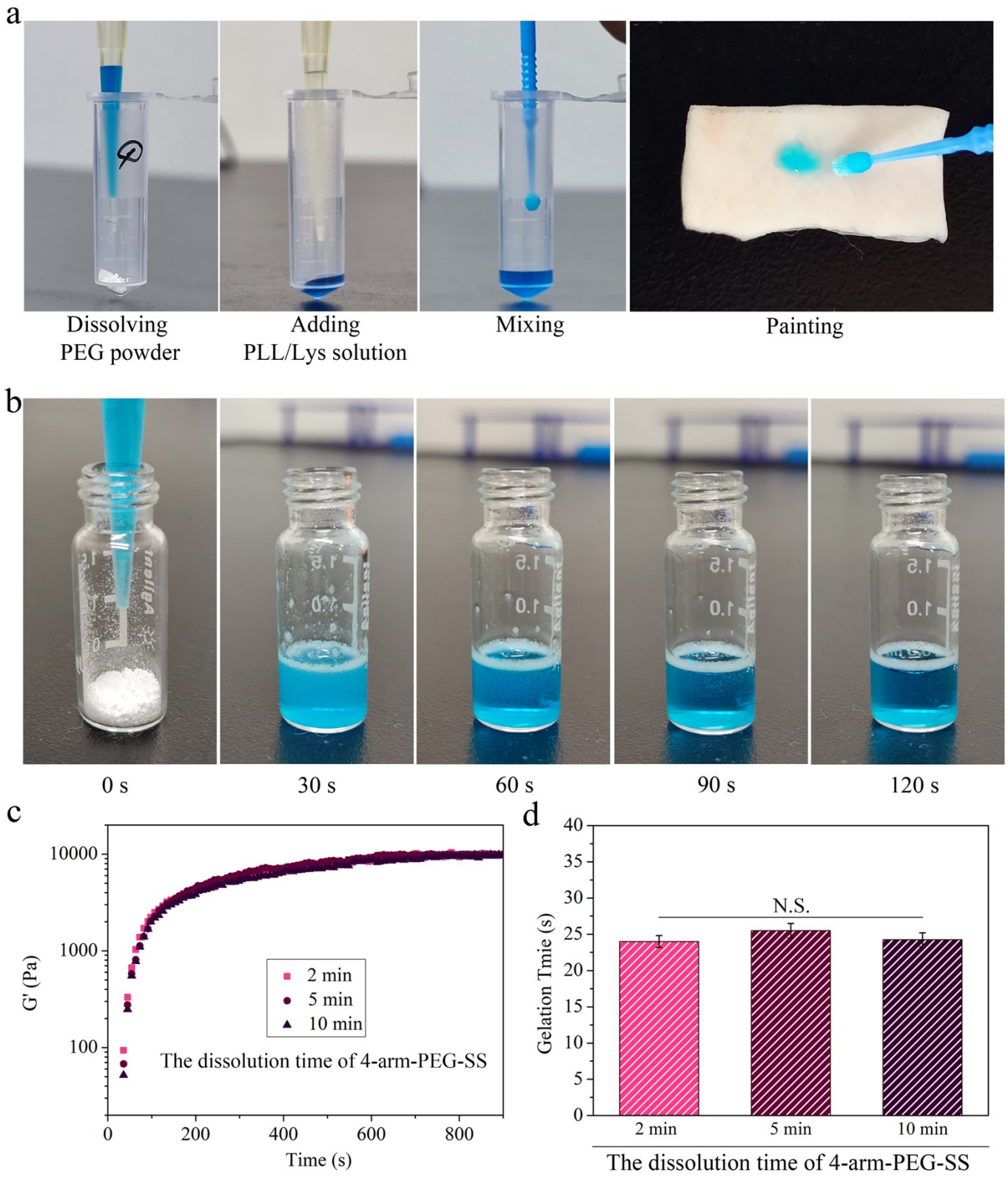

Fig. S1 (a) The gel can be applied to the desired micro wound tissue surface convenient by mixing and then painting. (b) 4-arm-PEG-NHS (ss) can be quickly dissolved by water within 2 min at resting state. (c)By rheological analysis, the storage modulus （G’） of the PEG-PLL-Lys (10:6:4) hydrogel prepared by 4-arm-PEG-NHS after dissolving for different times(2, 5, 10 min). (d) The gelation time of PEG-PLL-Lys (10:6:4)

hydrogel prepared by 4-arm-PEG-NHS after dissolving for different times.

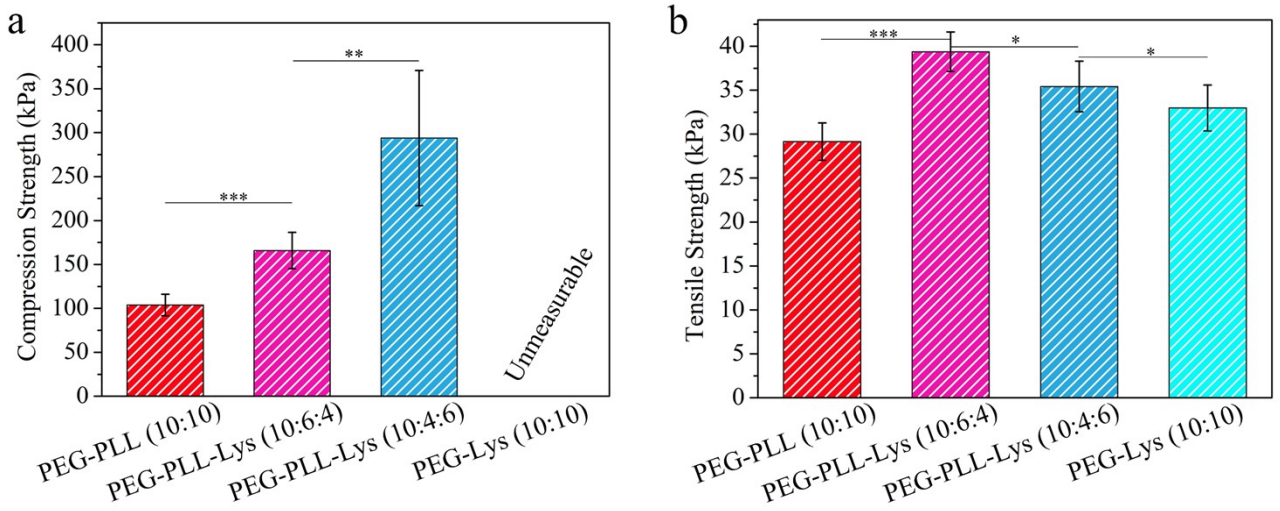

Fig. S2 (a) Compression strength and (b) Tensile strength of PEG-PLL-Lys hydrogels with different ratio according to stress-strain curve.

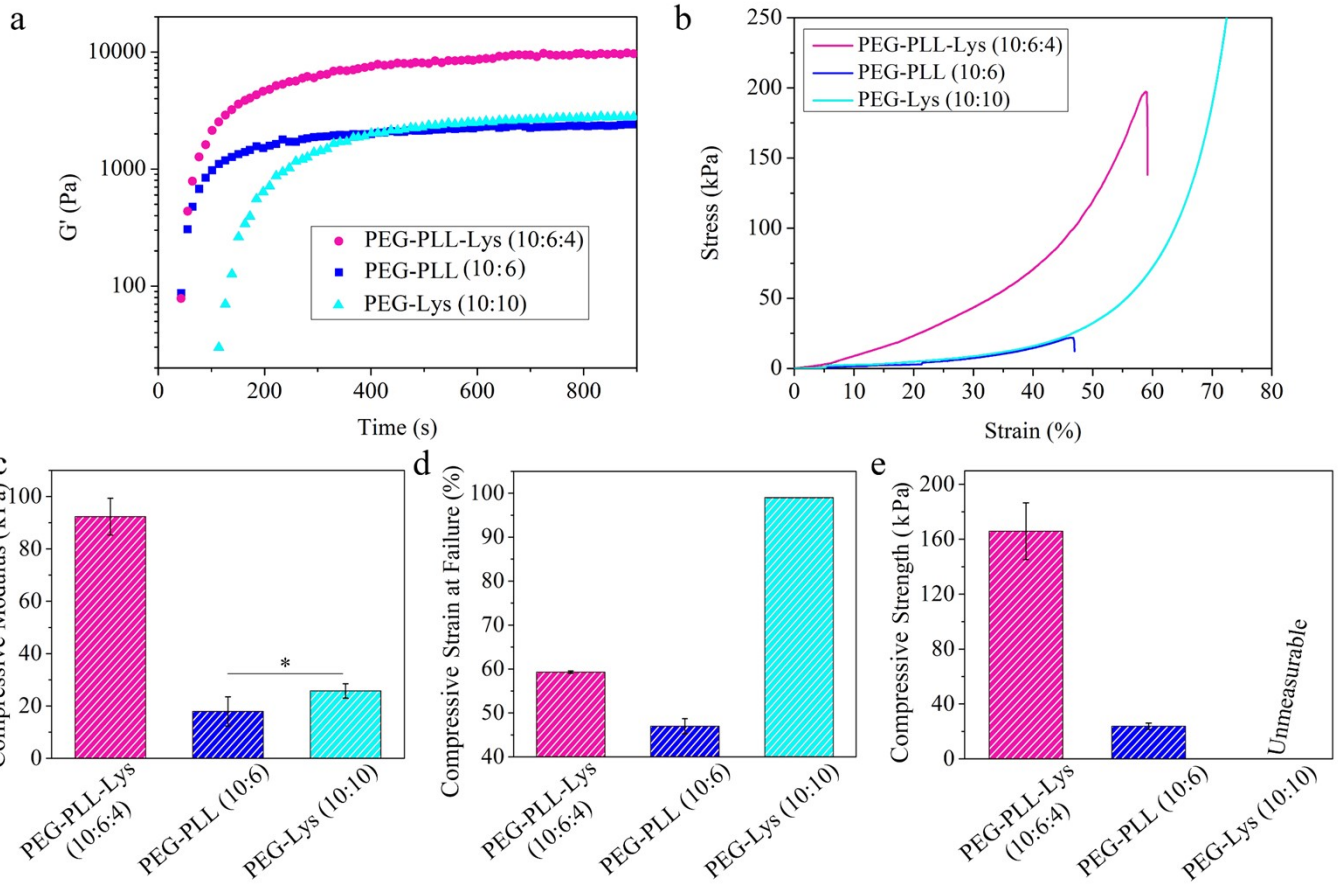

Fig. S3 (a) By rheological analysis, the storage modulus (G') of PEG-PLL-Lys (10:6:4), PEG-PLL (10:6), PEG-Lys (10:10) hydrogel. (b) The compression stress-strain of PEG-PLL-Lys (10:6:4), PEG-PLL (10:6), PEG-Lys (10:10) hydrogel, and (c) the calculated corresponding initial compressive modulus, (d) compressive strain as failure and (e) compressive strength according the curve.

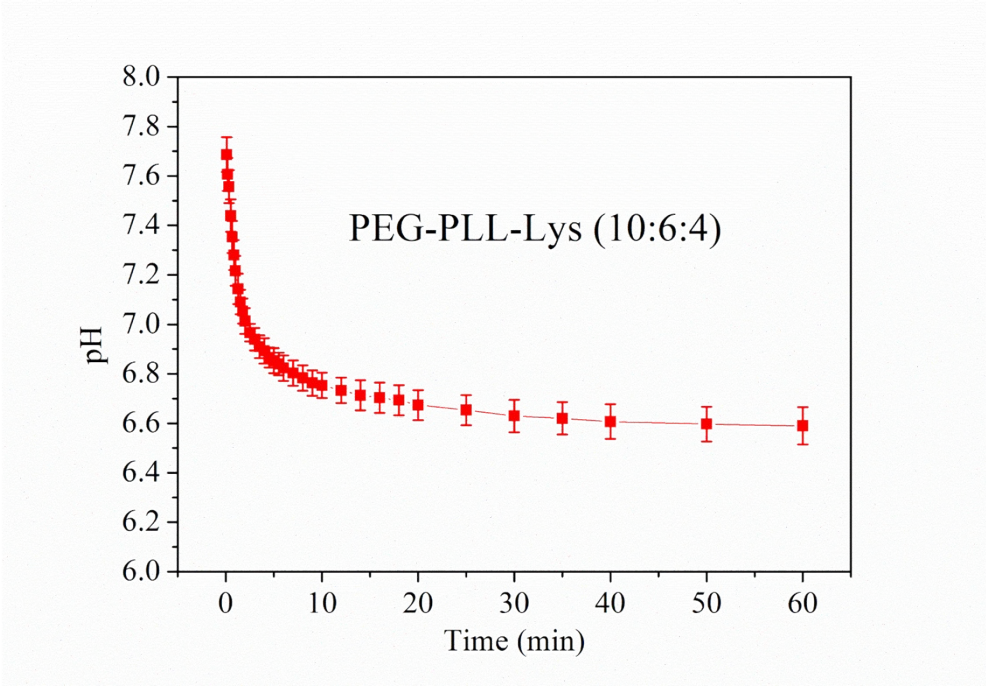

Fig. S4 pH change of PEG-PLL-Lys (10:6:4) hydrogel during gel formation.