Supplementary Materials

Macro/nano topological modification of silk fibroin mesh with mimicked extracellular matrix structure and excellent biocompatibility

1. Preparation of regenerated silk fibroin

Silkworm cocoons were degummed in a 0.5 % Na_2CO_3 aqueous solution at 90 ℃ for 1 h each time, through three consecutive treatments. The acquired fibers were rinsed four times with warm water and exsiccated at 60 ℃ overnight. The dried fibers after degumming were dissolved in a 9.3 mol/L LiBr solution at 45 ℃. After 72 h of dialysis, the porous spongy regenerated fibroin (SF) was obtained by freeze-drying.

2. ROS scavenging test

Each sample(10 mm×10 mm) was immersed in 2 ml of DPPH(0.04 w/v) solution in centrifuge tubes. After incubating at 37 ℃ for 30 min, 1 h, and 24 h., a microplate reader (Multiskan Sky, Thermo Scientific) was used to read intensities at 517 nm. The scavenging rate of samples against DPPH radicals was calculated using the following formula:

$$\text{clearance rate } (\%)=[1-(A_i-A_j)Ac]\times 100$$

Where Ac is the absorbance value of 0.04 mg/mL DPPH working solution; A_i is the absorbance value of different samples. A_j is the absorbance value measured for the original sample.

Table S1. The physical properties of three different SM

Mesh code	Thickness (mm)	Density (g/m^2)	Pore size (μm)	Porosity (%)
SM1	0.15±0.05	38.6±0.3	100±5	17.9±1.6
SM2	0.13±0.02	46.0±0.1	200±5	34.5±1.6
SM3	0.24±0.03	43.3±0.2	500±5	46.2±2.6

Table S2. The physical properties of three different SFM

Mesh code	Thickness (mm)	Density (g/m^2)	Pore size (μm)	Porosity (%)
SFM1	0.14±0.03	28.7±0.1	105±2	31.1±0.6
SFM2	0.13±0.03	37.2±0.4	211±6	44.2±2.2
SFM3	0.21±0.04	38.4±0.2	531±11	52.0±1.1

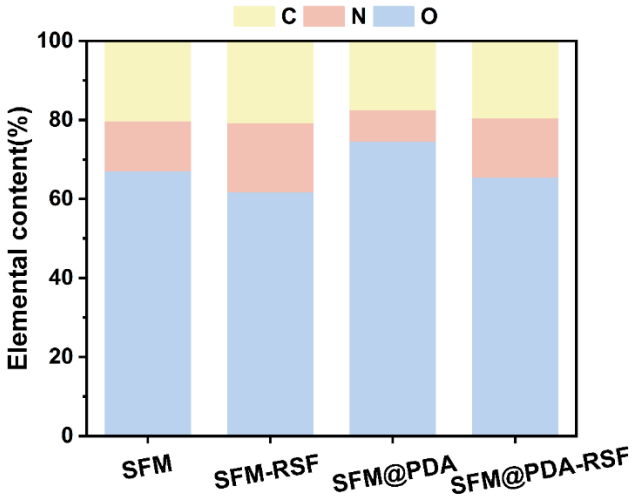

Fig. S1. The composition percentage of elements C, N and O in the xps spectrum.

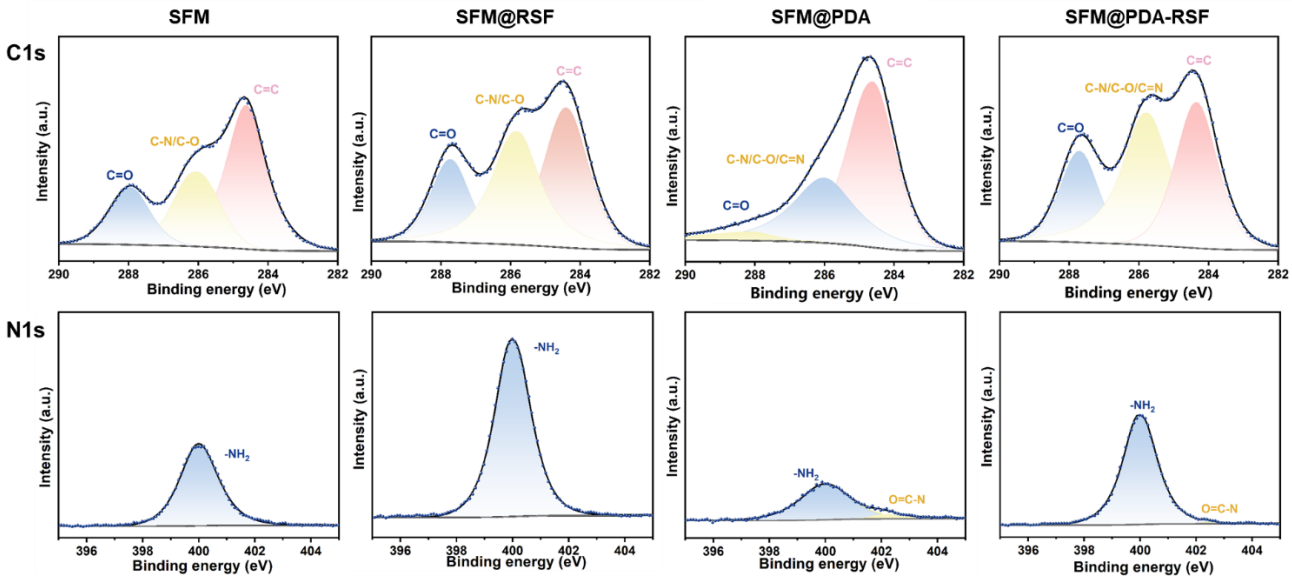

Fig. S2. High-resolution XPS spectra of C1s and N1s in different meshes.

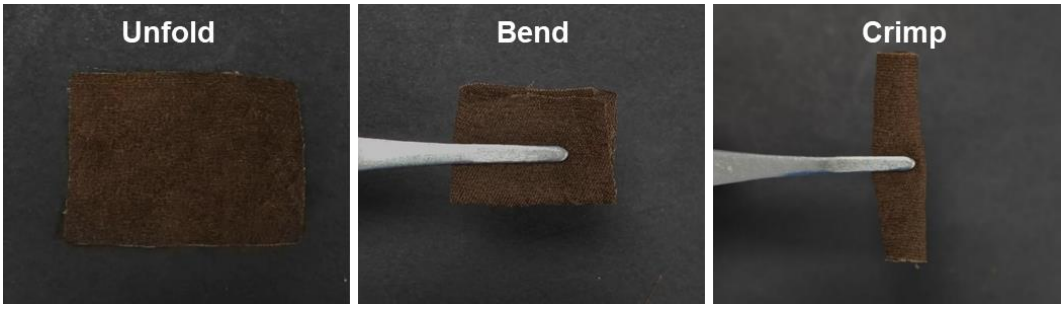

Fig. S3. Photos of SFM@PDA-RSF under unfold, bend and crimp.

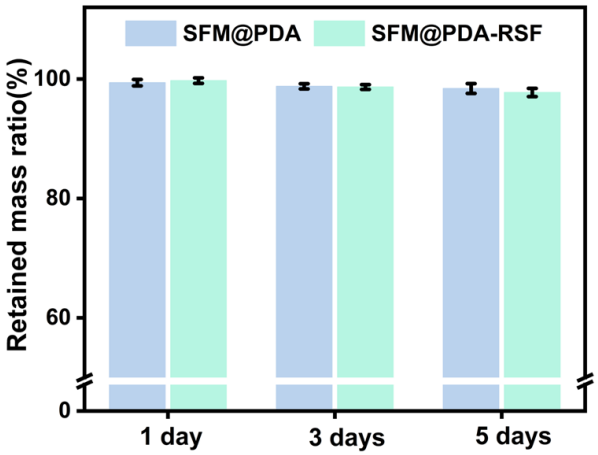

Fig. S4. Retained mass ratio of degraded meshes.

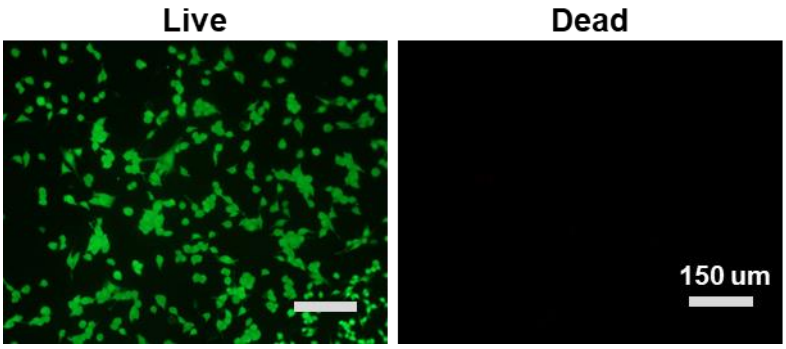

Fig. S5. Fluorescence images of NIH/3T3 embryo live/dead staining blank control group.