ARTICLE

Sustainable and Self-Healable Silk Fibroin Nanocomposites with Antibacterial and Drug Eluting Properties for 3D Printed Wound Dressings

Received 00th January 20xx,
Accepted 00th January 20xx

DOI: 10.1039/x0xx00000x

Sana Sheybanikashani[1], Nooshin Zandi[1*], Danial Hosseini[1], Roya Lotfi[2], Abdolreza Simchi[1,2,*]

[1] Department of Materials Science and Engineering, Sharif University of Technology, P.O. Box 11365-11155, Tehran, Iran

[2] Institute for Nanoscience and Nanotechnology, Sharif University of Technology, P.O. Box 11365-11155, Tehran, Iran

[a] sheybani.sana99@gmail.com *(S. Sheybanikashani)*
[b] zandi.nooshin66@gmail.com *(N. Zandi)*
[c] cr.danial@gmail.com *(D. Hoseini)*
[d] r.lotfi69@gmail.com *(R. Lotfi)*
[e] simchi@sharif.edu *(A. Simchi)*
[f] **Corresponding authors: N. Zandi (zandi.nooshin66@gmail.com) and A. Simchi (simchi@sharif.edu)*
Electronic Supplementary Information (ESI) available: See DOI: 10.1039/x0xx00000x

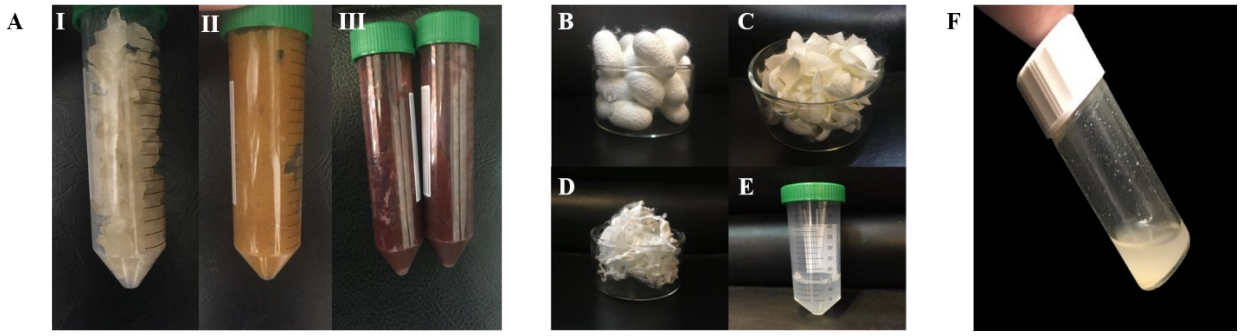

Figure S1. Synthesis of SF and oxidation of Salep. (A) Images of oxidized Salep by sodium metaperiodate for (I) 6 h, (II) 14 days, and (III) 30 days. (B-E) Representative images of cut cocoons and degumming SF. (F) The uncrosslinked hydrogel containing 1 wt.% SF.

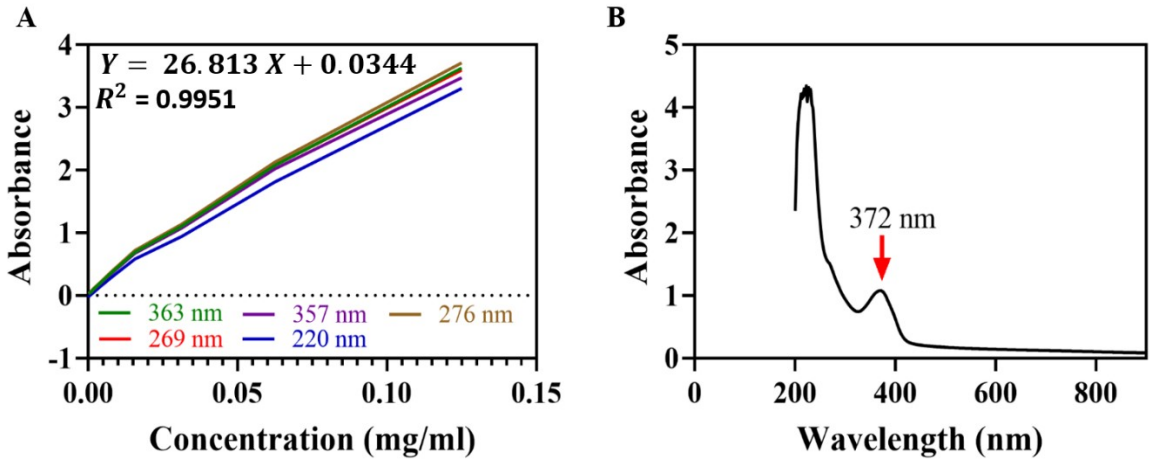

Figure S2. Absorption spectra and the calibration curve of TC in PBS. (A) The calibration curve is prepared by measuring the absorbance values of serially diluted TC solutions at 372 nm. (B) The measurement was performed by scanning the TC solution in a wavelength range of 200 -1000 nm.

Hydrogel	Pore Size (μm)
50SFOS-NPs	61.87 ± 17
25SFOS-NPs	38.12 ± 18

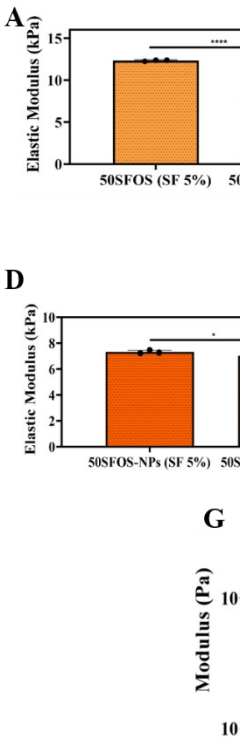

Figure S3. Mechanical and Rheological characterization of hydrogels. (A-F) The effect of SF concentration and NPs on the ultimate tensile strain, extensibility, and elastic modulus. The values of dynamic modulus (G′ and G″) as a function of time determine the recovery of the hydrogels containing (G) 5 wt.% SF (50SFOS-NPs) and (H) 3 wt.% SF (50SFOS-NPs). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, **** $p < 0.0001$

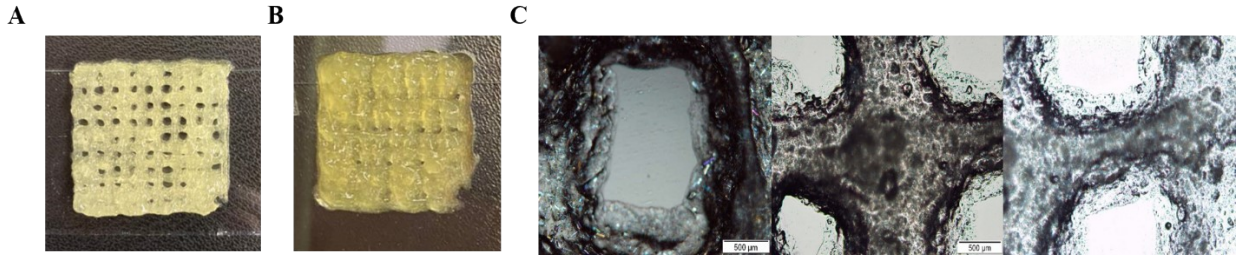

Figure. S4. 3D printing of 50SFOS-NPs hydrogels. Optical images show the 3D printed structures by employing (A) 50SFOS-nanoplex (5 wt.% SF) and (B) 50SFOS-NPs (3 wt.% SF). The printing parameters, including the feeding rate and pressure, for (A) and (B) were 125 $mm^3.s^{-1}$ and 30 kPa, and 75 $mm^3.s^{-1}$ and 110 kPa, respectively. (C) Optical microscopic images show the internal structure of 3D-printed 50SFOS-NPs (5 wt.% SF).

Table S1. The average pore size for the fabricated hydrogel containing 3 wt.% SF

75SFOS-NPs	24.39 ± 8
50SFOS	323 ± 119