Supplementary Material

Dynamically crosslinked, self-adapting, injectable gelatin-chondroitin sulfate hydrogel with antibacterial and antioxidant properties for treatment of deep and irregular wounds

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Supplementary tables

Table-1 Release kinetics model equations

 M_t = amount of drug release at "t", and K_H , K, and K_0 are constants

| Zero-order | $M_t = M_o + K_o t$ |
|------------------|---|
| First-order | $\log C = \log C_o - \frac{kt}{2.303}$ |
| Higuchi | $ft = Q = K_H \times t^{\frac{1}{2}}$ |
| Hixson Crowell | $W_{o}^{1/3} - W_{t}^{1/3} = kt$ |
| Korsmeyer-Peppas | $ln_{o}^{\text{ind}} \frac{M_{t}}{M_{o}} = n ln_{o}^{\text{ind}} t + ln_{o}^{\text{ind}} K$ |

Table-2 FTIR peaks of the optimized G-CS-TA and G-CS-TA/AgNPs hydrogels

| Code | Band (cm ⁻¹) | Assignment |
|------|--------------------------|--|
| 1 | 3291 | stretching of N-H and Polyphenolic OH of TA |
| 2 | 3066 | C-H stretching in aromatic rings of TA |
| 3 | 1747 | oxidation of polyphenolic hydroxyls into carboxyl groups |
| 4 | 1637 | Amide I |
| 5 | 1538 | Amide II |
| 6 | 1233 | Amide III, stretching of S=O in CS, B-O in BO ₄ units derived |
| | | from Sodium meta-borate |

Table-3 Syringeability of fabricated hydrogel formulations

| Sample | Syringeability(%) |
|----------------|-------------------|
| G/CS/TA-1 | 98.8±0.5 |
| G/CS/TA-2 | 98.1±0.31 |
| G/CS/TA/AgNP-1 | 98.5±0.63 |
| G/CS/TA/AgNP-2 | 99.01±0.28 |

Table 4 Drug release kinetics (R² value) of Tannic acid from different hydrogel formulations

| Hydrogels Models | G/CS/TA-1 | G/CS/TA/AgNP-1 | G/CS/TA-2 | G/CS/TA/AgNP-2 |
|---------------------|-----------|----------------|-----------|----------------|
| Zero-order | 0.9718 | 0.9594 | 0.9764 | 0.9367 |
| First Order | 0.7247 | 0.6953 | 0.7050 | 0.5816 |
| Higuchi | 0.925 | 0.9553 | 0.943 | 0.9567 |
| Hixson | 0.9736 | 0.9776 | 0.9798 | 0.9644 |
| Korsmeyer-peppas | 0.8361 | 0.9084 | 0.90339 | 0.8878 |

Table 5 Drug release kinetics (R² value) of silver nanoparticles from G/CS/TA/AgNP-1, G/CS/TA/AgNP-2

| Hydrogels | G/CS/TA/AgNP-1 | G/CS/TA/AgNP-2 |
|------------------|----------------|----------------|
| Models | | |
| Zero-order | 0.9117 | 0.9642 |
| First Order | 0.5618 | 0.6047 |
| Higuchi | 0.9632 | 0.9735 |
| Hixson | 0.9661 | 0.9887 |
| Korsmeyer-peppas | 0.9282 | 0.9384 |

Supplementary figures



Figure S1- (A) Hydrogel loaded in the injection with 24G needle. (B) injectability of the hydrogel. (C) Printability of the fabricated hydrogel via 24G needle.



Figure S2- Mechanism of self-healing ability of the hydrogel.



Figure S3- Release kinetics of Tannic acid from fabricated dynamically crosslinked injectable hydrogels. (A) Zero-order kinetics of Tannic Acid release from fabricated injectable hydrogels, (B) First-order kinetics of Tannic Acid release from fabricated injectable hydrogels, (C) Higuchi model of Tannic Acid release from fabricated injectable hydrogels, (D) Hixson model of Tannic Acid release from fabricated injectable hydrogels, (E) Kors-peppas model of Tannic Acid release from fabricated injectable hydrogels.



Figure S4- Release kinetics of silver nanoparticles from fabricated dynamically crosslinked injectable hydrogels. (A) Zero-order kinetics of silver nanoparticles release from fabricated injectable hydrogels, (B) First-order kinetics of silver nanoparticles release from fabricated injectable hydrogels, (C) Higuchi model of silver nanoparticles release from fabricated injectable hydrogels, (D) Hixson model of silver nanoparticles release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release from fabricated injectable hydrogels, (E) Kors-peppas model of silver nanoparticles release from fabricated injectable hydrogels.



Figure S5- Epidermal thickness of the H&E stained tissue samples from each treatment group.