Supplementary Information

Bacterial Cellulose-Polydopamine based Injectable Composite Hydrogel for Enhanced Hemostasis in Acute Wounds

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Table S1: Comparative description of previously reported hydrogels used for hemostatic outcomes in respect to preparation methods, advantages, and limitations.

Method/Material	Advantages	Limitations	Ref.
Blue-light-activated double-network strategy AC/PDM Hydrogel: -Allyl cellulose (AC) -P (Dopamine methacrylamide) (PDM) Photo-initiator: lithiumphenyl-2,4,6-trimethylbenzoylphosphinate (LAP)	-Strong tissue adhesive strength -Fast gelation -Antibacterial properties -Tissue-like mechanical strength	- The use of AC and PDM prolongs and complicates the fabrication process. - The photo-initiator limited penetration depth may result in incomplete curing. material based on photo initiator can be delicate, limiting their robustness.	[1]
One-step physical cross-linking method Quaternary ammonium chitosan /tannic acid (TA) Cross-linked by dynamic ionic bonds and hydrogen bonds between QCS and TA	-Superior reactive oxygen species scavenging activity -Broad-spectrum antibacterial ability -Rapid hemostatic capability	-The whole system is based on ionic and hydrogen bonds which may not provide full potential of material.	[2]
Chitosan-based hydrogels Cross-linked by 3-(3,4-dihydroxyphenyl) propionic acid-modified chitosan (DCS) Sebacic acid-terminated polyethylene glycol modified by p-hydroxybenzaldehyde (PEGSH)	-Suitable stretchability (∼780%) -High blood absorbability (1300% ± 50%) -Strong adhesion (∼68.5 kPa) -Stretchable, self-adhesive, antibacterial	-Requires precise regulation of PEGSH proportion for favorable cytocompatibility -Involves extensive processing and complex modifications.	[3]
Incorporation of Keratin–catechin nanoparticles (KE-NPs) into cellulose hydrogel -Sodium carboxymethyl cellulose -Keratin–catechin nanoparticles (KE-NPs)	-Enhances mechanical properties -Provides antioxidant and antimicrobial properties	-Nanoparticles agglomeration poses Dispersion challenges. -Stirring the mixture in the dark under nitrogen protection at 37 °C makes the process complex. -Adding nanoparticles suspension with 0-2.5% w/w concentration complicates the weighing and solution preparation.	[4]
Current work: BC/PDA/CMC hydrogel -Bacterial cellulose (BC) -Polydopamine (PDA) -Carboxymethyl cellulose (CMC)	-Simple synthesis method -Easy storage conditions -No complex procedures used -Good hemostatic and antioxidant property	-less adhesive nature	-

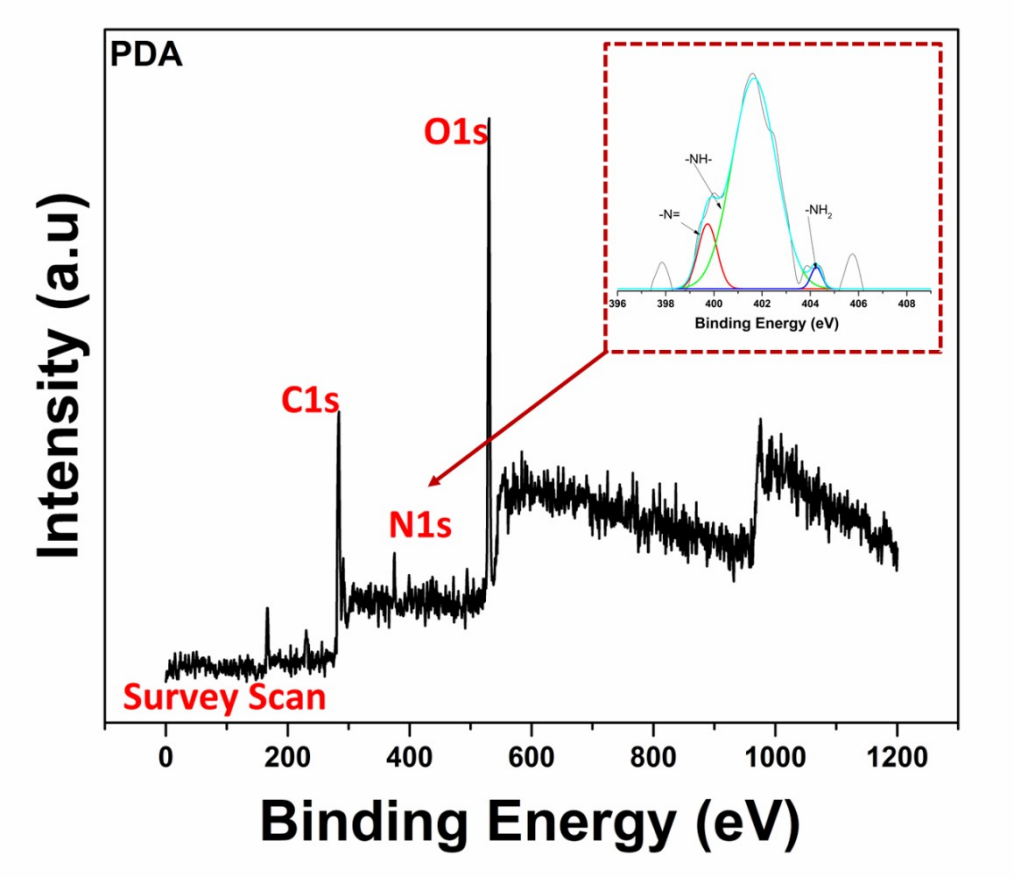

Figure S1: XPS survey spectra of polydopamine (PDA) with inset showing deconvoluted peak of nitrogen.

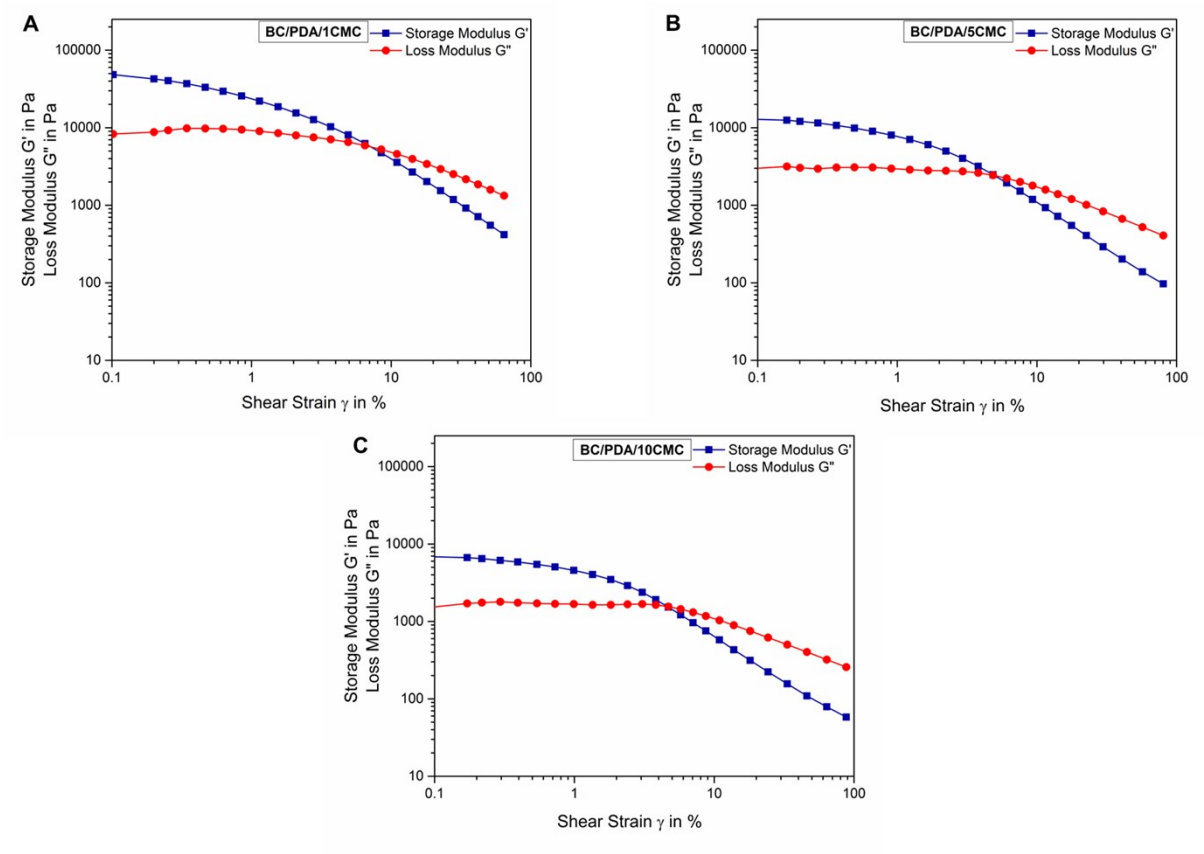

Figure S2: Strain sweep graph of (A) BC/PDA/1CMC (B) BC/PDA/5CMC and (C) BC/PDA/10CMC samples.

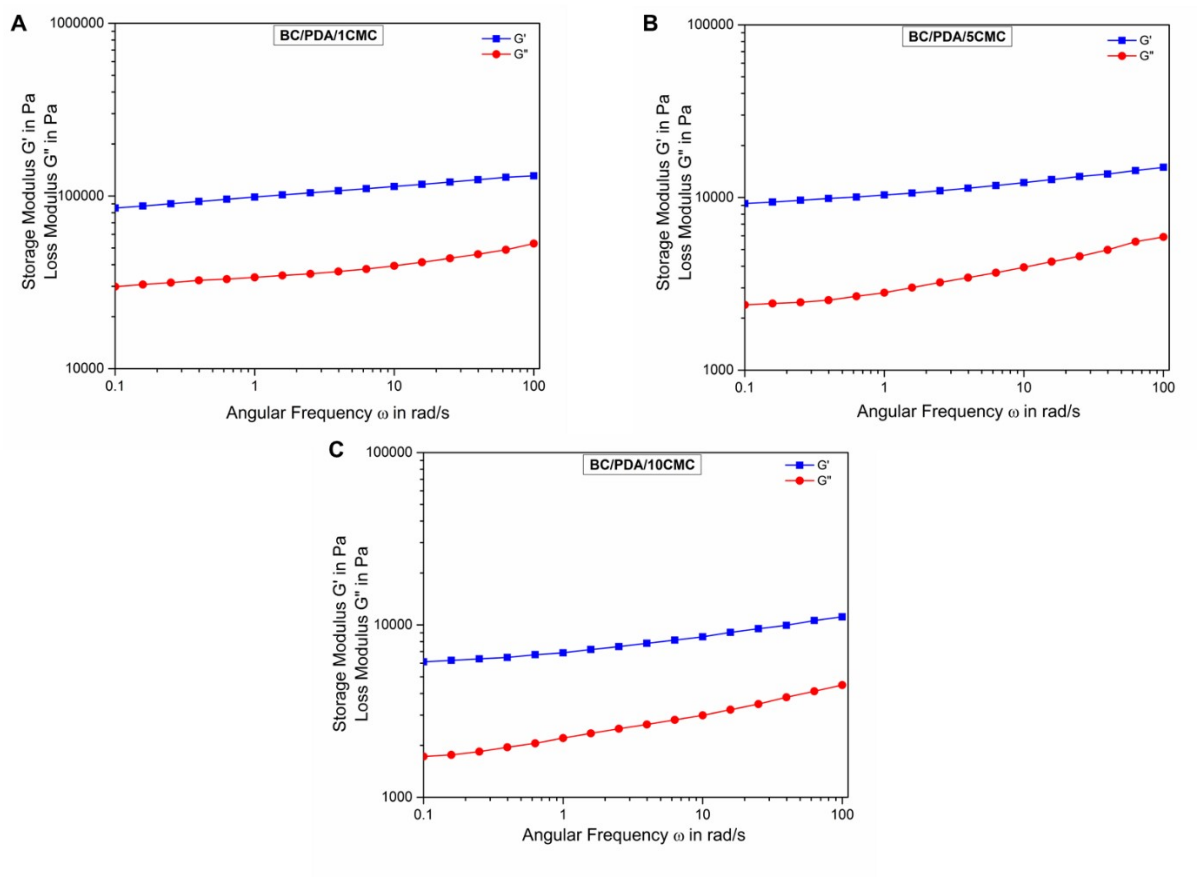

Figure S3: Frequency sweep graph of (A) BC/PDA/1CMC (B) BC/PDA/5CMC and (C) BC/PDA/10CMC samples.

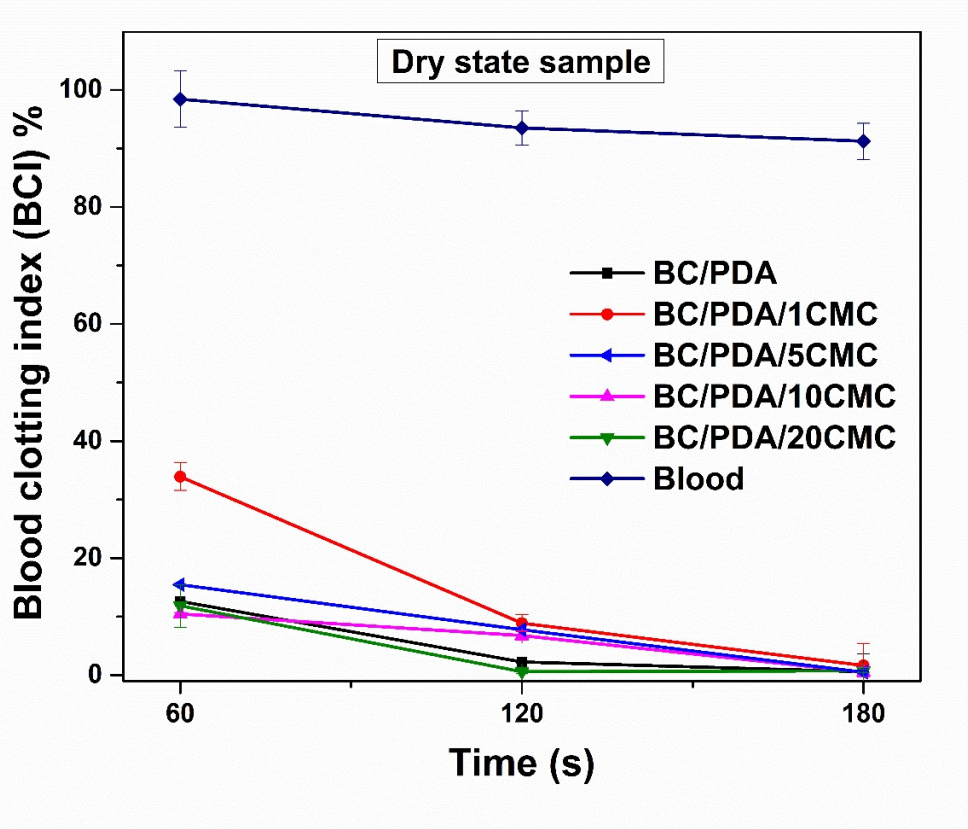

Figure S4: *In vitro* blood clotting study showing blood clotting index (BCI) at different time points on dry from of samples.

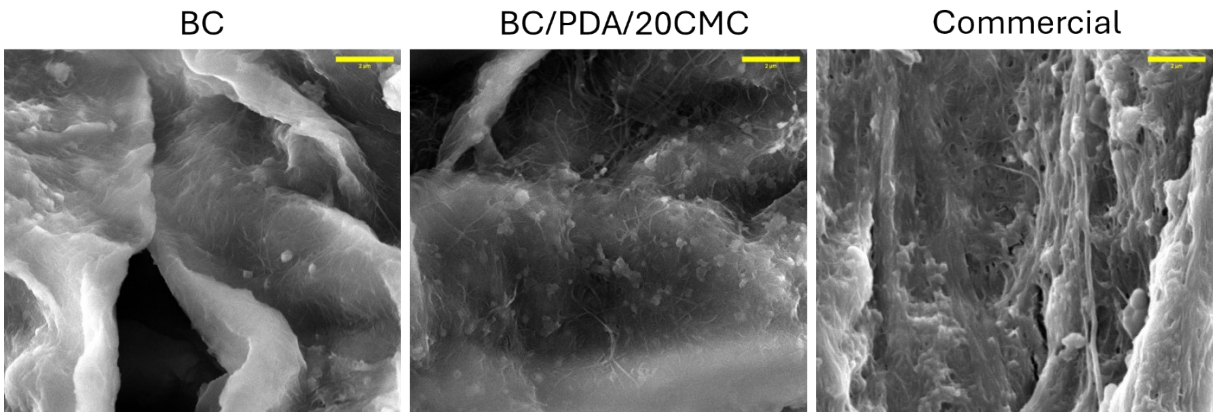

Figure S5: SEM images of platelet adhesion on samples at 7000× magnification. of BC, BC/PDA/20CMC, and commercial. Scale bar is equal to 2 µm.

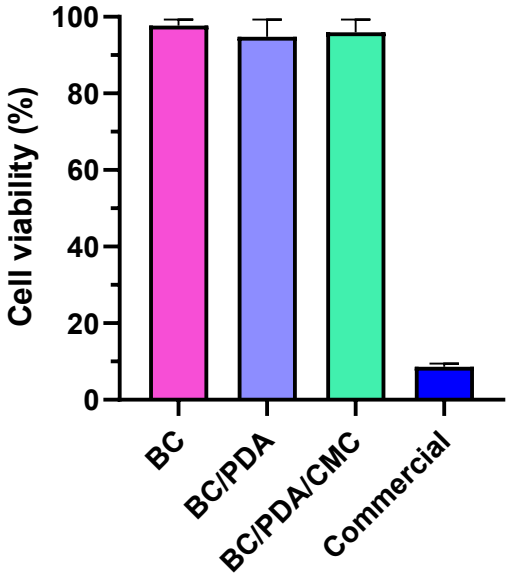

Figure S6: % Cell viability of NIH3T3 cells in presence of samples and controls using MTT assay.

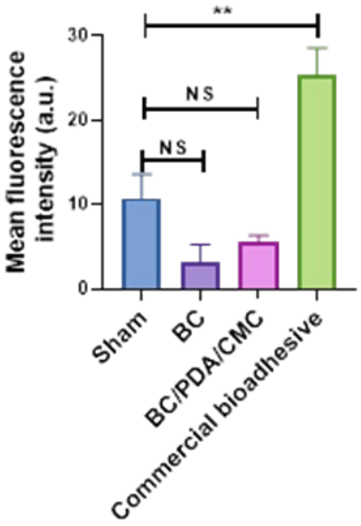

Figure S7: Semi-quantitative analysis of the expression of TNF-α (red).

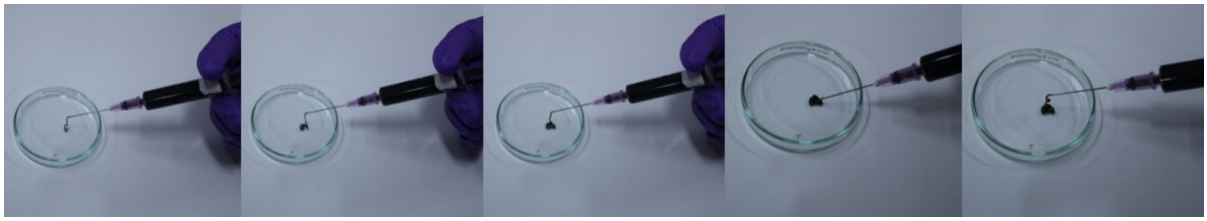

Figure S8: BC/PDA/20CMC hydrogel injecting through 2 mL syringe (23G).

References

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