

Supporting Information

Visible Light-based 3D Bioprinted Composite Scaffolds of κ -Carrageenan for Bone Tissue Engineering

Sushma Kumari^{1,2†}, Pritiranjana Mondal^{1†}, Suhela Tyeb¹, and Kaushik Chatterjee^{1*}*

¹Department of Materials Engineering, Indian Institute of Science, C.V. Raman Avenue,
Bangalore 560012, India

Current Address: ²Centre for Biomaterials, Cellular and Molecular Theranostics (CBCMT),
Vellore Institute of Technology, Vellore 632014, Tamil Nadu, India

[†]**Contributed equally**

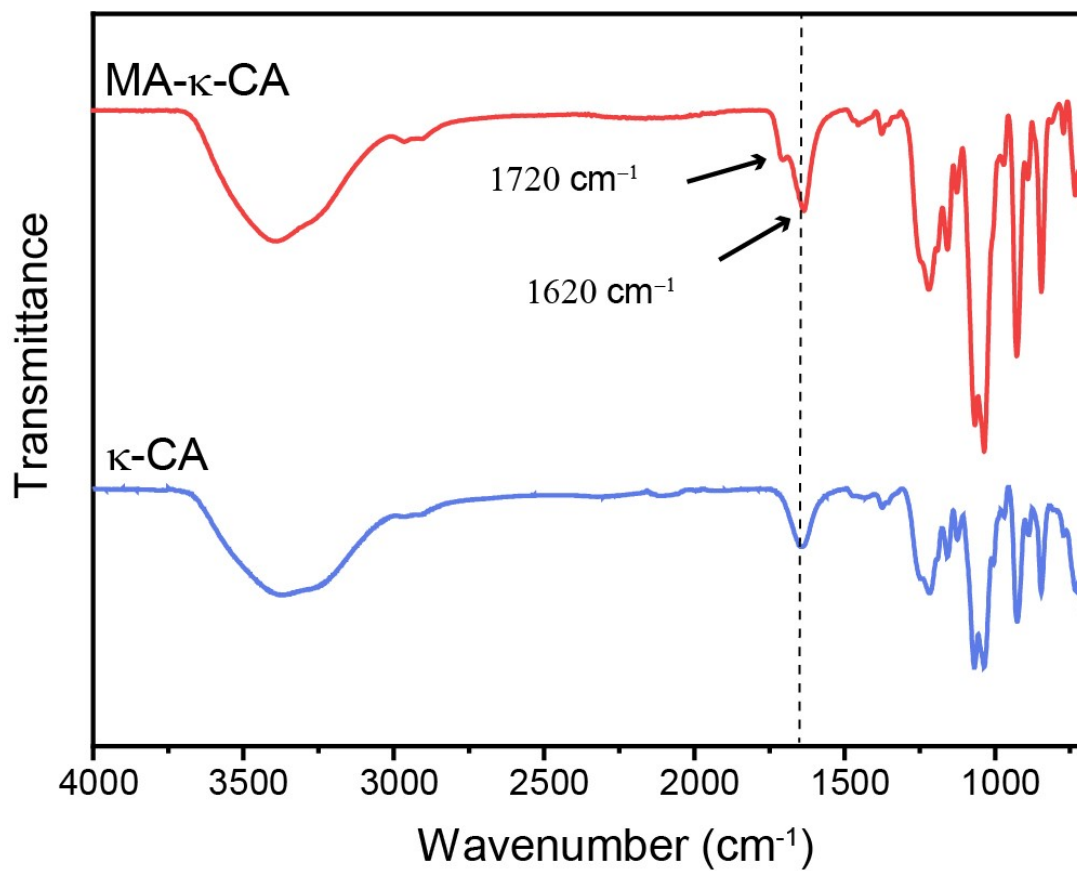
***Corresponding Author**

Email: kchatterjee@iisc.ac.in; Tel.: +91-80-22933408

Email: sushmakumari86@gmail.com

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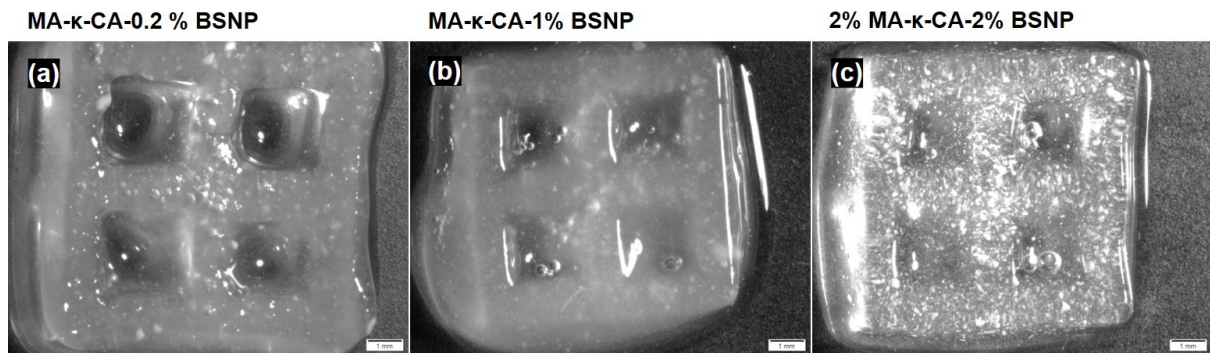
20 **Figure S1.** The FTIR spectra of the native κ -CA and chemically functionalized MA- κ -CA with
21 C=C (stretching vibration) at 1620 cm^{-1} and C=O (stretching vibration for ester) at 1720 cm^{-1} .

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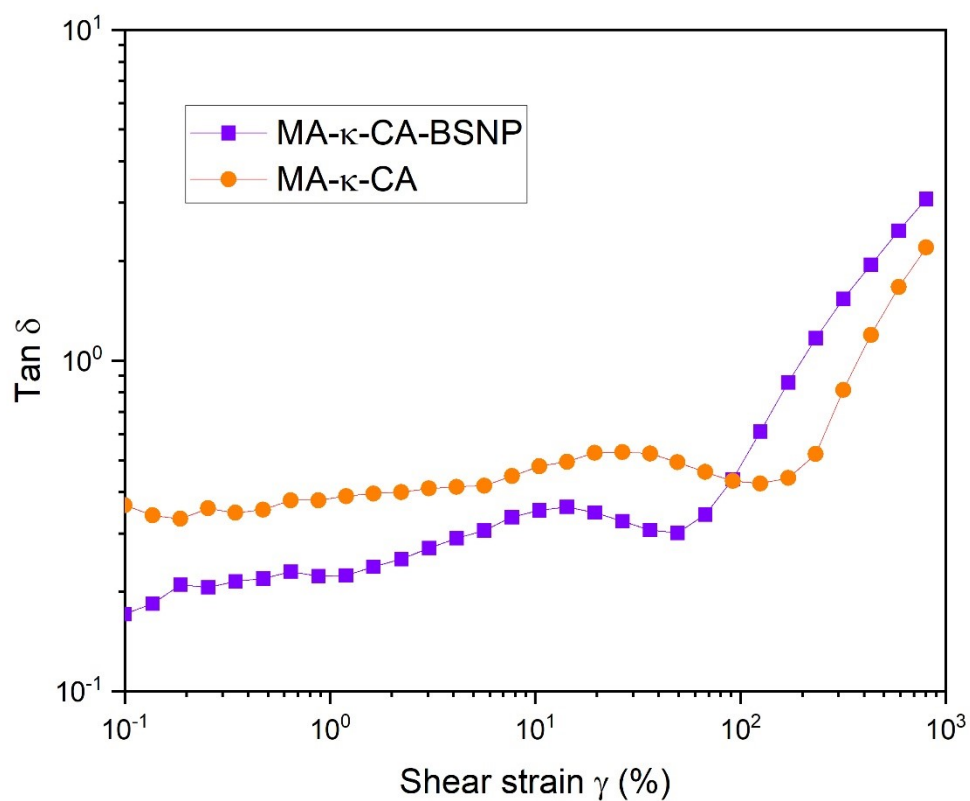


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27 **Figure S2.** Effect of BSNP concentration on the printability of photocurable printing precursor
28 solution of 2% w/v MA-κ-CA, mixed with (a) 0.2 % BSNP, (b) 1 % BSNP, and 2 % BSNP.
29 Dimensions of hydrogel grid are $8 \times 8 \times 2 \text{ mm}^3$. Scale bars: 1 mm.

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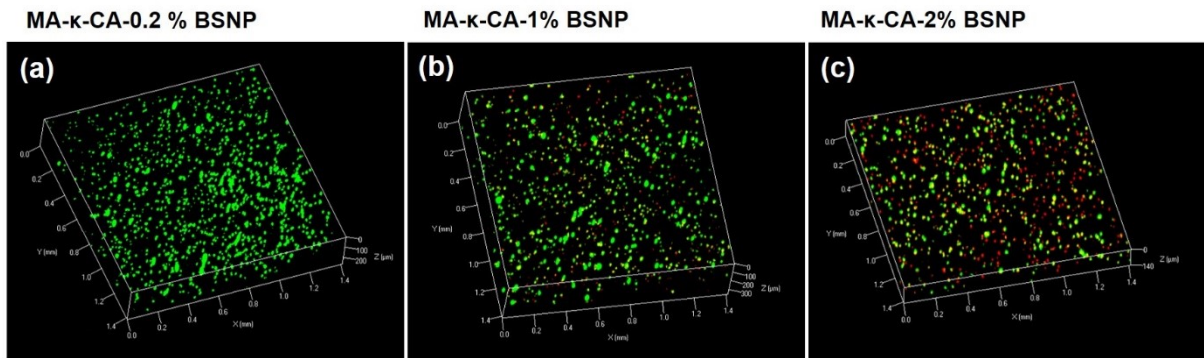


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34 **Figure S3.** Graphical representation of $\text{tan } \delta$ as a function of shear strain for the DLP printed
35 hydrogels of 2% MA- κ -CA and composite 2% MA- κ -CA-BSNP.

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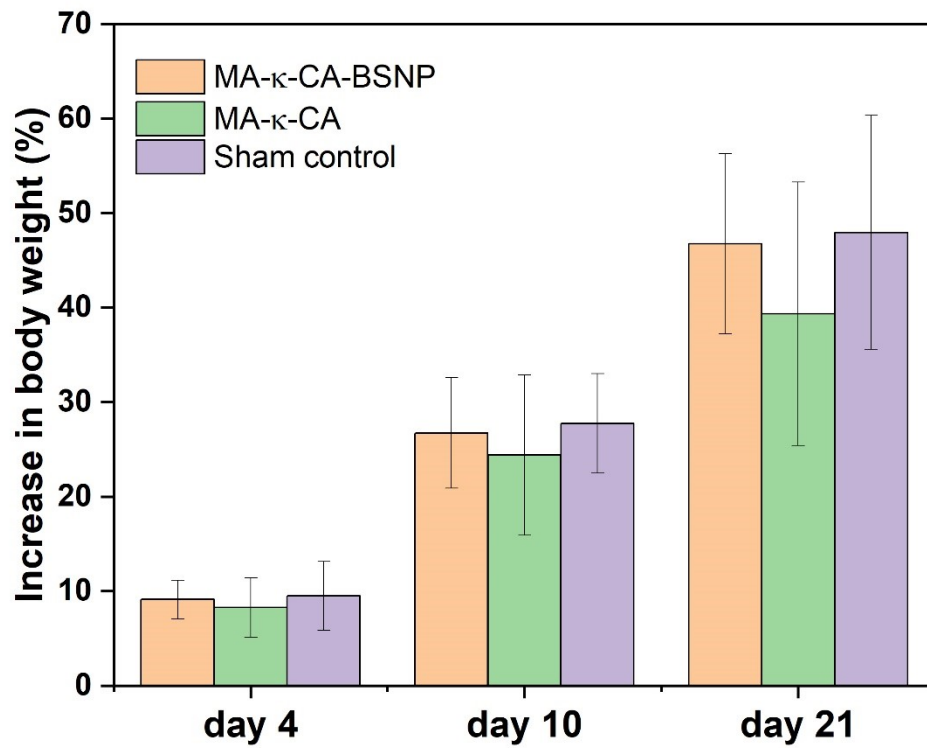


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39 **Figure S4.** The cytotoxicity effect of BSNP concentration on the DLP printing of MC3T3-E1
40 osteoblast cells mixed with (a) MA-κ-CA-0.2% BSNP, (b) MA-κ-CA-1% BSNP, and (c) MA-
41 κ-CA-2% BSNP to fabricate cell-laden composite hydrogels. Merged live/dead 3D
42 fluorescence images of MC3T3-E1 osteoblasts, stained with calcein AM (live cells: green) and
43 ethidium homodimer I (dead cells: red) on day 2.

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48 **Figure S5.** Increase of body weight of the rat of all group.

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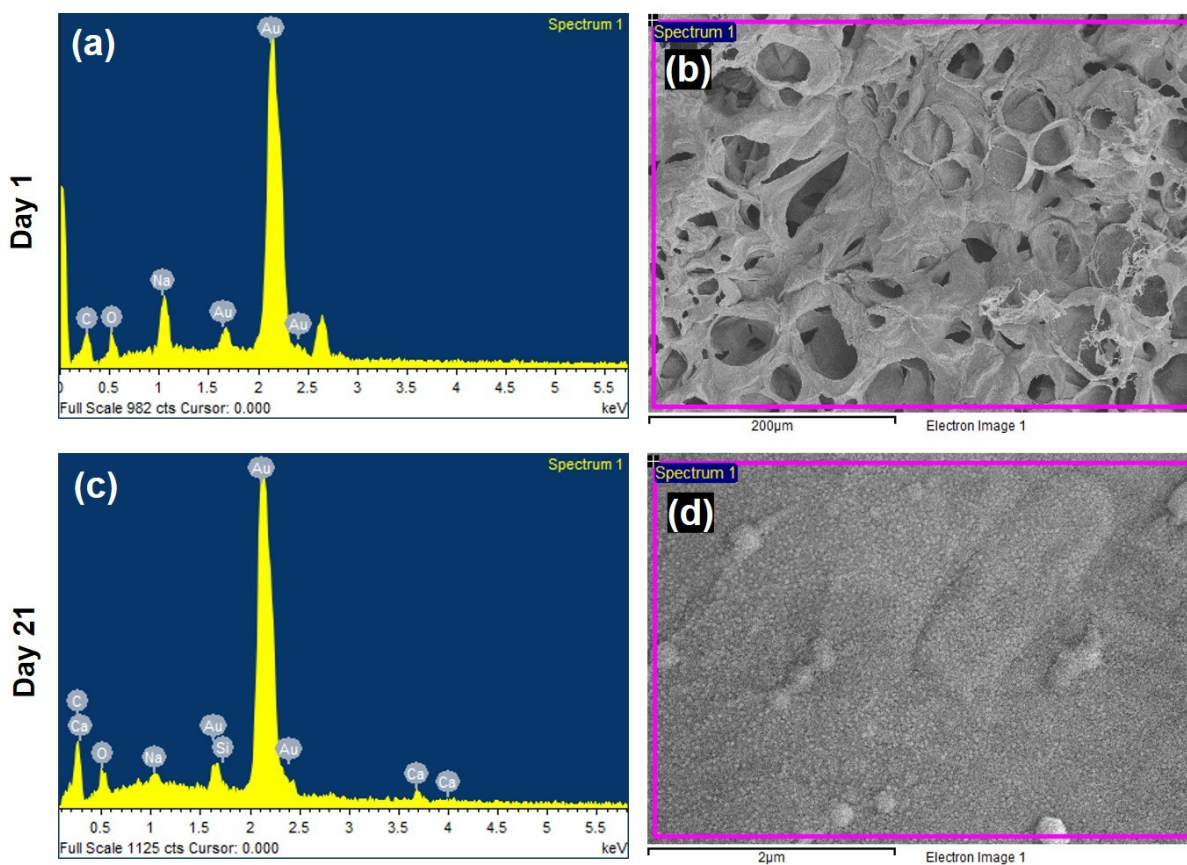
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56 **Figure S6.** SEM-EDS analysis for the DLP printed MC3T3-E1 osteoblast cell-laden MA-κ-
57 CA-BSNP composite hydrogels on (a-b) day 1 and (c-d) day 21.

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62 **Table S1:** Hematological studies of sham control, MA-κ-CA hydrogel and MA-κ-CA-BSNP
 63 composite hydrogel -treated group

		RBC (10 ⁶ /μl)	Hemogl obin (g/dL)	MC V (fL)	MC H (pg)	MC HC (g/d L)	PCV (%)	TLC (cells/ mm ³)	SGPT (U/Lt)	SGOT (U/Lt)	Creatini ne (mg/dL)
Day 4	SHAM	5.5 ±1.8	12.1 ±1.2	68.1 ± 4.8	18.4 5 ± 2.5	29.8 ± 3.1	41.6 ± 1.5	4550 ± 353	85.4 ± 2.3	269 ± 13.9	0.11
	MA-κ- CA	6.0 ± 2.2	12 ±1.5	70.2 ± 6.9	17.9 ± 1.3	25.6 ± 1.5	46.8 ± 2.2	5933 ± 757	80.8 ± 7.8	265 ± 35.9	0.12
	MA-κ- CA- BSNP	6.8 ± 2.3	13.4 ± 2.6	60.1 ± 5.8	19.7 ± 2.1	32.8 ± 2.9	40.8 ± 3.5	4600 ± 658	81.9 ± 10.8	287.7± 50	0.14
Day 10	SHAM	8.3 ± 2.2	16.2 ± 3.7	58.9 ± 6.5	19.5 ± 2.5	33.2 ± 4.2	48.7 ± 23	4200 ± 671	98.8 ± 2.19	246.4 ± 7.7	0.7
	MA-κ- CA	6.9 ± 1.7	13.7 ± 1.3	59.2 ± 5.5	19.9 ± 3	33.6 ± 3.4	40.7 ± 4.2	4300 ± 636	92.6 ± 11.9	248 ± 60	0.6
	MA-κ- CA- BSNP	7.0 ± 2.4	13.5 ± 3	58.5 ± 8.7	19.1 ± 2.8	32.8 ± 4.1	41.1 ± 5.6	4300 ± 708	75.9 ± 15.6	285.6 ± 70	0.6
Day 21	SHAM	7.3 ± 3.1	14.6 ± 3.8	57.1 ± 8.7	19.8 ± 2.8	34.8 ± 4.0	41.9 ± 7.8	5200 ± 800	62.5 ± 20.8	260.9 ± 80	0.16
	MA-κ- CA	6.9 ± 2.8	15.3 ± 4.0	52 ± 6.7	18.6 ±3.6	31.8 ± 5.1	39 ± 8.0	4200 ± 575	105.2 ± 18.0	272.7 ± 89	0.16
	MA-κ- CA- BSNP	7.8 ± 3.1	15.1 ± 3.8	58.2 ± 8.0	17.4 ± 2.4	33.4 ± 6.2	45.2 ± 7.0	3800 ± 835	91.8 ± 22.0	293.4 ± 70	0.21