ACCSCIENCE PUBLISHING

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RESEARCH ARTICLE

Nanomaterial-modified bioinks for DLP-based bioprinting of bone constructs: Impact on mechanical properties and mesenchymal stem cell function

Supplementary File

Table S1. Volume, surface area, base area, and porosity of the porous 3D model.

3D model	Volume (mm^3)	Surface area (mm^2)	Base area (mm^2)	Porosity (%)
Porous	60.9	891.18	Mean: 15.14; minimum: 7.00; maximum: 31.54	41.23
Solid	147.7	161.38	38.45	0

Table S2. Printing parameters using the Lumen X for methacrylated gelatin (GelMa)-based bioinks.

Parameter	Specification
Layer height (μm)	100
First layer	4×
Light intensity, % (mW/cm^2)	70 (33.58)
Light exposure (s)	9

Table S3. Quanti-Tect Primer Assays (Qiagen) for polymerase chain reaction (PCR).

Gene	QuantiTect Primer Assay	Catalog number
Alkaline phosphatase	Hs_ALPL_1_SG	QT00012957
Osteocalcin	Hs_BGLAP_1_SG	OT00232771
Collagen type 1	Hs_COL1A_1_SG	QT00037793
60S Ribosomal protein L13a	Hs_RPL13A_1_SG	QT00089915

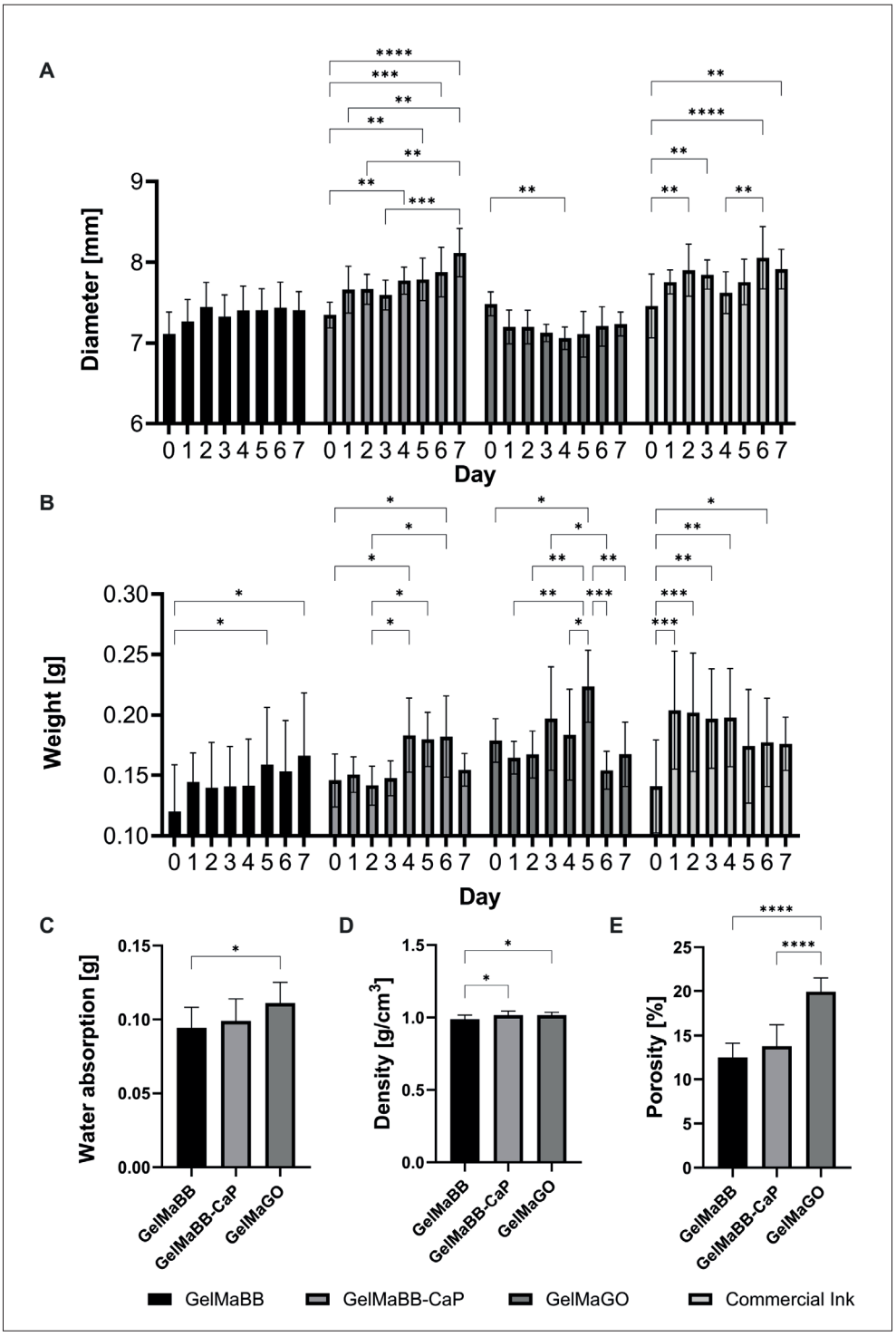

Figure S1. Weight, size, water absorption, density, and volume of the printed samples. (A) Diameter of samples printed with methacrylated gelatin (GelMa)-based bioinks without cells. Statistical evaluation was performed using a two-way analysis of variance (ANOVA; n = 6). (B) Weight development of samples printed with the GelMaBB bioink. For statistical evaluation, two-way ANOVA was applied (n = 6). (C) Water absorption of the different constructs (GelMaBB, GelMaBB-CaP, and GelMaGO). For statistical evaluation, one-way ANOVA was applied (n = 12). (D) Density of the printed constructs (GelMaBB, GelMaBB-CaP, and GelMaGO) without cells. For statistical evaluation, one-way ANOVA was applied (n = 12). (E) Porosity of the individual constructs (without cells). For statistical evaluation, one-way ANOVA was applied (n = 12). *p < 0.05; **p < 0.01; ***p < 0.001; and ****p < 0.0001. Abbreviations: CaP: Calcium phosphate; BB: Brilliant Black; GO: Graphene oxide.

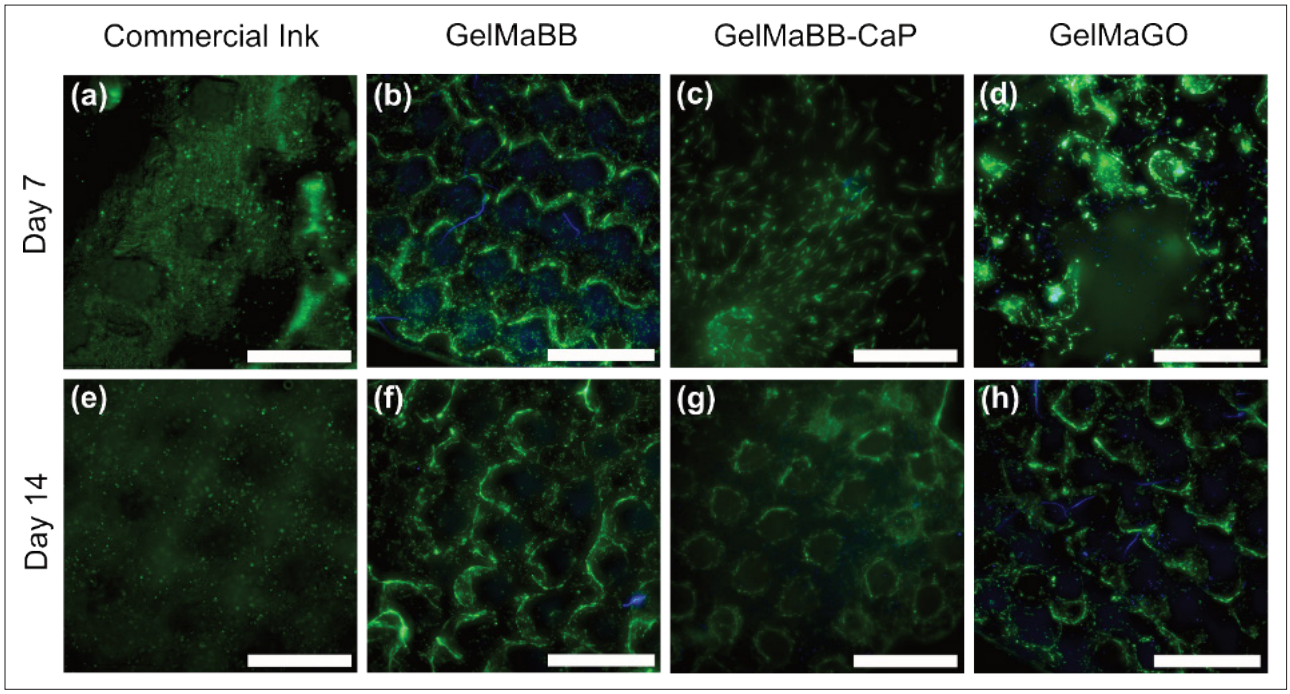

Figure S2. Human mesenchymal stem cell (hMSC) vitality and distribution within methacrylated gelatin (GelMa)-based constructs. Live staining with Calcein AM (green) and Hoechst (blue) after 7 (A–D) and 14 (E–H) days. Scale bars: 500 μm. Abbreviations: CaP: Calcium phosphate; BB: Brilliant Black; GO: Graphene oxide.

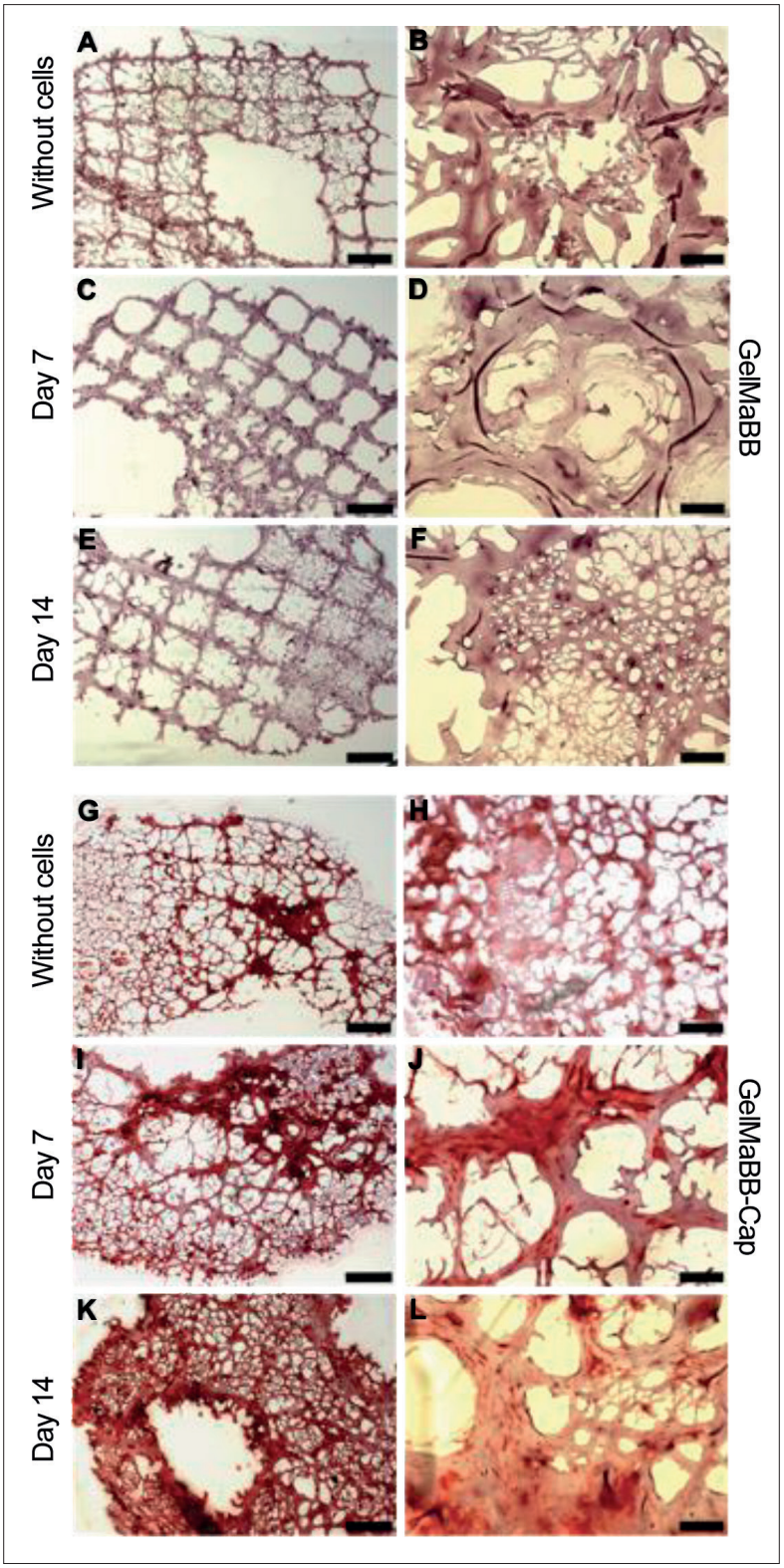

Figure S3. Alizarin Red staining (ARS) of cryo-sections from GelMaBB (A–F) and GelMa-CaP (G–L). Constructs printed without cells (A, B, G, and H) served as controls for the staining process to determine material-based background staining. Magnification: 4× (A, C, E, G, I, K), 20× (B, D, F, H, J, L). Scale bars: 500 μm (A–F); 100 μm (G–L).