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3D-bioprinted skin-mimicking bilayer hydrogel dressing with compartmentalized antibacterial and pro-healing functions for diabetic wounds

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Supplementary File

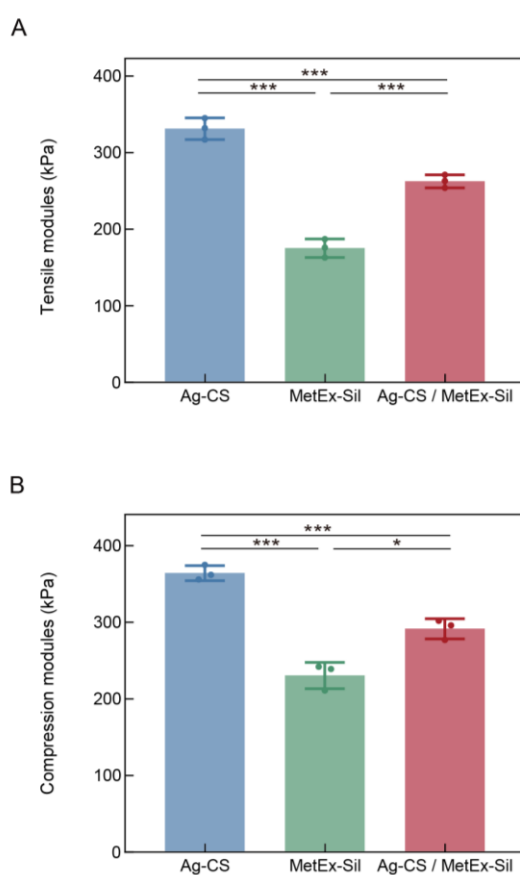


Figure S1. Mechanical properties of the hydrogel layers and bilayer construct. (A) Quantitative analysis of tensile modulus calculated from the linear region (10–30% strain). (B) Quantitative analysis of compression modulus determined from the 10–30% strain region. Tensile testing was performed at 10 mm/min and compression testing at 2 mm/min. Data are presented as mean \pm standard deviation (SD). Statistical significance was determined by one-way ANOVA with Tukey's post-hoc test. Statistical significance is indicated as follows: ns, not significant ($p > 0.05$); * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

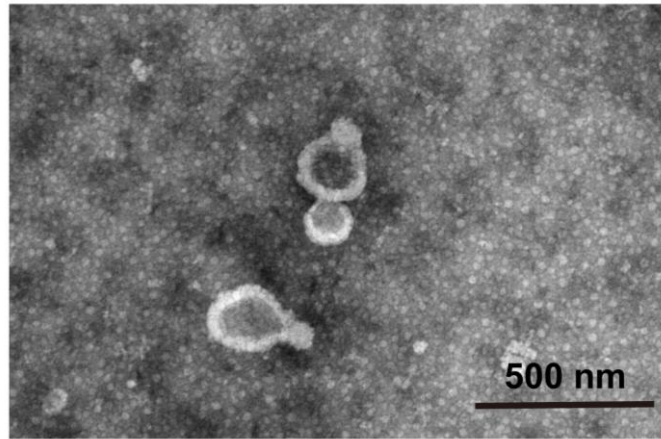


Figure S2. Representative transmission electron microscopy (TEM) image of exosomes recovered from the release medium of the MetEx-Sil hydrogel at day 3. Scale bar:500 nm.

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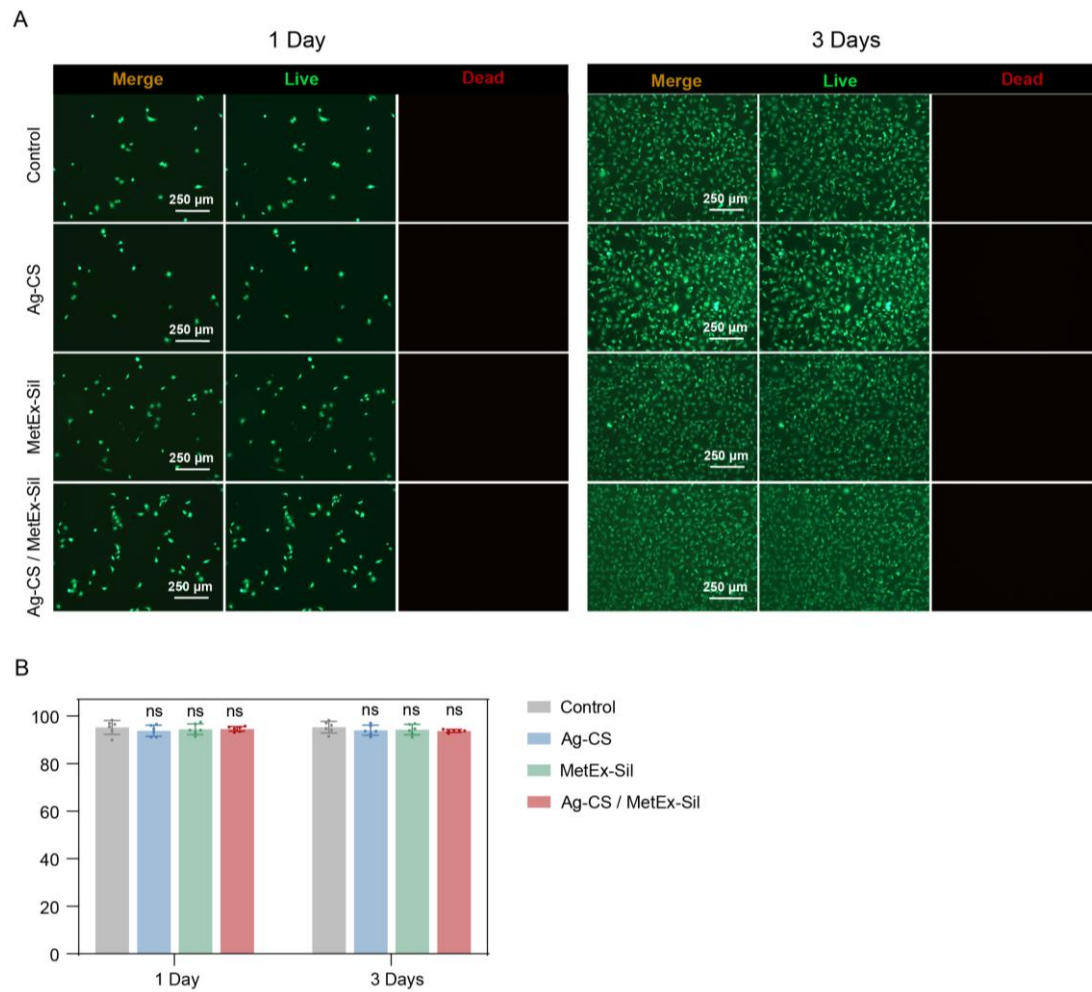


Figure S3. Representative Calcein-AM/PI live/dead staining images of human skin fibroblasts (HSFs) cultured on different scaffolds (Control, Ag-CS, MetEx-Sil, and Ag-CS/MetEx-Sil) at days 1 and 3. Scale bar: 650 μm . Statistical comparisons were conducted between the control group and each experimental group at the respective time point.

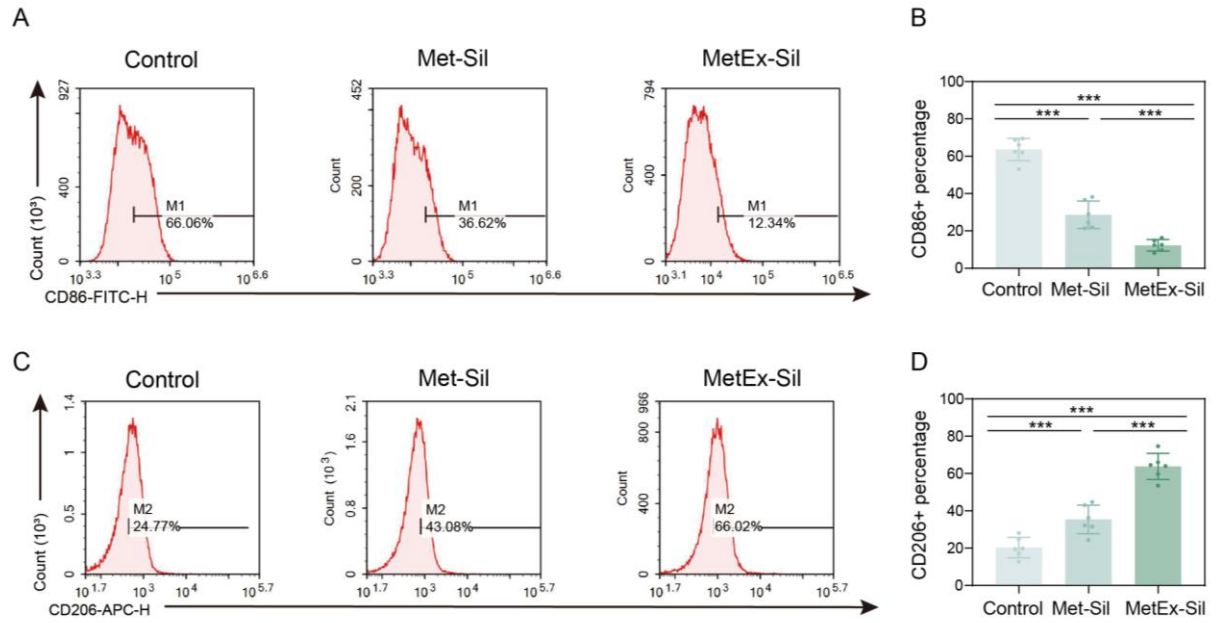


Figure S4. (A, C) Representative flow cytometry histograms showing the expression of CD86 (M1 marker) (A) and CD206 (M2 marker) (C) at 7 days. (B, D) Percentages of CD86⁺ (B) and CD206⁺ (D) macrophage proportions. Data are presented as mean \pm standard deviation (SD). Statistical significance was determined by one-way ANOVA with Tukey's post-hoc test. Statistical significance is indicated by asterisks: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

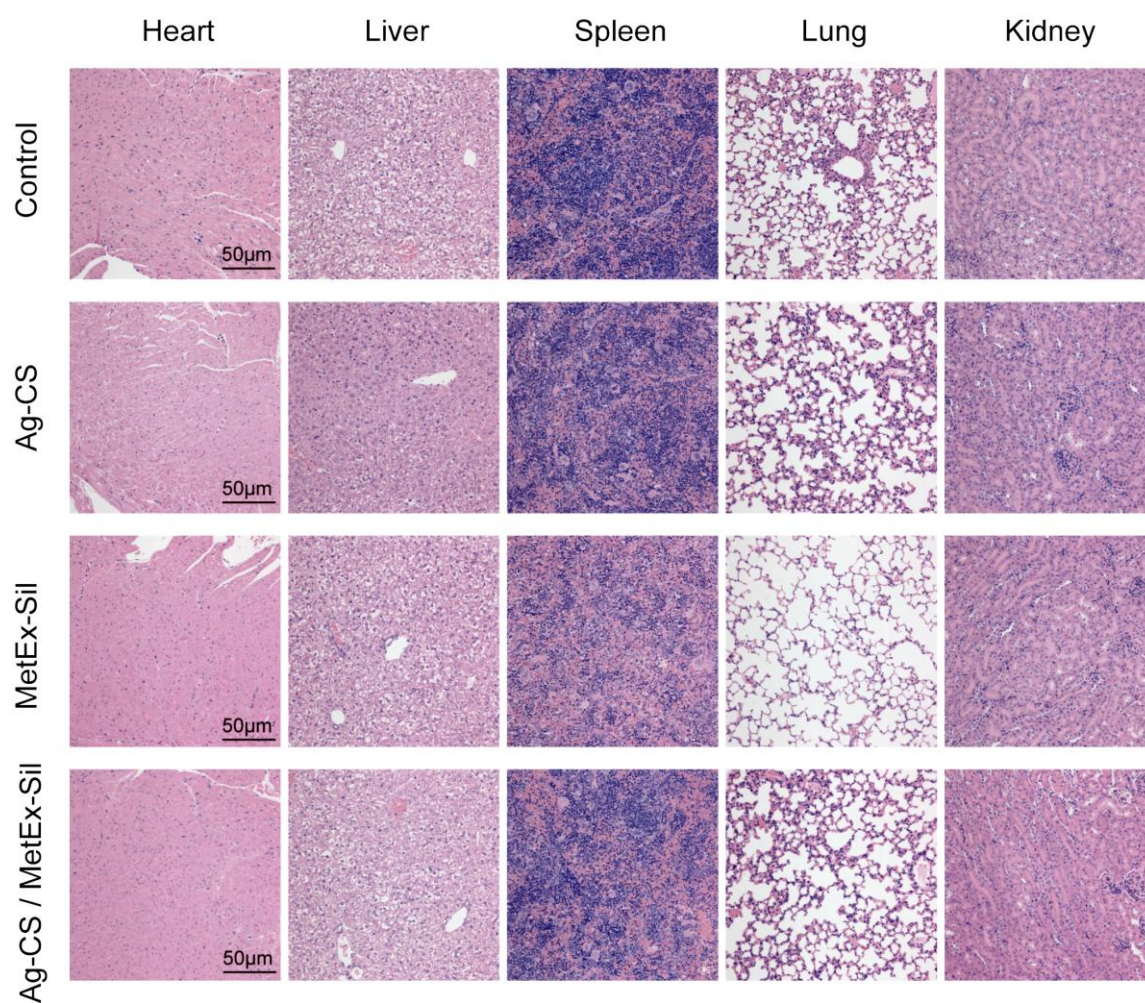


Figure S5. Representative H&E-stained sections of the heart, liver, spleen, lung, and kidney were obtained from mice at day 15 post-treatment across four groups: Control (gauze), Ag-CS, MetEx-Sil, and Ag-CS/MetEx-Sil. Scale bar, 50 µm.