ACCSCIENCE PUBLISHING

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RESEARCH ARTICLE

Self-healing silk fibroin–gelatin–based 3D printed bilayer scaffolds with stable interface and bidirectional lineage control for osteochondral regeneration

Supplementary File

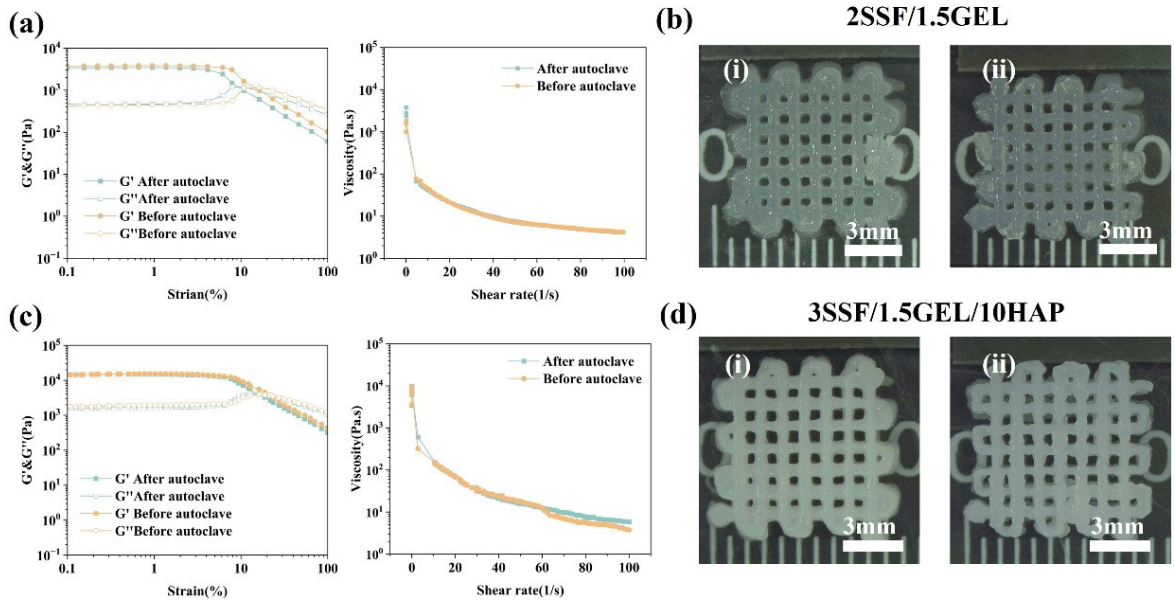

Figure S1. Effect of high-pressure sterilization on printability. (a) Oscillatory amplitude sweep (left) and rotational shear rate sweep (right) of cartilage layer bioink (2SSF/1.5GEL) before and after high-pressure sterilization; (b) Micrographs of 3D-printed scaffolds from cartilage layer bioink (2SSF/1.5GEL) before (i) and after high-pressure sterilization (ii); (c) Oscillatory amplitude sweep (left) and rotational shear rate sweep (right) of bone layer bioink (3SSF/1.5GEL/10HAP) before and after high-pressure sterilization; (d) Micrographs of 3D-printed scaffolds from bone layer bioink (3SSF/1.5GEL/10HAP) before (i) and after high-pressure sterilization (ii).

Abbreviations: G′: Storage modulus; G″: Loss modulus; GEL: Gelatin; HAP: Hydroxyapatite; SSF: Sonicated silk fibroin.

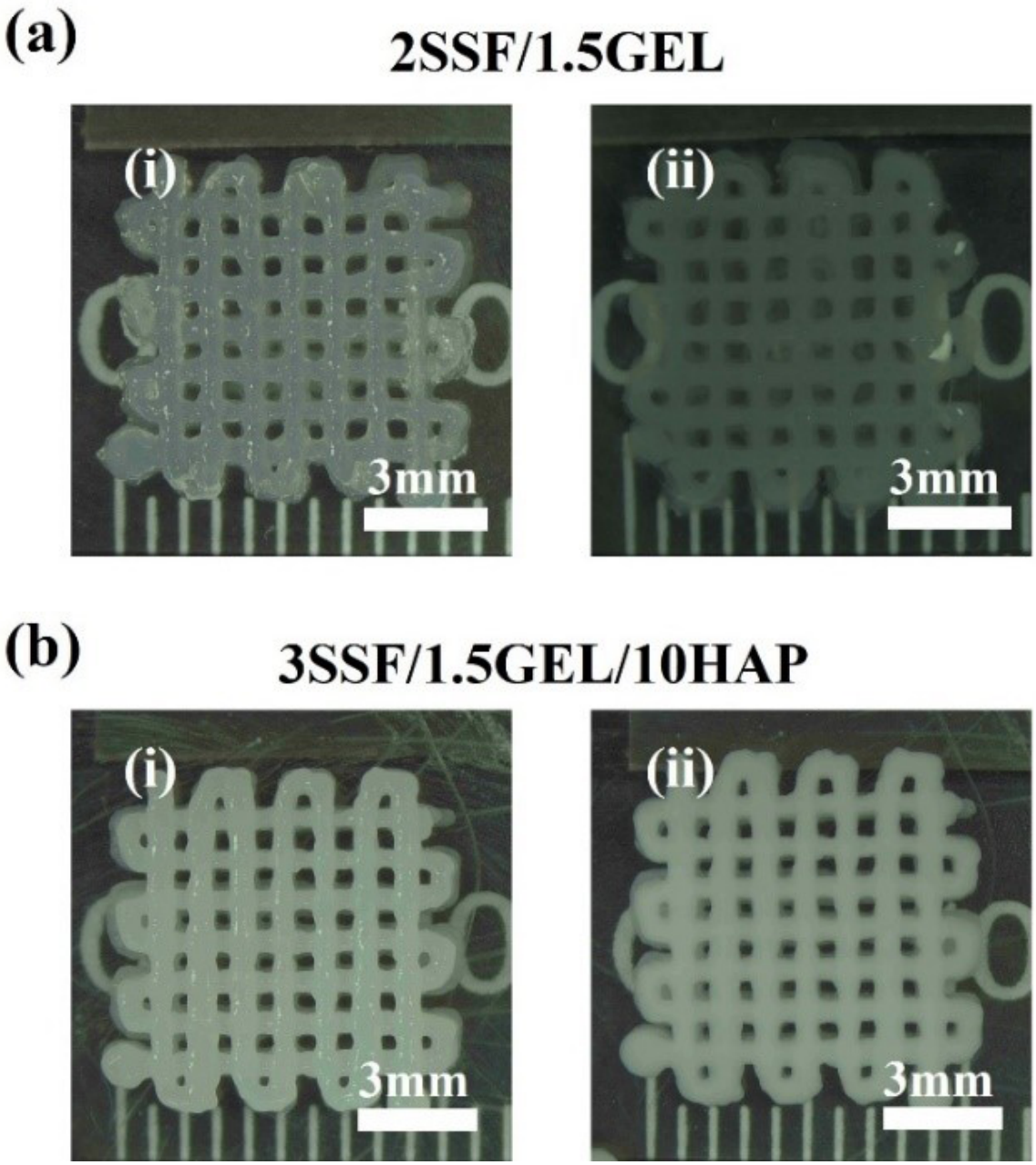

Figure S2. Images of scaffolds before and after PBS immersion. (a) Cartilage layer and bone layer scaffolds before PBS immersion;(b) Cartilage layer and bone layer scaffolds after PBS immersion.
Abbreviations: GEL: Gelatin; PBS: Phosphate-buffered saline; SSF: Sonicated silk fibroin.

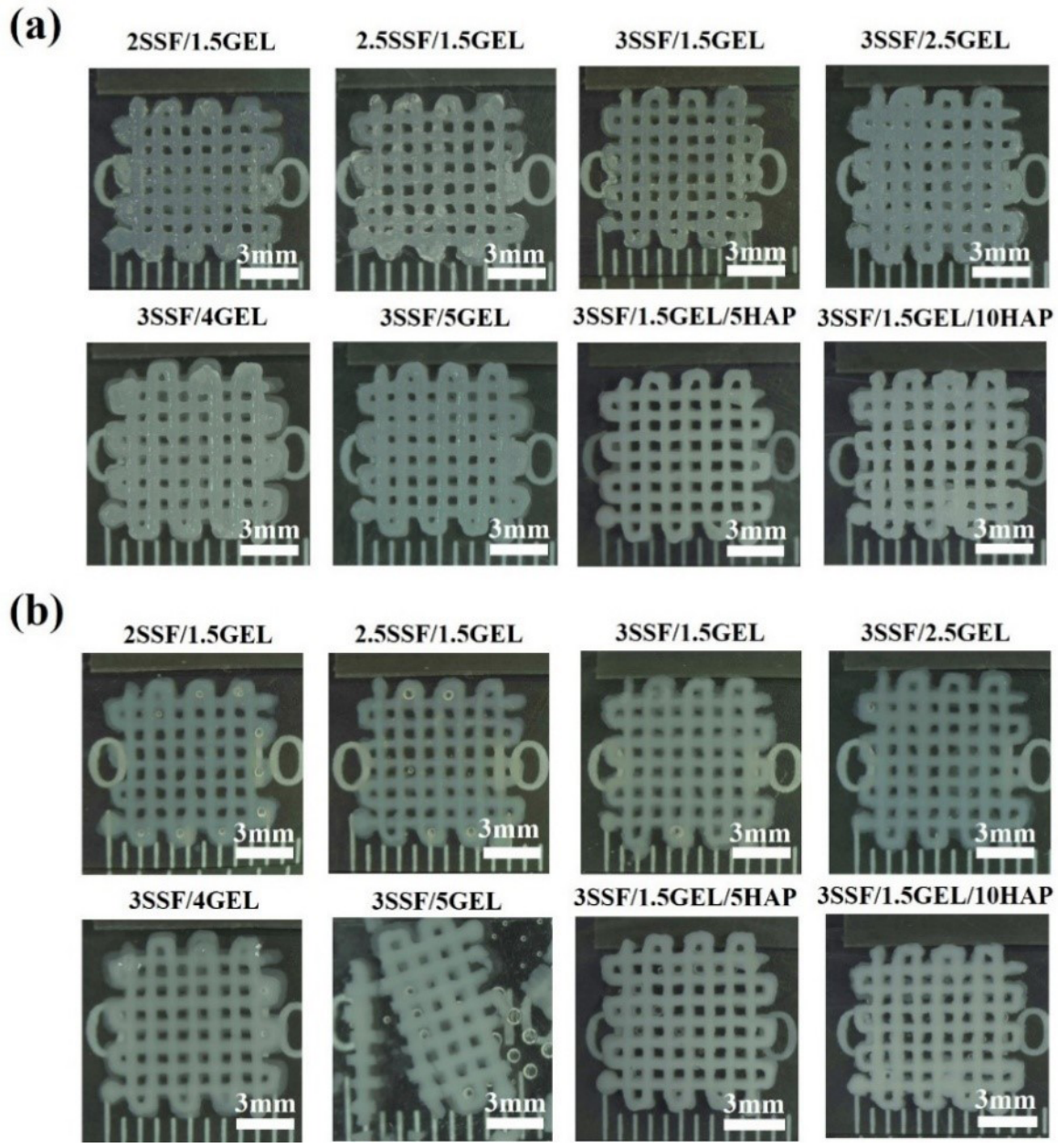

Figure S3. Long-term structural stability of scaffolds at 37 °C. (a) Structural micrographs of cartilage layer scaffolds as-printed (i) and after immersion in 37 °C PBS for one week (ii); (b) Structural micrographs of bone layer scaffolds as-printed (i) and after immersion in 37 °C PBS for one week (ii). Abbreviations: GEL: Gelatin; HAP: Hydroxyapatite; PBS: Phosphate-buffered saline; SSF: Sonicated silk fibroin.

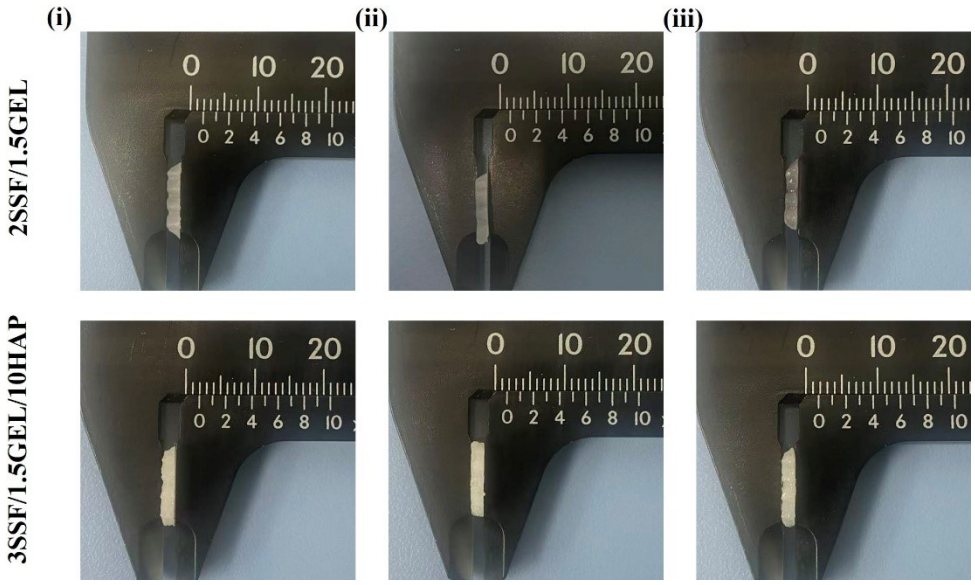

Figure S4. Height recovery of the scaffolds. Heights of the chondral layer scaffold (2SSF/1.5GEL) and osseous layer scaffold (3SSF/1.5GEL/10HAP) before compression (i), immediately after compression (ii), and after compression followed by PBS soaking (iii).
Abbreviations: GEL: Gelatin; HAP: Hydroxyapatite; PBS: Phosphate-buffered saline; SSF: Sonicated silk fibroin.

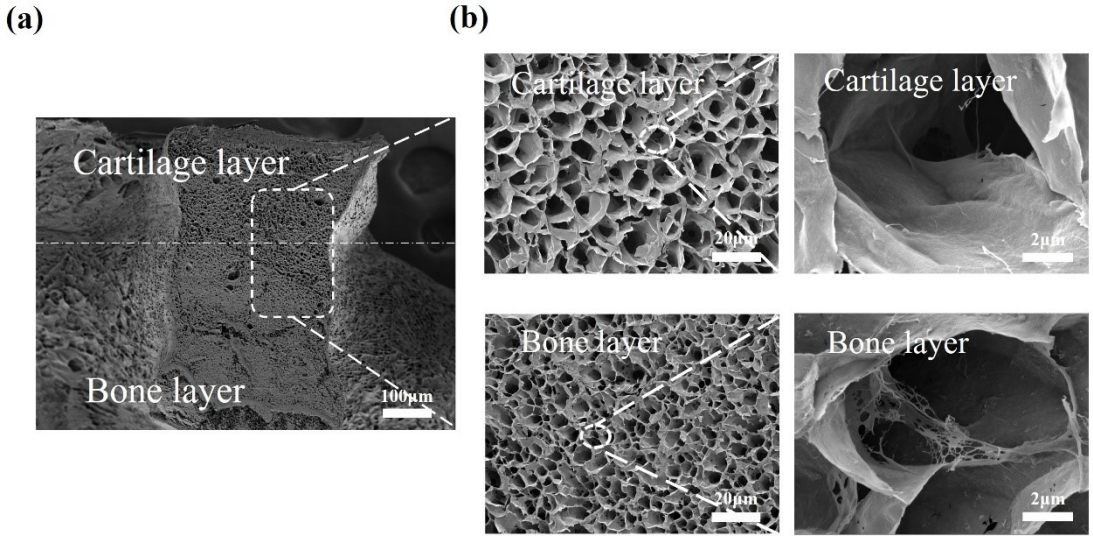

Figure S5. Scanning electron microscopy (SEM) images of the bilayer scaffold. (a) SEM image of the bilayer scaffold; (b) SEM images of the corresponding cartilage layer and bone layer of the bilayer scaffold.

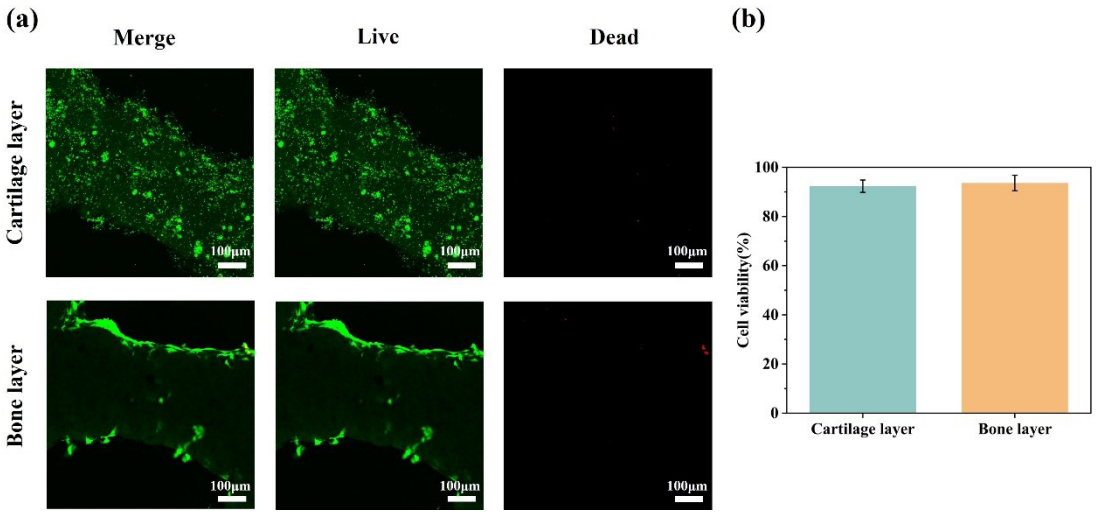

Figure S6. Cell viability of the cartilage layer scaffold and the bone layer scaffold. (a) Live/dead staining of the cartilage layer scaffold and the bone layer scaffold; (b) Statistical analysis of cell viability of the cartilage layer scaffold and the bone layer scaffold.

Supplementary videos

Video S1: Selfhealing of the cartilage layer ink after incision.

Video S2: Selfhealing of the bone layer ink after incision.

Video S3: Selfhealing of the cartilage layer and bone layer inks after incision.