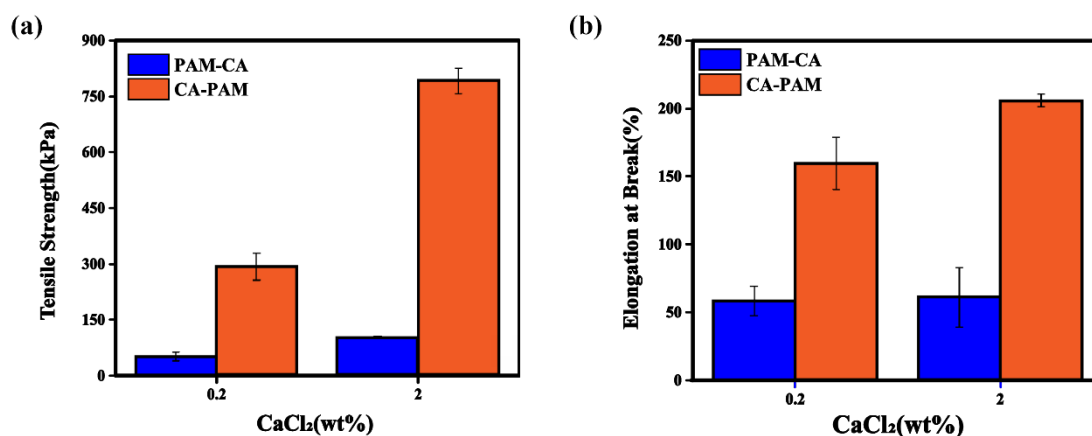


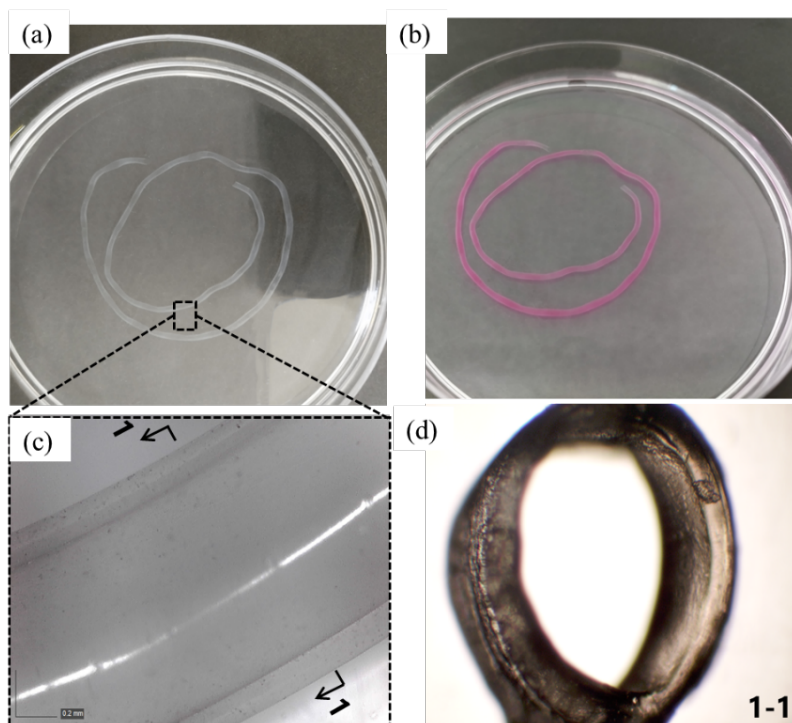
RESEARCH ARTICLE

Coaxial 3D printing of hollow tubular sodium alginate/  
polyacrylamide double-network hydrogel scaffolds

Supplementary File



**Figure S1.** (a) Tensile strength of PAM-CA and CA-PAM hydrogels crosslinked by CaCl<sub>2</sub> at different concentrations; (b) Elongation at break of PAM-CA and CA-PAM hydrogels crosslinked with different concentrations of CaCl<sub>2</sub>



**Figure S2.** CA-PAM hollow hydrogel tube: (a) tube in tap water; (b) perfusion with colored food dyes; (c) microscopic image of the tube. Scale bars: 0.2 mm; magnification: 30 $\times$ ; (d) microscopic image of the cross-section.

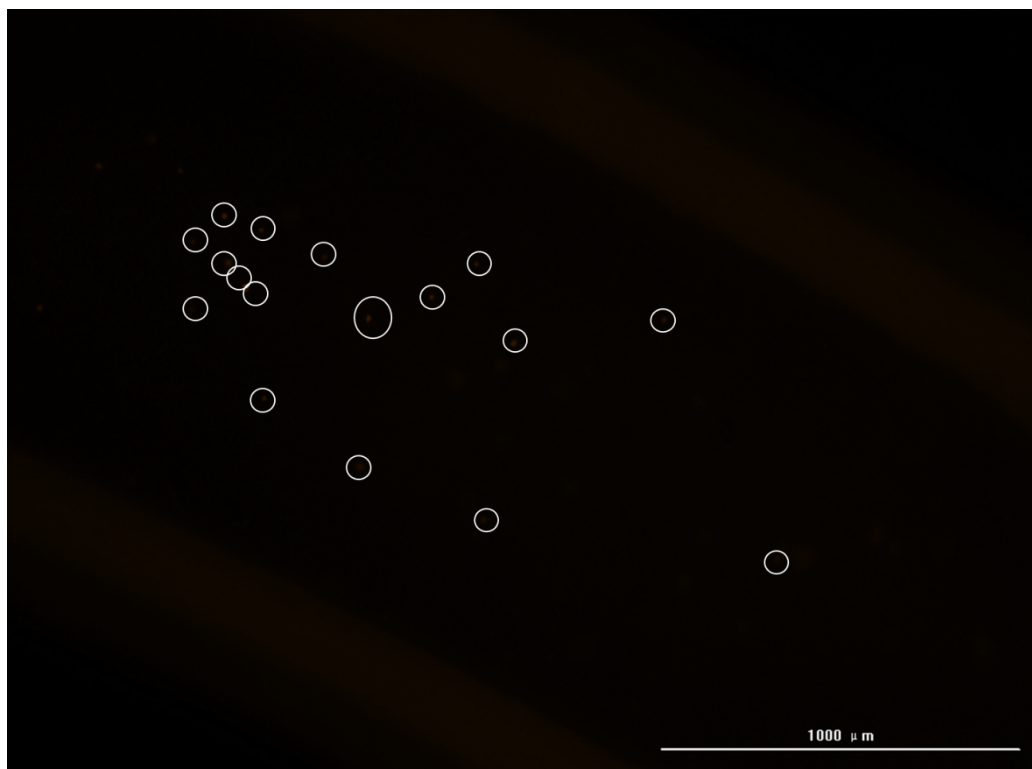


Figure S3. Red-fluorescence images of dead cells after 3 days of culture. Scale bars: 1,000 μm; magnification: 20×.

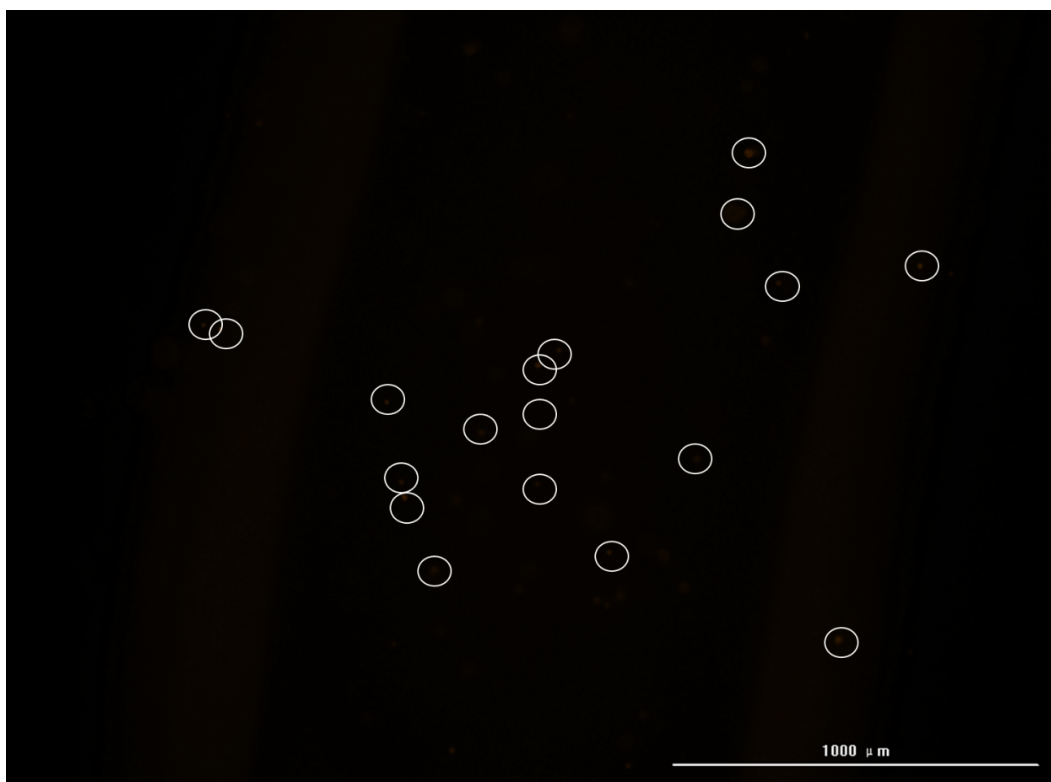
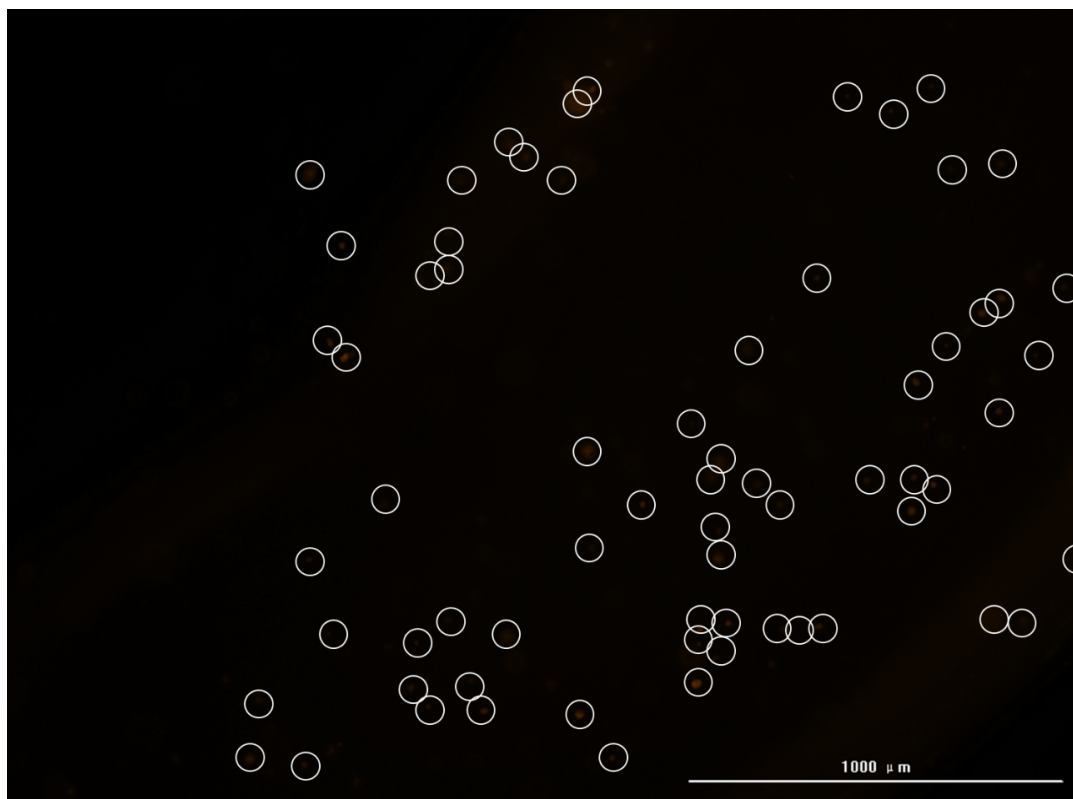
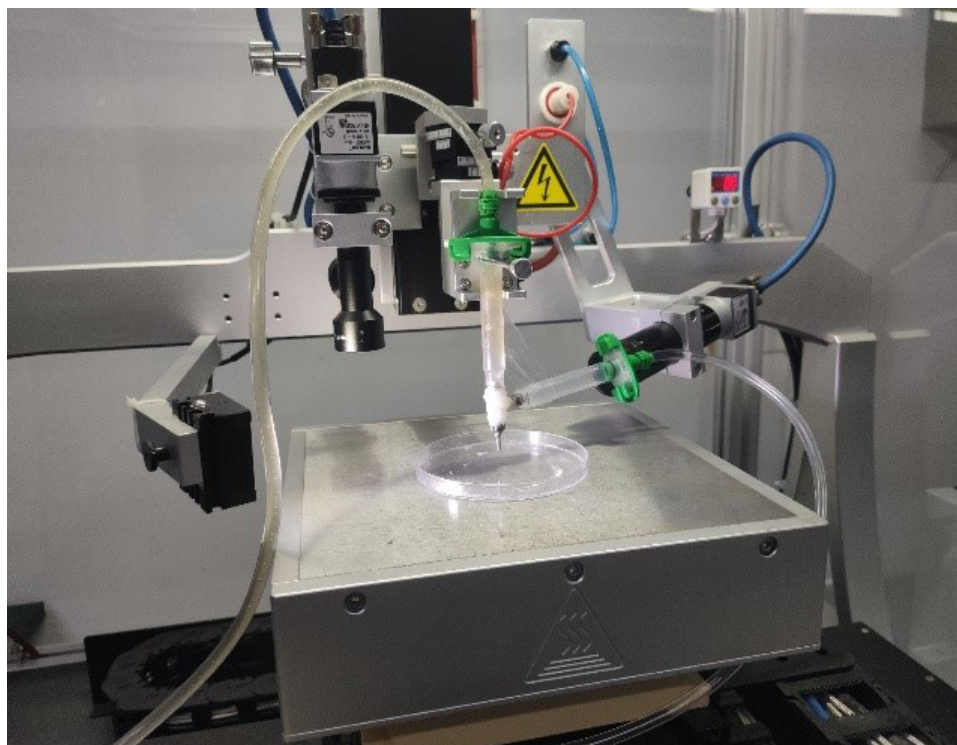


Figure S4. Red-fluorescence images of dead cells after 5 days of culture. Scale bars: 1,000 μm; magnification: 20×.



**Figure S5.** Red-fluorescence images of dead cells after 7 days of culture. Scale bars: 1,000  $\mu\text{m}$ ; magnification: 20 $\times$ .



**Figure S6.** Printing setup used for coaxial extrusion-based fabrication of hollow tubular hydrogel scaffolds

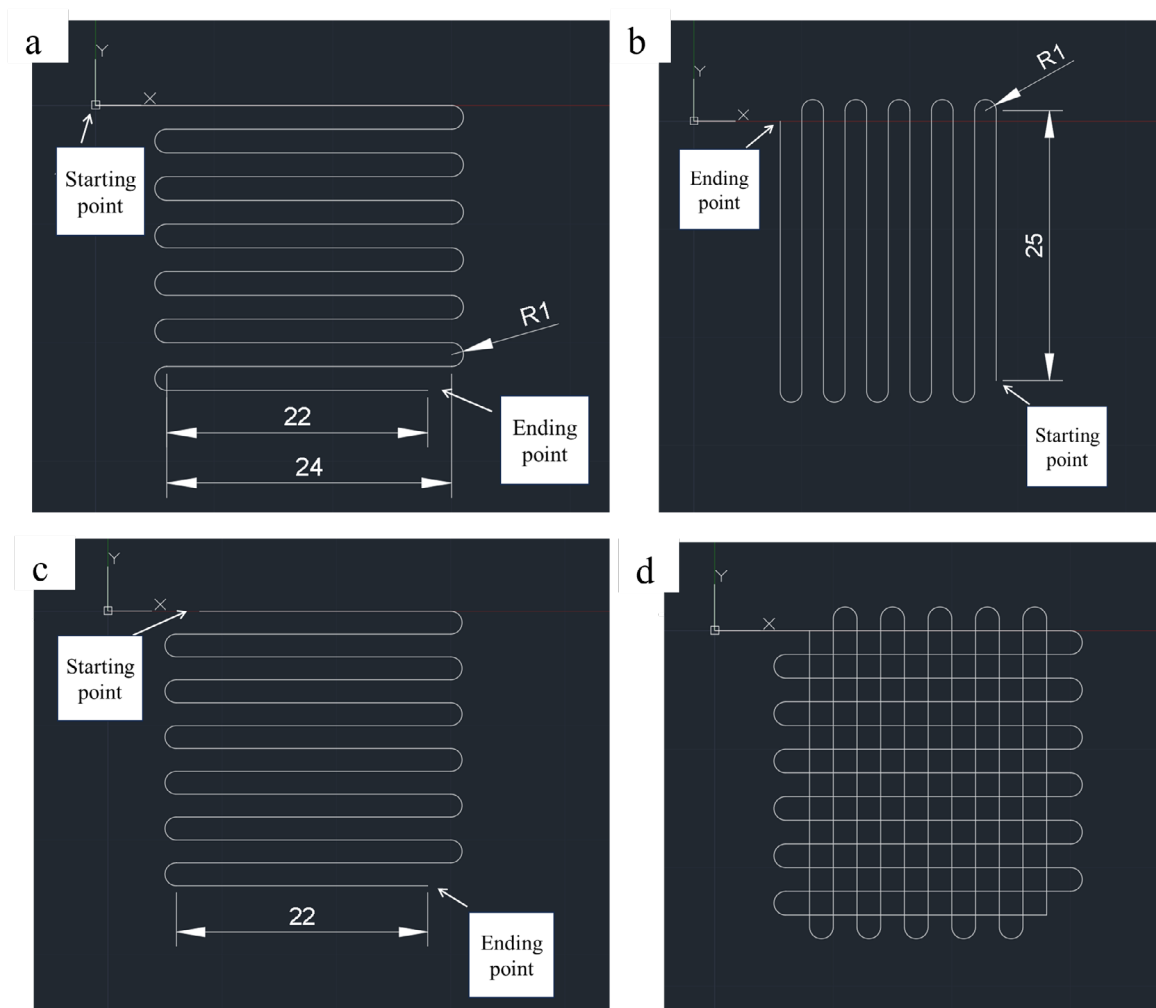


Figure S7. Multilayer hollow tubular structure printing path. (a) First layer; (b) Even-numbered layers; (c) Odd-numbered layers; (d) Combined multilayer path.