Supplementary Information:

Title: 3D printing of shear-thinning hyaluronic acid hydrogels with secondary crosslinking

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Number of pages: 4

Number of figures: 6

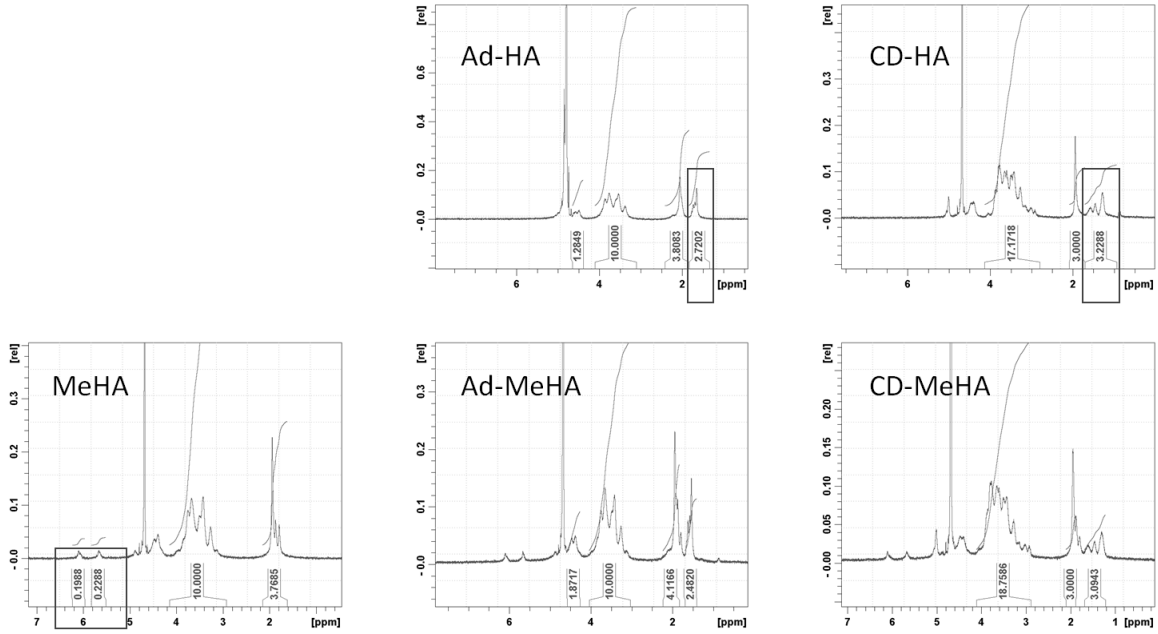

Figure S1. ^{1}H NMR spectra of synthesized macromers with proton peaks highlighted for determining methacrylate modification (each 1 H) in MeHA, adamantane modification (12 H) in Ad-HA, and CD modification (12 H) in CD-HA. Ad-MeHA and CD-MeHA were synthesized from MeHA, so the degree of methacrylation was unchanged.

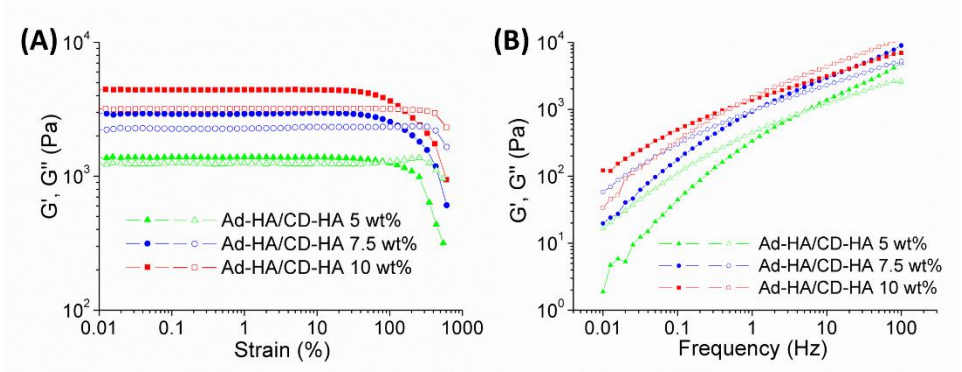

Figure S2. Oscillatory (A) strain (at frequency of 10 Hz) and (B) frequency (at strain of 0.2%) sweeps of GH materials at various concentrations.

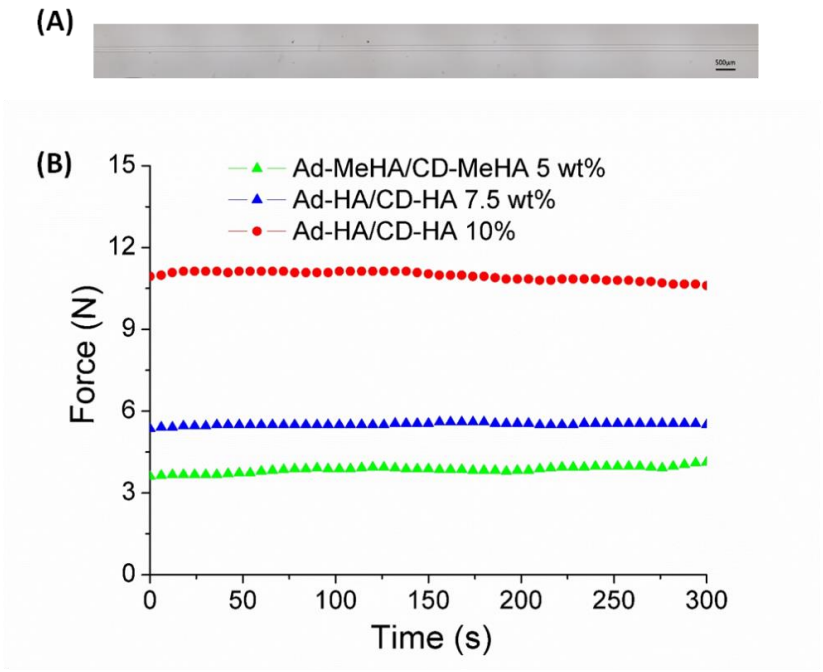

Figure S3. Consistency of filament and extrusion force during printing. (A) Image of the printed filament from the 5 wt% GH ink under constant extrusion rate and needle translation speed, and (B) force measured at the piston during extrusion of the GH or DC inks.

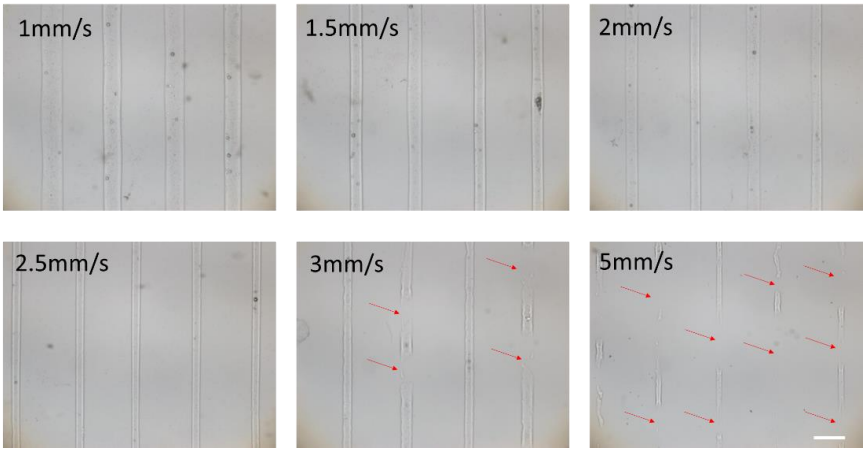

Figure S4. Phase images of printed filaments using the 5 wt% GH hydrogel under different moving speeds, quantified in Figure 4E. Red arrows indicate the broken regions of filaments. Scale bar is 500 μm.

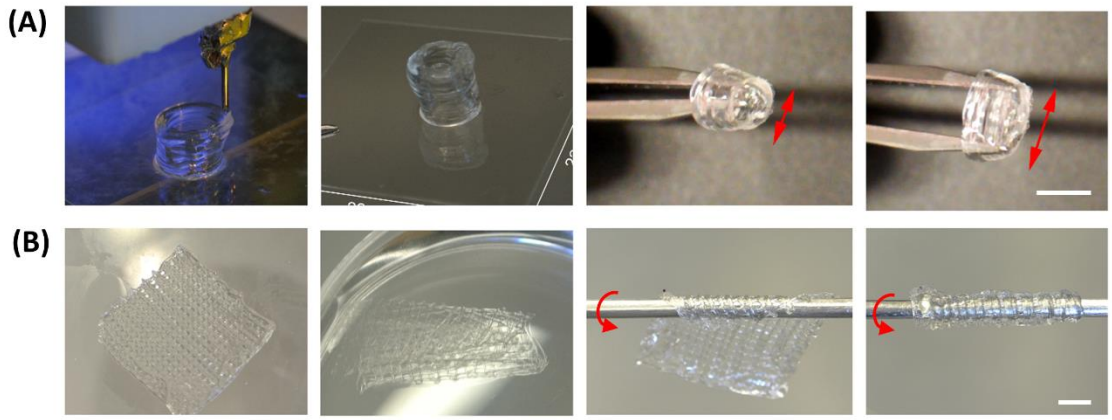

Figure S5. Examples of different printed geometries using the 5 wt% DC hydrogel: (A) tube and (B) sheet. Scale bars are 5 mm.

Figure S6. Printed tube structure using the 5 wt% DC hydrogel during one-month incubation. Scale bar is 5 mm.