

Supporting information

Polymorphic calcium alginate microfibers assembled using programmable microfluidic field for cell regulation

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Supplemental figures and tables

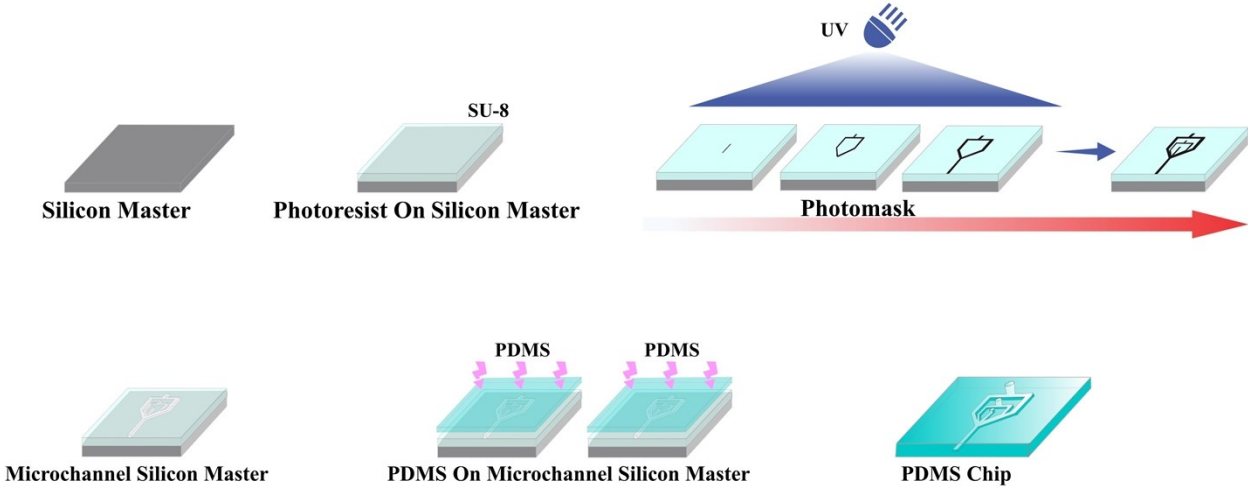


Fig. S1 Design and manufacture of microfluidic chips.

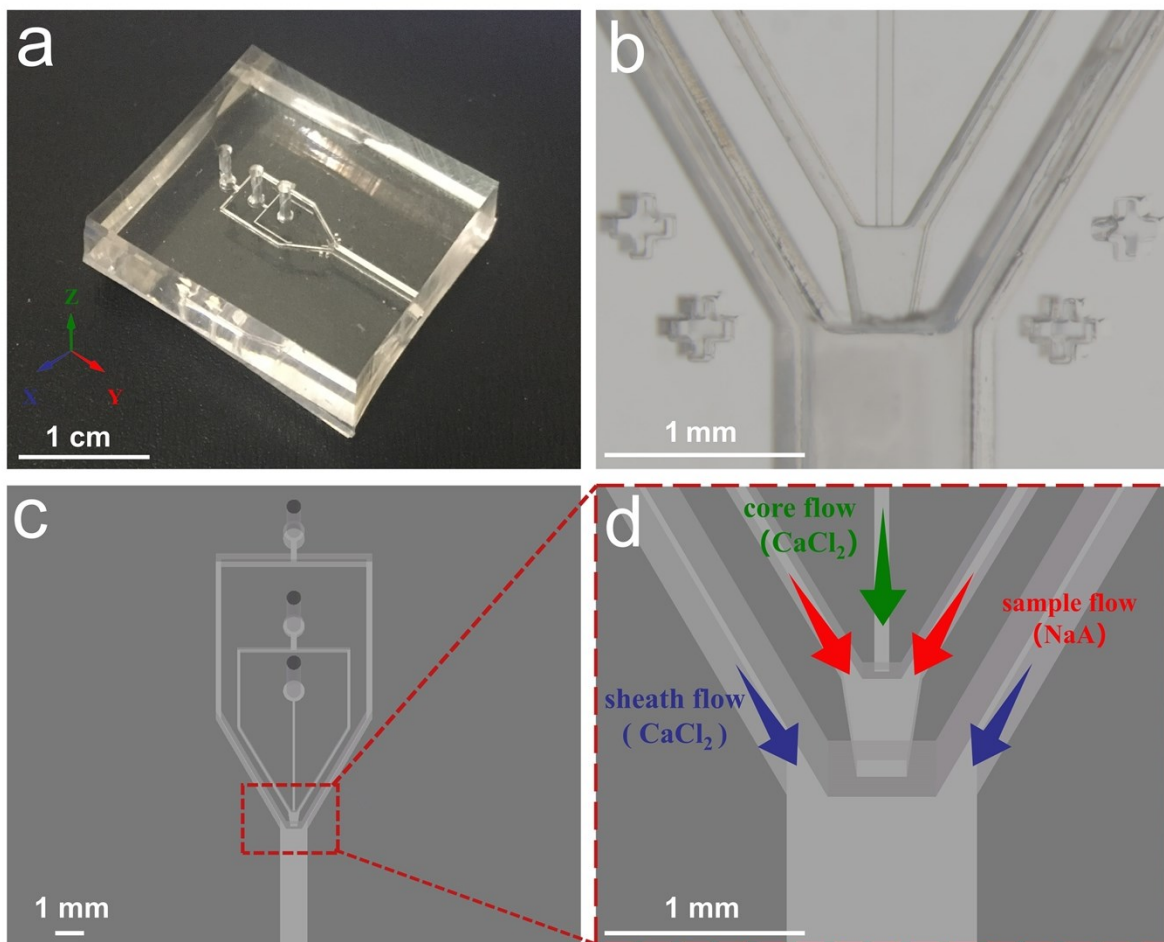


Fig. S2 Structure of chip channels. (a) Digital image of the chip; (b) Magnified stereomicroscopic image of the tapered channel in the chip; (c) Simulation three-dimensional (3-D) diagram of the three-layer microchannel of the chip; (d) Magnified 3-D simulation diagram of the tapered channel in the chip.

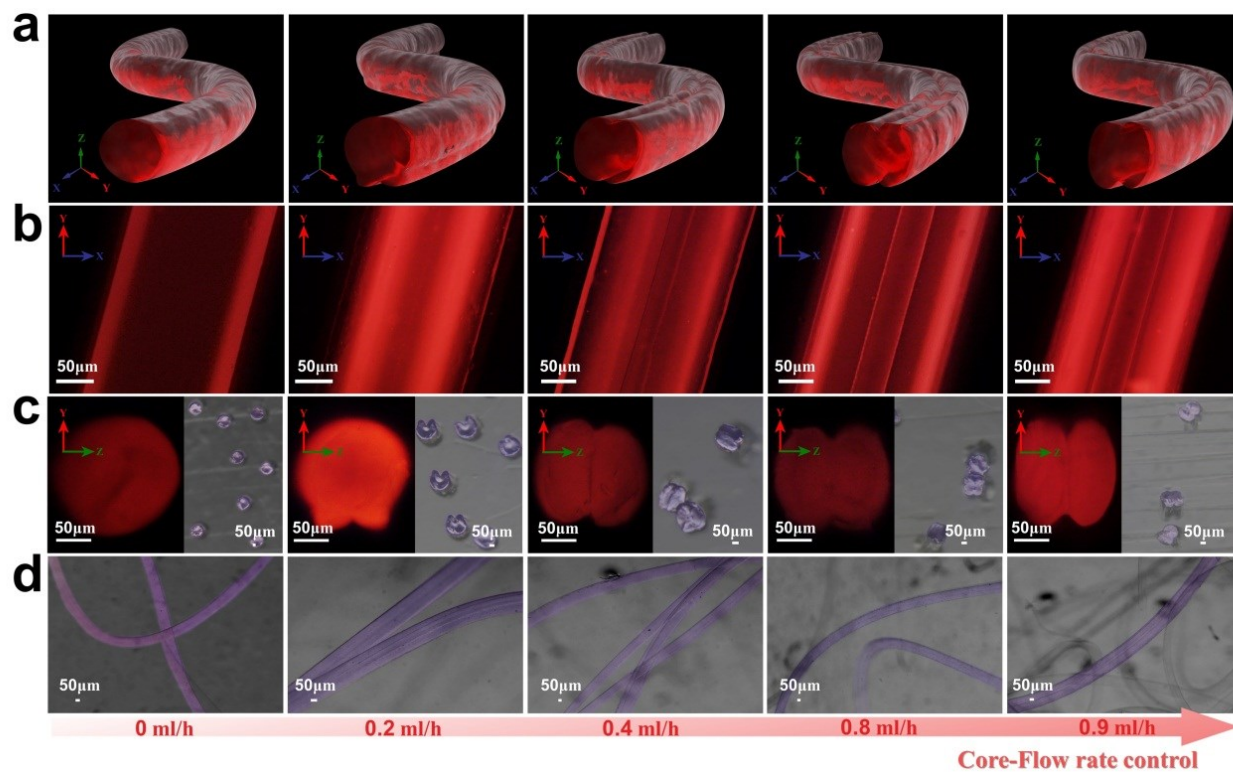


Fig. S3 Cylindrical, Janus-like alginate fibers. (a) Simulation 3-D graphs of the fibers; (b) Fluorescence microscopic images of the axial plane of the fibers; (c) Fluorescence microscopic images and stereomicroscopic images of the cross-section of the fibers; (d) Stereomicroscopic images of the axial plane of the fibers.

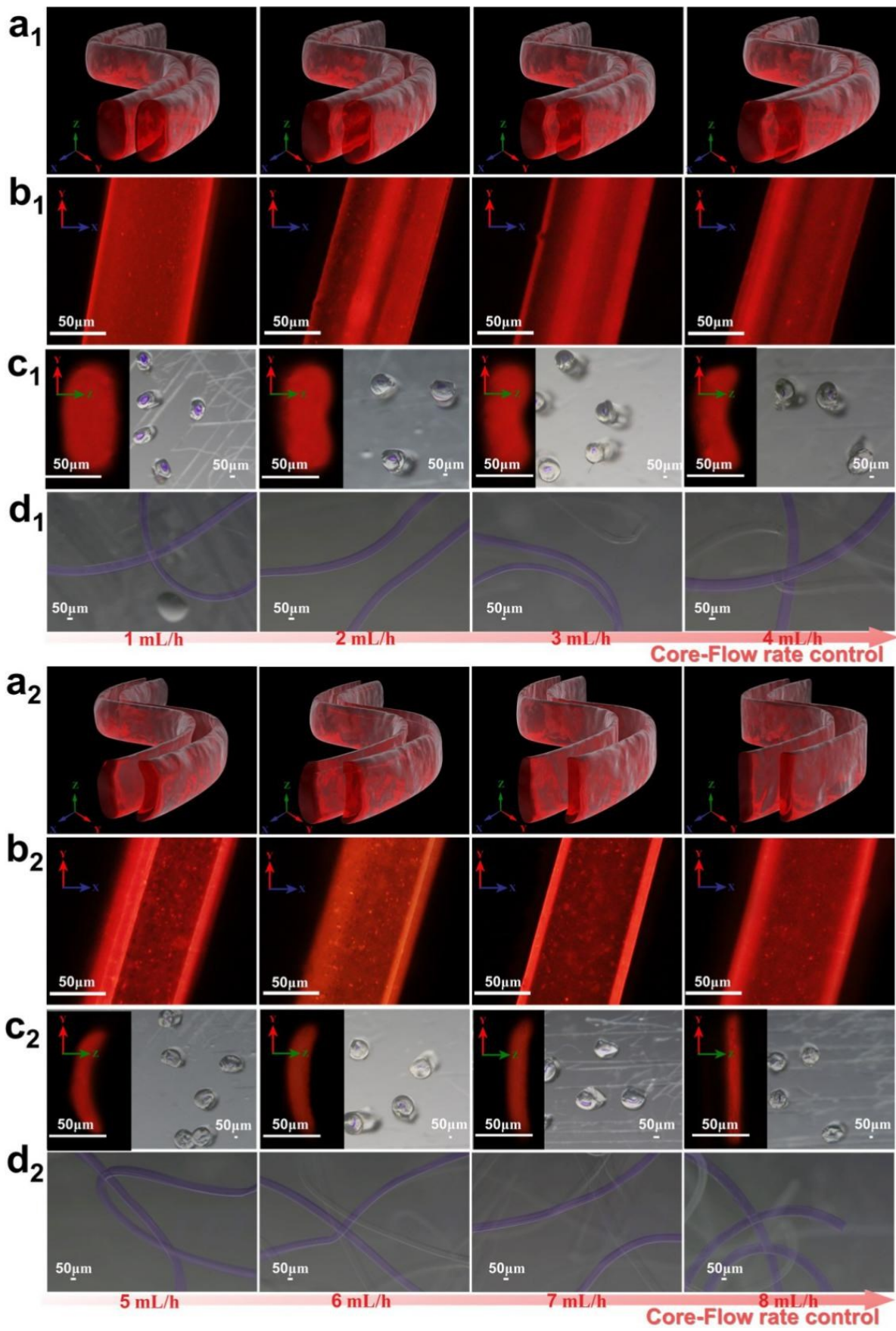


Fig. S4 Elliptic cylindrical, depth-adjustable grooved, flat alginate fibers. (a) Simulation 3-D graphs of the fibers; (b) Fluorescence microscopic images of the axial plane of the fibers; (c) Fluorescence microscopic images of the cross-section of the fibers and stereomicroscopic images of the cross-section of the CaA-embedded fibers; (d) Stereomicroscopic images of the axial plane of the fibers.

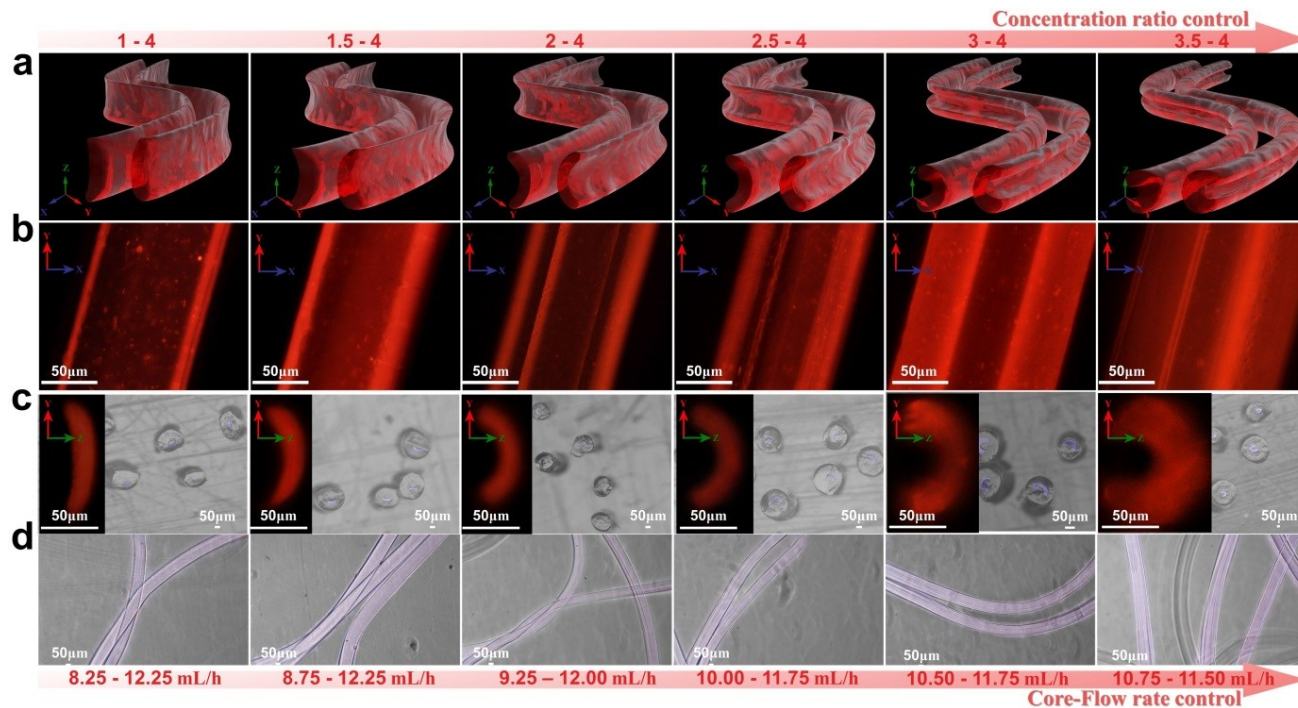


Fig. S5 Curvature-adjustable grooved alginate fibers. (a) Simulation 3-D graphs of the fibers; (b) Fluorescence microscopic images of the axial plane of the fibers; (c) Fluorescence microscopic images of the cross-section of the fibers and stereomicroscopic images of the cross-section of the CaA-embedded fibers; (d) Stereomicroscopic images of the axial plane of the fibers.

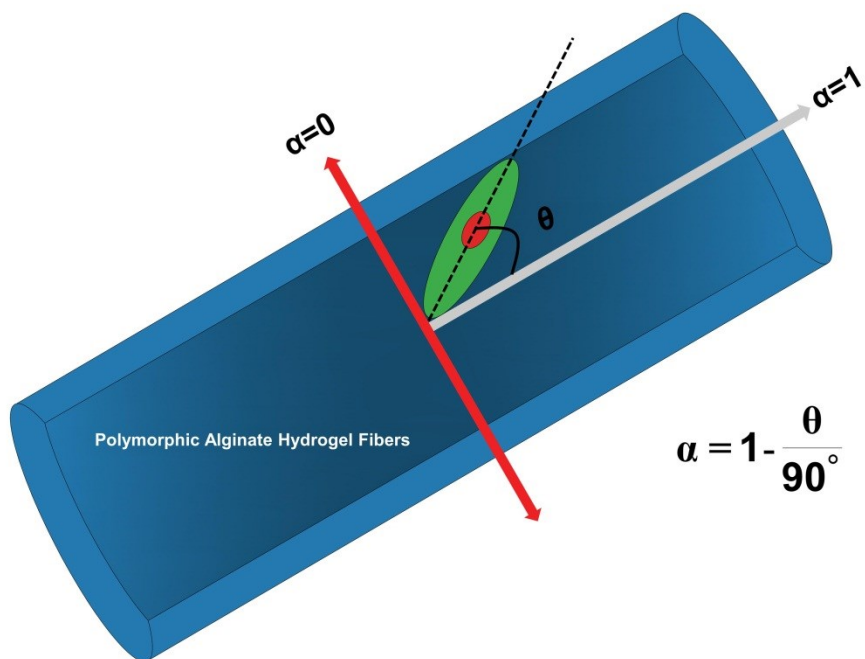


Fig. S6 Measurement of cell orientation using alignment angle between the groove direction of the curvature-adjustable grooved alginate fiber and growth direction of the L929 cells.

Table S1. Design parameters of chips used in experiments. W: Orifice width; H: Channel height.

Chip type	Layer 1 (W/H)	Layer 2 (W/H)	Layer 3 (W/H)
Three-channel microfluidic chip	75/54 μm	250/424 μm	950/1432 μm

Table S2. Experimental parameters for the preparation of the six categories of microfibers. Values shown in the Core flow, Sample flow, and Sheath flow columns represent the flow rate in the core flow channel, sample flow channel, and two branch channels of the sheath flow channel, respectively.

Flow fiber type	Core flow (mL/h)	Sample flow (mL/h)	Sheath flow (mL/h)	C_k
Cylindrical alginate fiber	0	2	130–140	4
Janus-like alginate fiber	0.1–0.9	2	130–140	4
Elliptic cylindrical alginate fiber	1	2	130–140	4
Depth-adjustable grooved alginate fiber	1–7	2	130–140	4
Flat alginate fiber	7–8	2	130–140	4
Curvature-adjustable grooved fiber	8–12.5	2	130–140	0.5–4