## Supporting Information

## 4D Printed Cardiac Construct with Aligned Myofibers and Adjustable Curvature for Myocardial Regeneration

Yue Wang,<sup>†</sup>,  $\bigtriangledown$   $\circ$ , Haitao Cui,<sup>†</sup>,  $\circ$  Yancheng Wang  $\bigtriangledown$ ,  $\triangle$ , Chengyao Xu $\bigtriangledown$ , Timothy J. Esworthy,<sup>†</sup> Sung Yun Hann,<sup>†</sup> Manfred Boehm,<sup>‡</sup> Yin-Lin Shen<sup>†</sup>, Deqing Mei $\bigtriangledown$ ,  $\triangle$ , and Lijie Grace Zhang<sup>\*,†,//,⊥,#</sup>

<sup>▽</sup>Key Laboratory of Advanced Manufacturing Technology of Zhejiang Province, and<sup>△</sup> State Key Laboratory of Fluid Power and Mechatronics Systems, School of Mechanical Engineering, Zhejiang University, Hangzhou, 310027, China

<sup>†</sup>Department of Mechanical and Aerospace Engineering, <sup>//</sup> Departments of Electrical and Computer Engineering, <sup>⊥</sup> Department of Biomedical Engineering, and <sup>#</sup>Department of Medicine, The George Washington University, Washington, DC 20052, USA

<sup>‡</sup>National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, MD 20892, USA

## **Corresponding Author**

\*E-mail: lgzhang@gwu.edu. Phone: 202-994-2479. Fax: 202- 994-0238 (L.G.Z.). ORCID Lijie Grace Zhang: 0000-0003-3009-045X. Present Address: 800 22nd Street NW Science and Engineering Hall, Room 3590, Washington DC, 20052



**Figure S1** (a) Printed PEGDA scaffolds. After exposure to air at room temperature for 24 hours, the scaffolds were shrunk to half size. (b) The weight loss of PEGDA scaffolds. The weight of scaffolds was measured and analyzed. The weight of the scaffold was decreased by 15 hours. (c)-(f) The surface morphology viewed under fluorescence confocal microscopy; microgroove width was increased from 25 μm to 100 μm.



Figure S2 Cell proliferation analysis of (a) hECs and (b) hMSCs for 7 days of culture. Data



are presented as the mean  $\pm$  standard deviation, n $\geq$ 9, \*p<0.05; \*\*p<0.01 and \*\*\*p<0.001.

**Figure S3** hMSC proliferation and spreading morphology on different microgrooves with different cell densities after 3 days of culture. Scale bar: 40 µm.



**Figure S4** hMSC proliferation and spreading morphology on different microgrooves with different cell densities after 7 days of culture. Scale bar: 40 µm.



**Figure S5** Beating rate comparison of hiPSC-CMs seeded on the well plate and 4D microgroove scaffolds on day 7. Data are presented as the mean  $\pm$  standard deviation, N=9.

Movie S1 Shape change of NIR responsive 4D models.

Movie S2 Spontaneous contractions of hiPSC-CMs on the 4D constructs on day 7.