

Supplementary Material

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S1. Liquid characteristics

Table S1 - Conductivity and pH of the liquids used for sample hydration (n = 2)

Buffer	Conductivity / mS/cm	pH / -
System 1	$< 1 \cdot 10^{-3}$	6.41 ± 0.32
System 2	18.4 ± 0.2	6.45 ± 0.47
System 3	14.9 ± 0.2	8.04 ± 0.09
System 4	2.9 ± 0.3	8.00 ± 0.02

S2. Auxetic hydrogel scaffold

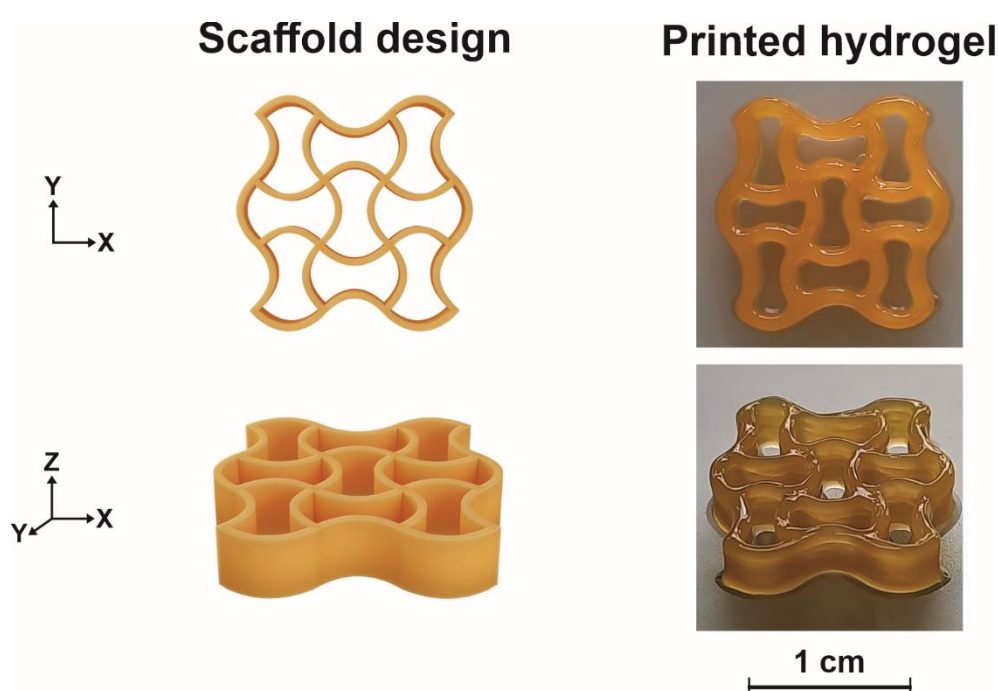


Figure S1 – Design of the auxetic scaffold consisting of nine point-symmetrically arranged re-entrant honeycomb structures and one of the 3D printed auxetic protein-based hydrogels before drying

S3. MRI parameters

Table S2 – MRI device and experimental MRI parameters for the image acquisition of liquid systems 1 to 4

MRI parameter	Value
MRI probe providing the sample chamber	MIC WB40 RES 200 1H 040/025 QTR
Pulse sequence	Fast low-angle shot (FLASH) ortho
Field of view	25 mm x 25 mm
Matrix	128 px x 128 px
Number of Slices	10
Slice thickness	0.6 mm
Slice distance	0 mm
Repetition time	0.2 s
Echo time	1.88 ms
Number of averages	4
Acquisition time	1 min 42 s

S4. MRI parameters for an optimized buffer-to-hydrogel contrast

Table S3 – MRI device and experimental MRI parameters for the image generation for the optimized buffer-to-hydrogel contrast for liquid system 2.

MRI parameter	Value
MRI probe providing the sample chamber	MIC WB40 RES 200 1H 040/025 QTR
Pulse sequence	Rapid acquisition with relaxation enhancement (RARE)
Field of view	25 mm x 25 mm
Matrix	128 px x 128 px
Number of Slices	10
Slice thickness	0.6 mm
Slice distance	0 mm
Repetition time	2.13 s
Echo time	10 ms
Number of averages	4
RARE factor	8
Acquisition time	1 min 42 s