Supplementary data for

High-strength fibrous sensors with enhanced aggregate state for biomechanical monitoring of Achilles tendon

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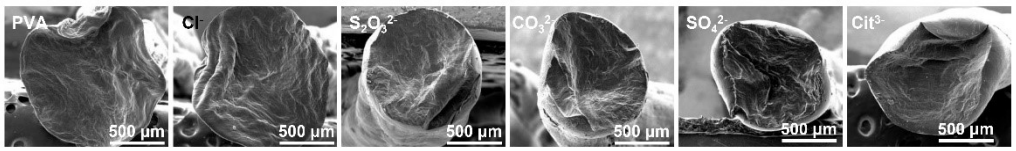

Fig. S1. SEM images of hydrogel fibers soaked with 1.0 M sodium salts.

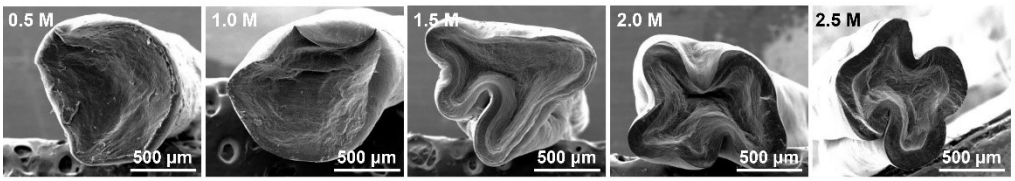

Fig. S2. SEM images of hydrogel fibers soaked in Na_3Cit with different concentration.

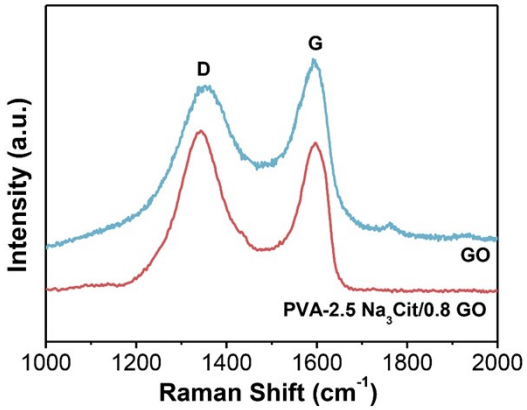

Fig.S3. Raman spectra of GO powders and PVA-2.5 Na_3Cit/0.8 GO fiber.

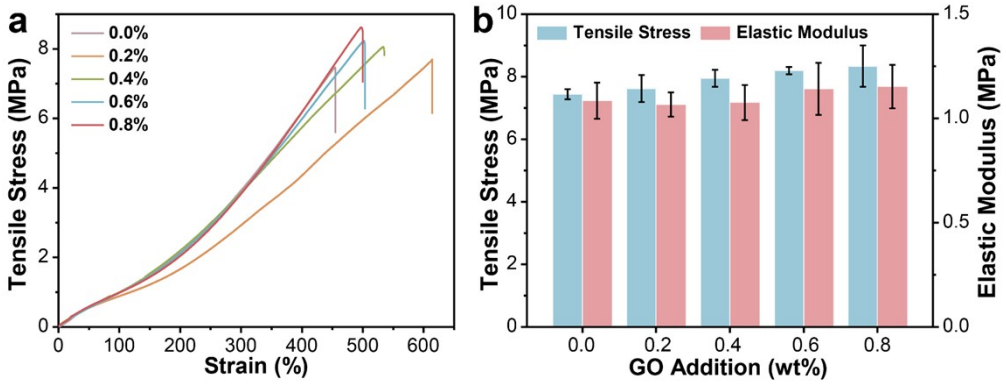

Fig. S4. Stress-strain curves **(a)**, corresponding tensile strength and elastic modulus **(b)** of composite hydrogel fibers with different GO addition. Data are presented as means ± standard deviation (SD, n=3).

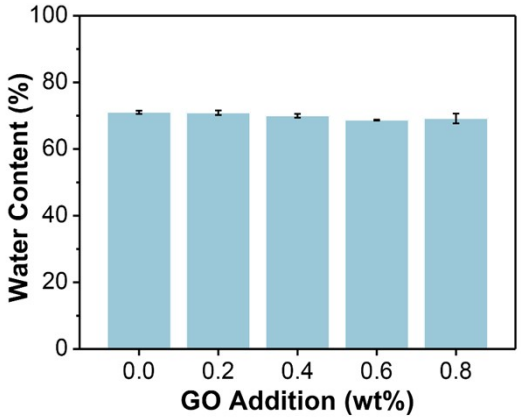

Fig. S5. Water content of composite hydrogel fibers with different GO addition. Data are presented as means ± standard deviation (SD, n=3).

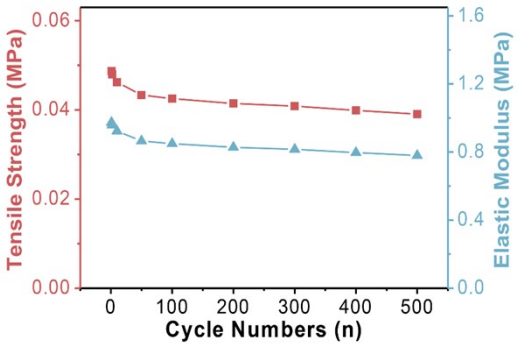

Fig. S6. Maximum stress and elastic modulus versus tensile cycle.

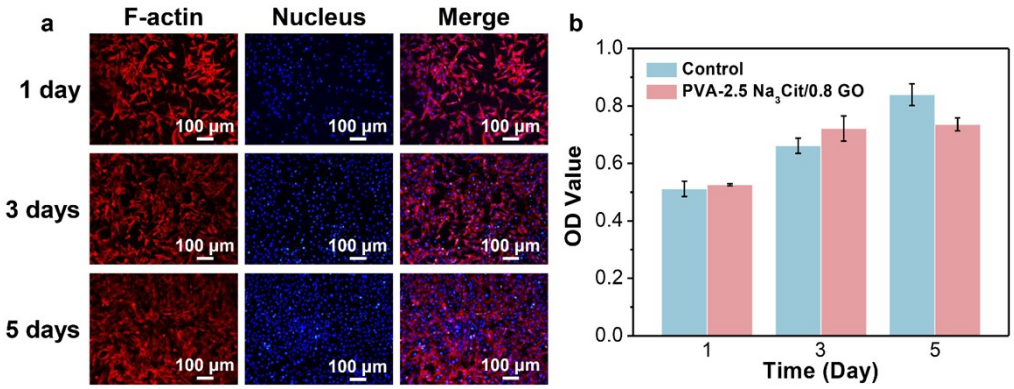

Fig. S7. (a) Cytoskeleton staining of MSCs after 1, 3 and 5 days. **(b)** CCK-8 results of each group for assessing the cell proliferation. Data are presented as means ± standard deviation (SD, n=3).

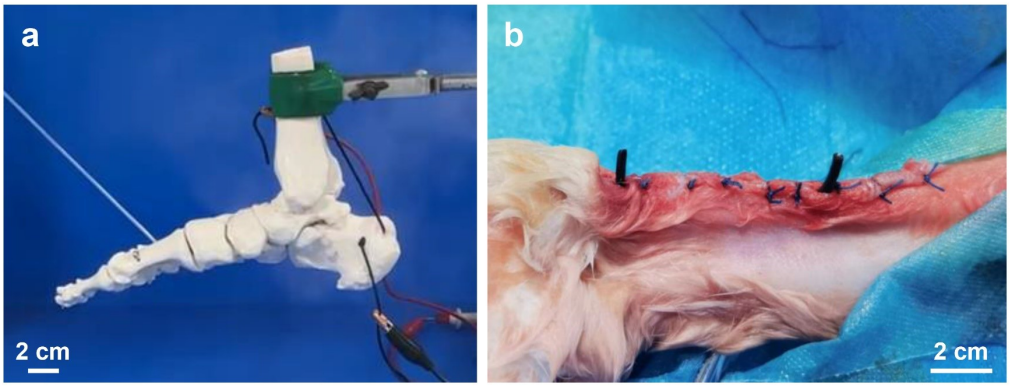

Fig. S8. Photographs of *in vitro* and *in vivo* models for fibrous sensor.

Table S1. The nomenclature and components of salting-out hydrogel fibers.

Samples	Salt	Salt Concentration (M)	DI Water (g)	PVA (g)	PVA (wt%)
PVA	/	0.0	90	16	15.10
PVA-1.0 NaCl	NaCl	1.0	90	16	15.10
PVA-1.0 $Na_2S_2O_3$	$Na_2S_2O_3$	1.0	90	16	15.10
PVA-1.0 Na_2CO_3	Na_2CO_3	1.0	90	16	15.10
PVA-1.0 Na_2SO_4	Na_2SO_4	1.0	90	16	15.10
PVA-1.0 Na_3Cit	Na_3Cit	1.0	90	16	15.10
PVA-0.5 Na_3Cit	Na_3Cit	0.5	90	16	15.10
PVA-1.5 Na_3Cit	Na_3Cit	1.5	90	16	15.10
PVA-2.0 Na_3Cit	Na_3Cit	2.0	90	16	15.10
PVA-2.5 Na_3Cit	Na_3Cit	2.5	90	16	15.10

Table S2. The nomenclature and components of rGO composite hydrogel fibers.

Samples	GO (wt%)	DI Water (g)	PVA (g)	PVA (wt%)
PVA-2.5 Na_3Cit	0.0	90	16	15.10
PVA-2.5 Na_3Cit/0.2 GO	0.2	90	16	15.10
PVA-2.5 Na_3Cit/0.4 GO	0.4	90	16	15.10
PVA-2.5 Na_3Cit/0.6 GO	0.6	90	16	15.10
PVA-2.5 Na_3Cit/0.8 GO	0.8	90	16	15.10

Table S3. Comparisons of PVA-2.5 Na_3Cit and other hydrogel-based strain sensors in the literature in terms of tensile strength and water content.

Name	Tensile Strength	Water Content	Ref.
Fe_3O_4@MXene/PVA-A	150.10 kPa	91.3%	[36]
$PVA_{0.2}HA\text{-}Ca_{0.4}$	0.47 MPa	79.7%	[37]
PVA-PAANa-PAH	0.86 MPa	77.5%	[38]
PPM-NL	0.93 MPa	65.1%	[39]
PVA-TA-EGaIn	1.13 MPa	75.0%	[40]
PVA/PA/APSi-4	1.27 MPa	82.9%	[41]
$PC_{4.5}T_6M_{45}$-3	1.80 MPa	81.0%	[23]
$P(AA\text{-}co\text{-}LMA)_{CTAB}$-41.3%	2.08 MPa	41.3%	[42]
$GO/PAA/KCl_{12–20}$	2.65 MPa	72.0%	[43]
$F\text{-}PVA\text{-}TA_{0.1}\text{-}Ag_{0.1}$	3.00 MPa	75.6%	[44]
FCAS	4.50 MPa	79.5%	[45]
PMAI-Ni-3	6.77 MPa	49.3%	[46]
M-PVA-1.6	7.20 MPa	36.9%	[47]
PVA/HPS-PA	9.33 MPa	27.0%	[48]
PVA-2.5 Na_3Cit	**7.40 MPa**	**71.9%**	**This Work**

Table S4. Comparisons of PVA-2.5 Na_3Cit and other hydrogel-based strain sensors in the literature in terms of elastic modulus and water content.

Name	Elastic Modulus	Water Content	Ref.
$PC_{4.5}T_6M_{45}$-3	2.40 kPa	81.0%	[23]
$PHALSD_5$	8.73 kPa	65.1%	[49]
PA/TA/PAA	15.00 kPa	92.4%	[50]
PVA-PAANa-PAH	24.00 kPa	77.5%	[38]
PAM/CMC/NaCl	40.00 kPa	66.1%	[51]
$PVA_{0.2}HA\text{-}Ca_{0.4}$	42.00 kPa	79.7%	[37]
Fe_3O_4@MXene/PVA-A	44.88 kPa	91.3%	[36]
$P(AM\text{-}AN\text{-}MA)/Fe^{3+}$	0.06 MPa	83.9%	[52]
SMRH	112.45 kPa	63.4%	[53]
PAC@200%	0.27 MPa	85.7%	[54]
$P(AA\text{-}co\text{-}LMA)_{CTAB}$-41.3%	353.40 kPa	41.3%	[42]
PAM-ALG-PPy	736.10 kPa	88.3%	[13]
M_d-x-Fe	1.10 MPa	45.0%	[55]
PVA7	1.90 MPa	57.0%	[56]
PVA-2.5 Na_3Cit	**1.09 MPa**	**71.9%**	**This Work**