Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

An implantable and versatile piezoresistive sensor for the monitoring of human-machine interfacing interactions and dynamical process of nerve repair

Ping Wu[a], Ao Xiao[a], Yanan Zhao[a], Feixiang Chen[a], Meifang Ke[a], Qiang Zhang[a], Jianwei Zhang[b], Xiaowen Shi[b], Xiaohua He[a] and Yun Chen[a, c*]

a Department of Biomedical Engineering, School of Basic Medical Sciences, Wuhan University, Wuhan 430071, China

b School of Resource and Environmental Science, Hubei International Scientific and Technological Cooperation Base of Sustainable Resource and Energy, Wuhan University, Wuhan 430079, China

c Hubei Province Key Laboratory of Allergy and Immune Related Diseases, Wuhan University, Wuhan 430071, China

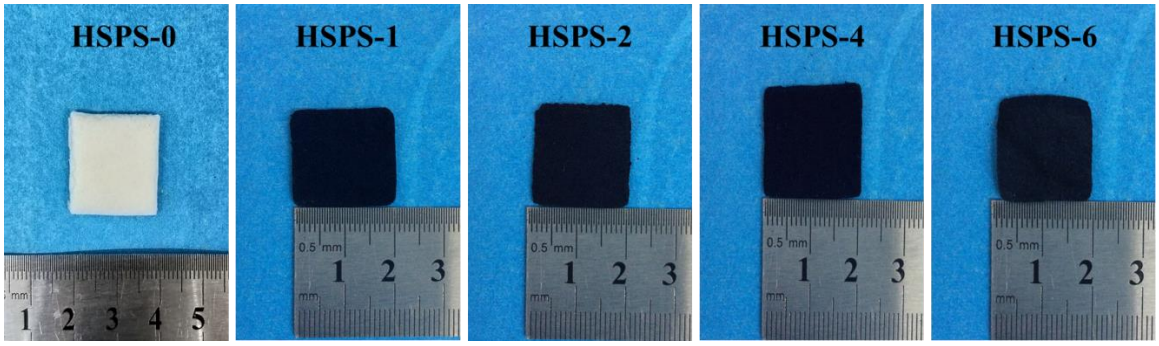

Figure S1. Photograph of HSPS-*t*

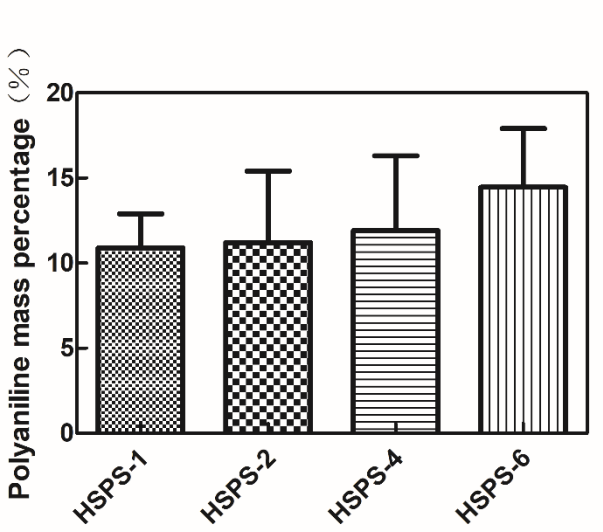

Figure S2. Polyaniline mass percentage in HSPS-1, HSPS-2, HSPS-4 and HSPS-6

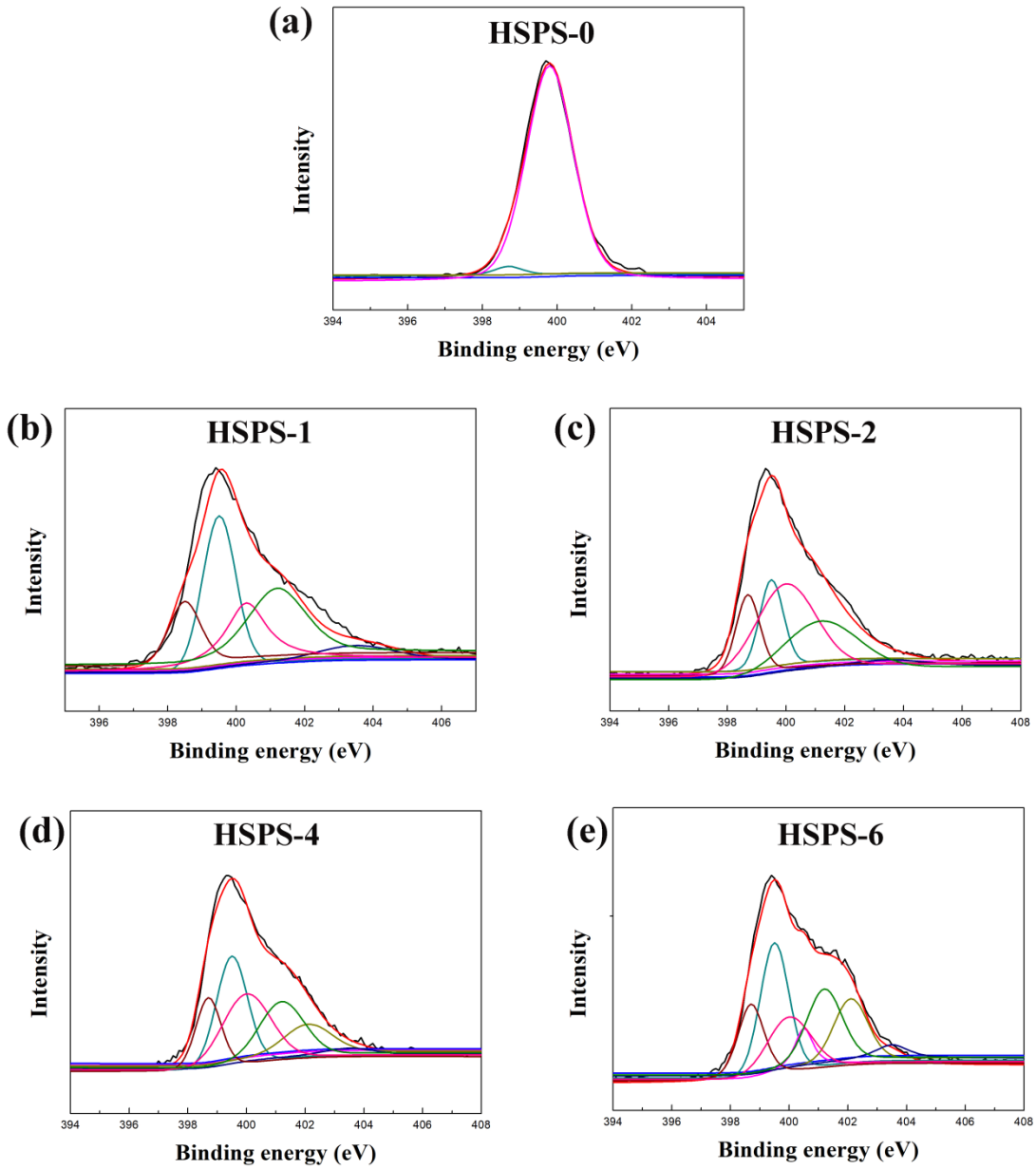

Figure S3. N_{1s} core level spectra of HSPS-*t*

Table S1. XPS results of HSPS-*t*

		－N= (PANI)	**－N－ (PANI)**	**－N^+ (PANI)**	**=N^+ (PANI)**	**NH/N-C (SPI)**	**C=N/N-C (SPI)**	**H-N-COO/ N-C=C (SPI)**
HSPS-0	Binding energy (eV)	399.5	400.5	402.5	403.5	398.7	399.8	401.2
	Binding area (%)	-	-	-	-	3.3	96.7	≈0
HSPS-1	Binding energy (eV)	399.5	400.5	402.5	403.5	398.5	400	401.2
	Binding area (%)	33.3	≈0	≈0	6.7	7.7	23.6	28.7
HSPS-2	Binding energy(eV)	399.5	400.5	402.5	403.5	398.7	400	401.2
	Binding area (%)	15.7	≈0	0.7	2.9	15.6	38.7	26.4
HSPS-4	Binding energy(eV)	399.5	400.5	402.5	403.5	398.5	400	401.2
	Binding area (%)	26.7	≈0	10.6	2.2	15.6	25.9	19
HSPS-6	Binding energy(eV)	399.5	400.5	402.5	403.5	398.5	400	401.2
	Binding area (%)	25	7.6	13.8	4.2	15.6	15.7	18.1

Table S2. The (－N^+ + =N^+)/ N percentage in PANI of HSPS-1, HSPS-2, HSPS-3 and HSPS-4

	HSPS-1	**HSPS-2**	**HSPS-4**	**HSPS-6**
(－N^+ + =N^+)/ N percentage (%)	16.7	18.5	32.4	35.6

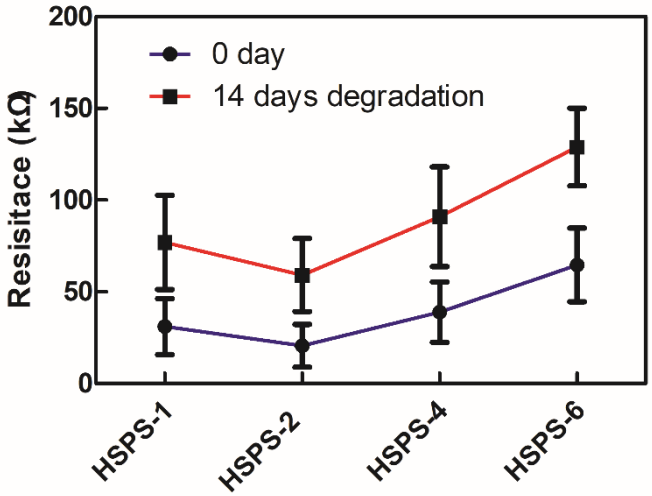

Figure S4. The resistance of HSPS-1, HSPS-2, HSPS-4 and HSPS-6 after 0 and 14 days of *in vitro* degradation

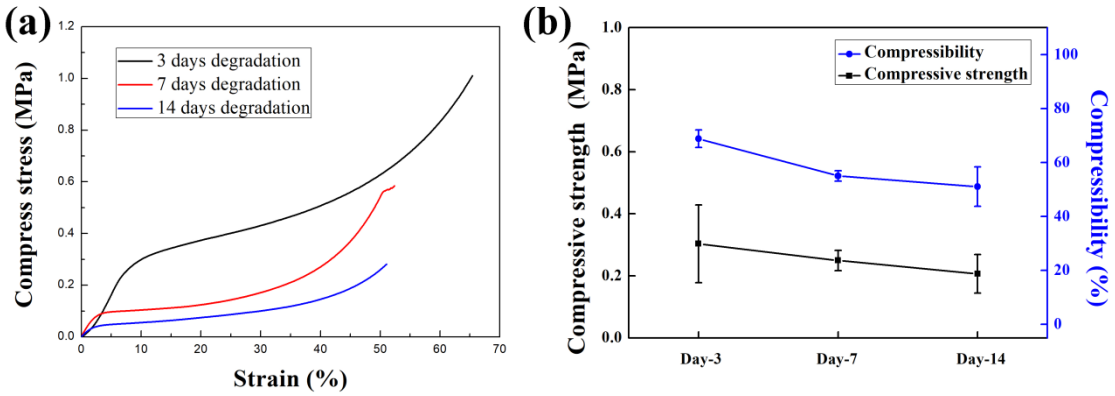

Figure S5. The compressive stress-strain (a), compressibility and compressive strength curves (b) of the HSPS-2 sponge after 3, 7 and 14 days *in vitro* degradation

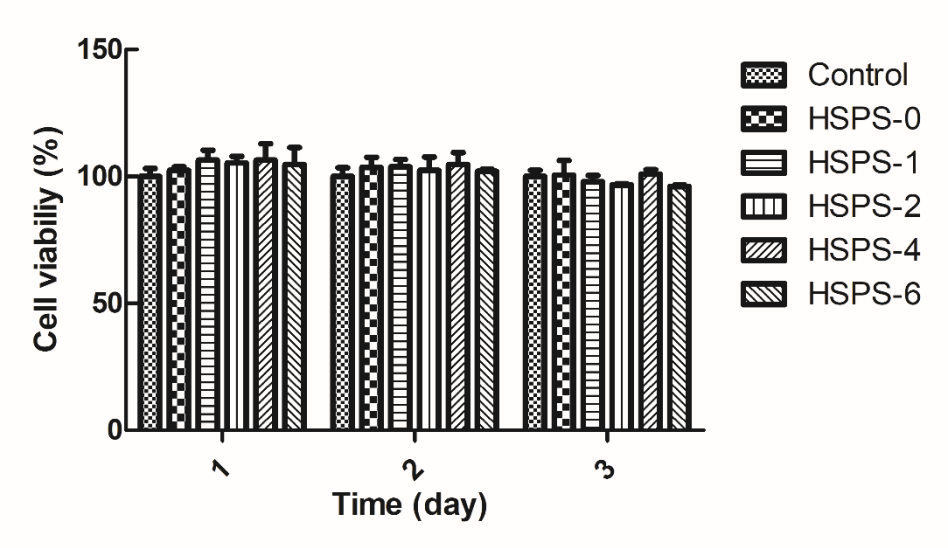

Figure S6. Cell viability of L929 cells incubated with HSPS-*t* extract

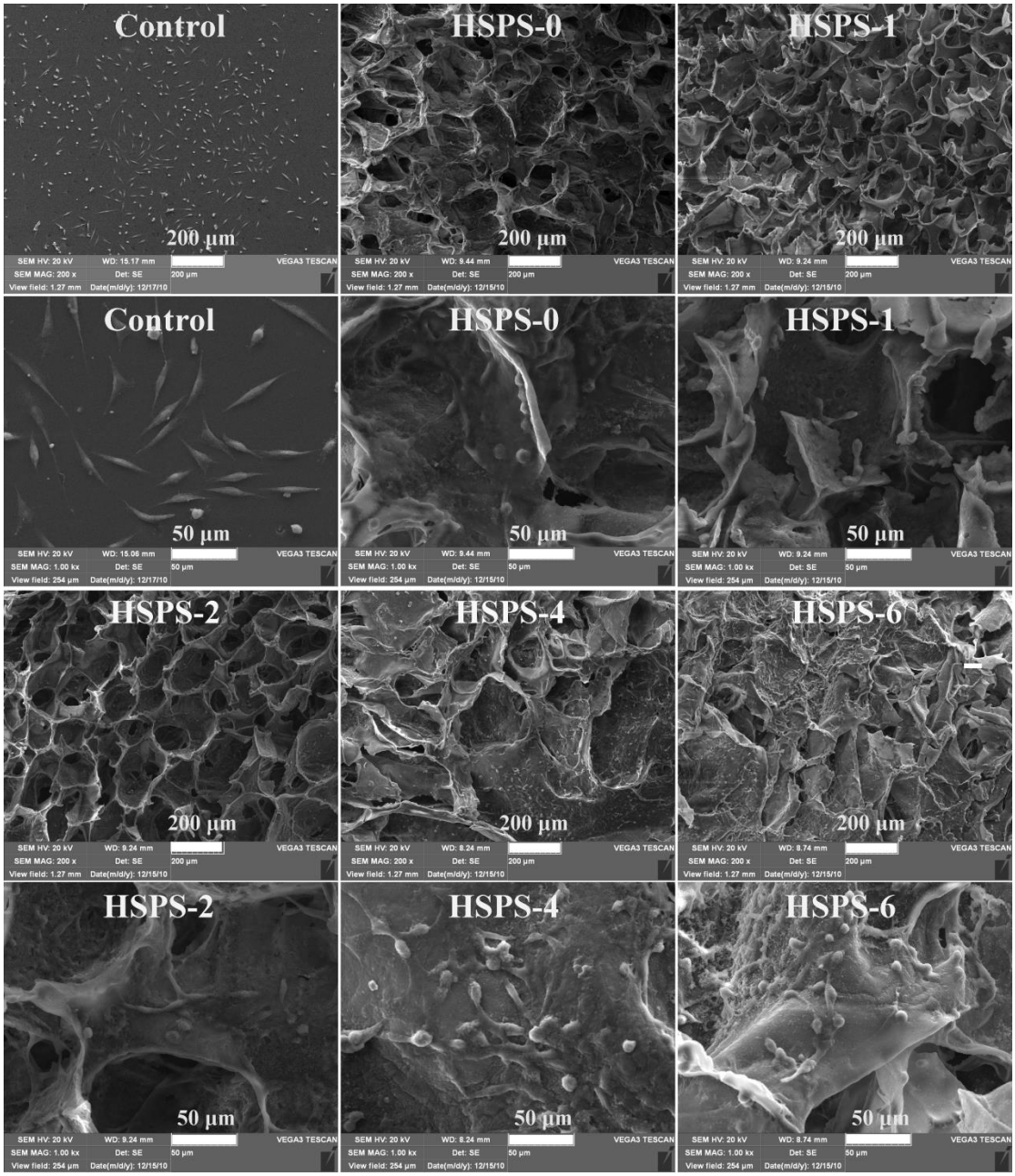

Figure S7. SEM images of L929 cells cultured on tissue culture plate (control) and the surface of HSPS-*t*.

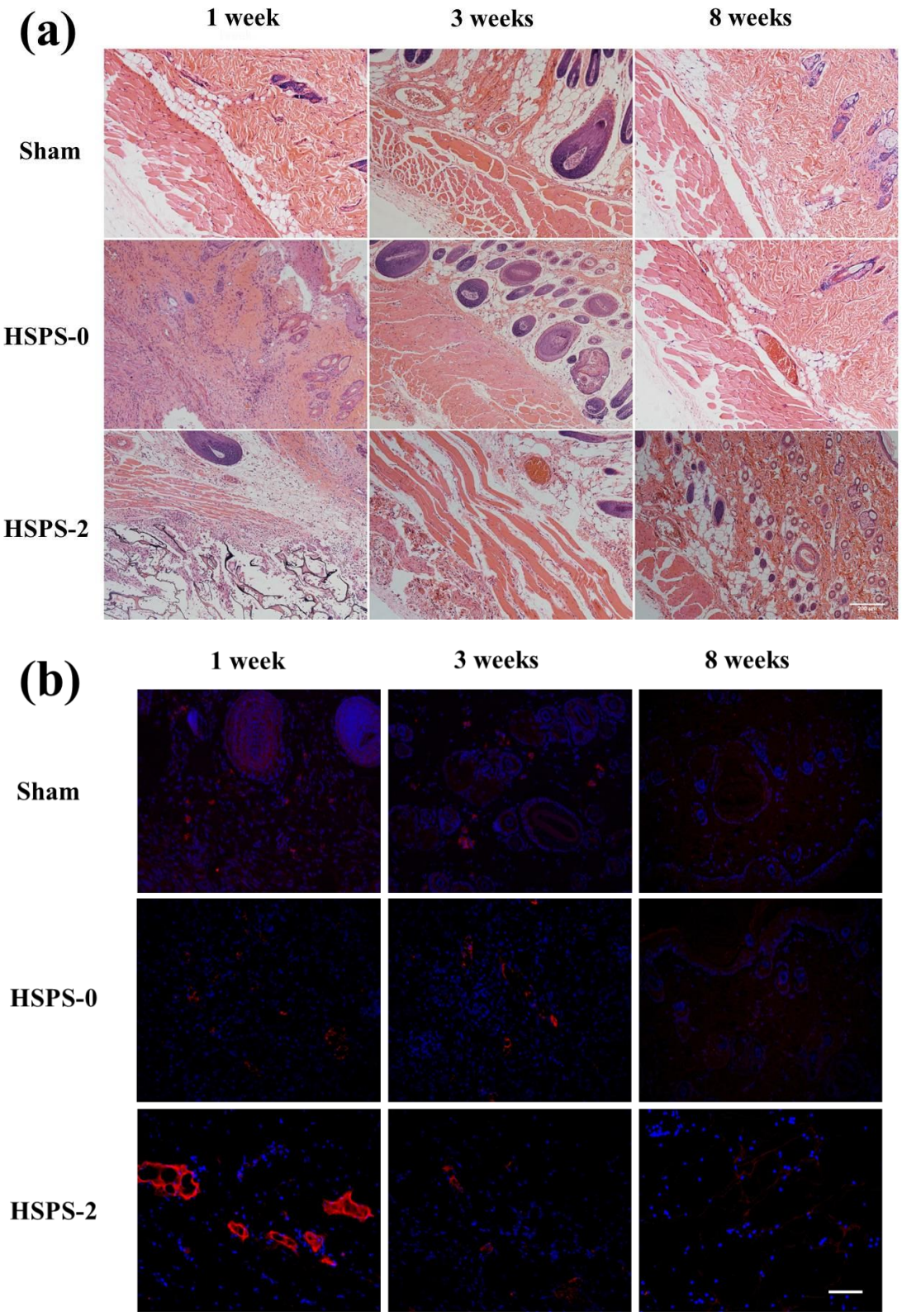

Figure S8. Biocompatibility of sham-operation, HSPS-0 and HSPS-2 sponges evaluated *in vivo*. (a) HE-staining after sensor implantation, scar bar=200 μm, (b) Immunofluorescent-staining after sensor implantation, scale bar=50 μm.

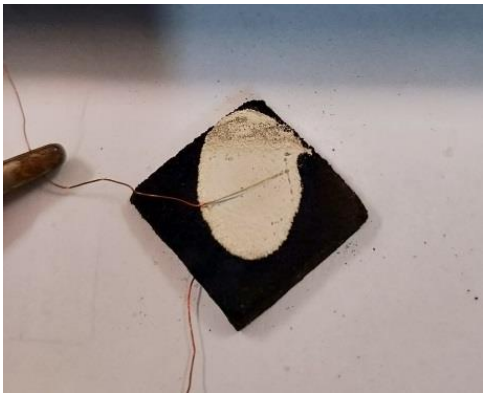

Figure S9. HSPS-2 sponge coated with conductive silver paste