

Supporting Information

Advanced Functional Materials

Dynamic Electromechanical Hydrogel Matrices for Stem Cell Culture

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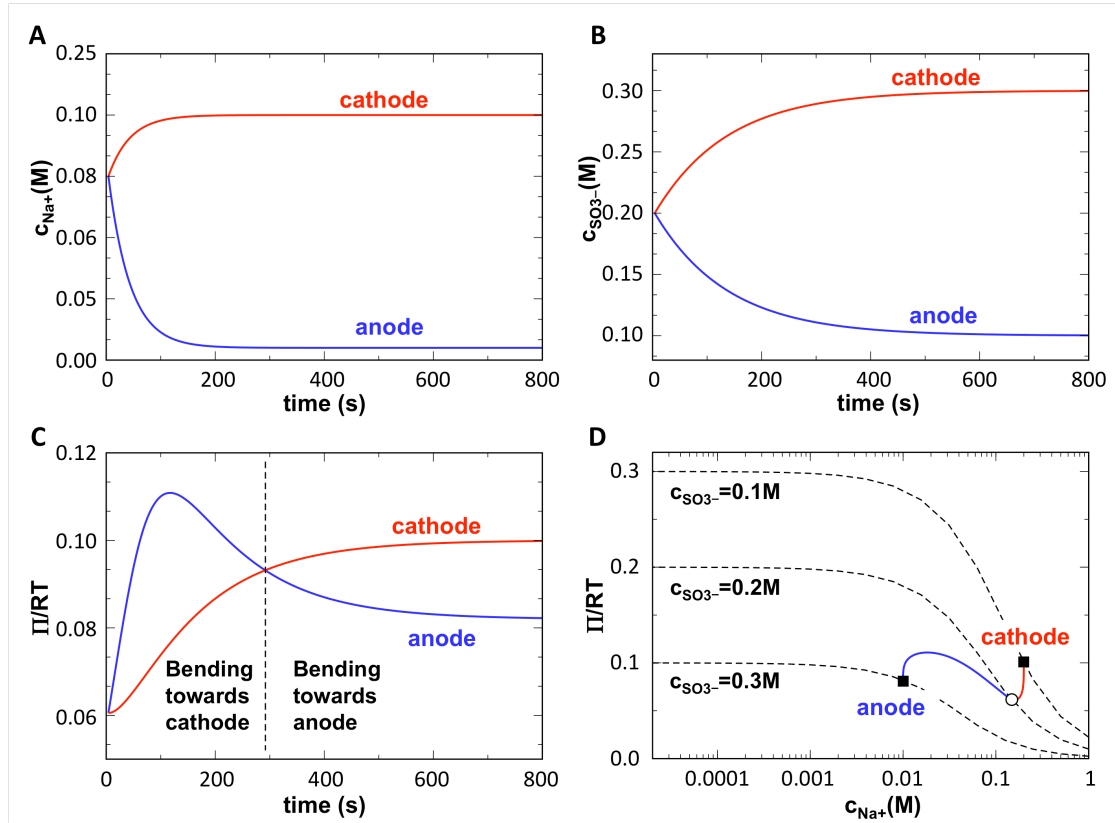


Figure S1. Theoretically predicted bending evolution for the bi-directional bending low-crosslink density PAMPS hydrogels. (A) Rough input profile for the change in solution concentration of Na^+ ions (c_{Na^+}) at the gel boundary on the anode and cathode side. (B) Input time evolution in the concentration of SO_3^- groups ($c_{\text{SO}_3^-}$) on the anode and cathode side of the gel. (C) Theoretically predicted time evolution of the osmotic pressure (Π/RT) on the anode and cathode sides based on the input solution Na^+ and gel SO_3^- concentrations. (D) Evolution trajectory of the osmotic pressure as a function of Na^+ concentration at the anode and cathode sides. The dashed lines show the osmotic pressure curves for three fixed SO_3^- concentrations.

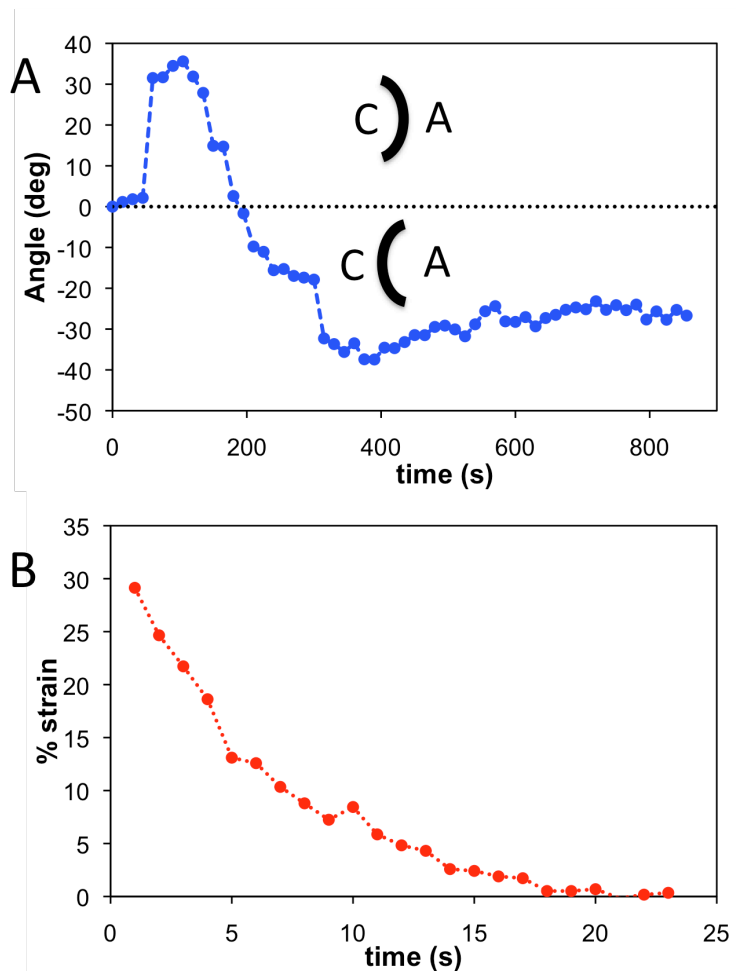


Figure S2. (A) Time evolution of the bending angle for a low crosslink density PEG/CS hydrogel strip. (B) Percentage strain relaxation of a bent PEG/CS hydrogels in the absence of electric field, where the bent strip was produced by switching on the electric field at time zero and switching it off at 1 minute.

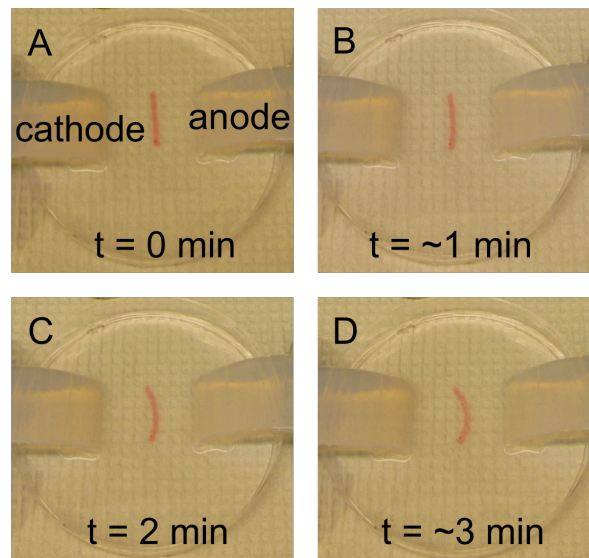


Figure S3. hMSC-laden high-crosslink density PEG/CS hydrogel (3 days post-encapsulation) showing electric-field induced bending towards the cathode at four different timepoints. For visualization, the medium was replaced with PBS.

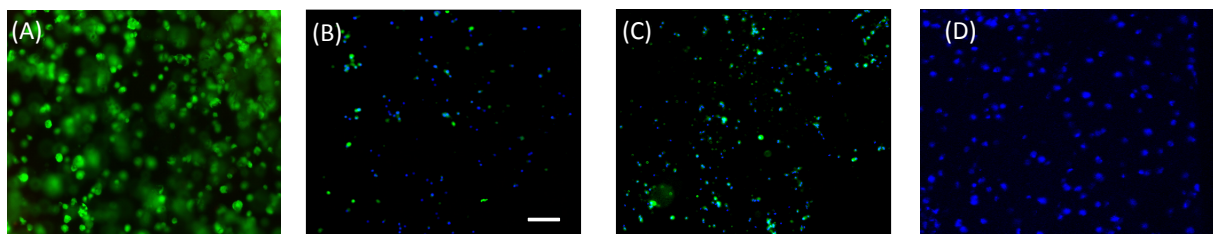


Figure S4. Effect of electro-mechanical matrices (PEG/CS hydrogels) on encapsulated cells. (A) Live/dead assay of hMSC-laden hydrogels subjected to electric field for five days. The green stain indicates viable cells. Ki67 staining for hMSC proliferation in control hydrogels (B) and electric field hydrogels (C) after five days. (D) TUNEL staining of hMSC-laden hydrogels after 21 days of culture showing absence of apoptotic cells. Scale bar represents 100 μm .

Table S1: List of primers used for qRT-PCR

Gene	Primer sequence: sense/antisense	Product size (bp)
β -actin	5' TGGCACCACACCTTCTACAATGAGC 3'	396
	5' GCACAGCTTCTCCTTAATGTCACGC 3'	
Col1	5' ATCCAGCTGACCTTCCTGCG 3'	322
	5' TCGAAGCCGAATTCCTGGTCT 3'	
AGN	5' GCCTTGAGCAGTTCACCTTC 3'	395
	5' CTCTTCTACGGGGACAGCAG 3'	
Col II	5' GAAACCATCAATGGTGGCTTCC 3'	301
	5' CGATAACAGTCTTGCCCCACTT 3'	
Col X	5'-CCCTTTTTGCTGCTAGTATCC-3'	468
	5'-CTGTTGTCCAGGTTTTCTGGCAC-3'	