ADVANCED FUNCTIONAL MATERIALS

Supporting Information

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A Highly Elastic and Rapidly Crosslinkable Elastin-Like Polypeptide-Based Hydrogel for Biomedical Applications

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The complete protein sequence is as follows:

MGWGSKCTSASGLVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGIPGVG
VPGVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGVPGVGIPGVGVPGVG
VPGVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVG
VPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVG
VPGVGIPGVGVPGVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGI
PGVGVPGVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVGVPGVGVPGVGIPGVGVP
GVGVPGVGVPGVGVPGVGIPGVGVPGVGVPGVGETTSKCTS*

The ELP was designed as a pentapeptide repeat of hydrophobic amino acids, with abbreviated sequence:

$[[VPGVG]_4IPGVG]_{14}$.

The complete nucleotide sequence of the completed gene is as follows, with the cysteine containing sequence (KCTS) italicized and the ELP gene in normal type:

GGATCC*AAATGTACCAGC*GCTAGCGGTCTCGTTGGTGTACCTGGTGTTGGCGTCCC
GGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGT
GTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTG
TAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCC
AGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGC
GTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCG
TTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACC
GGGTGTAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGT
ATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGTGTACCTGGTG
TTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCC
AGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGT
GTACCGGGTGTAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTG
TAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGTGTACC
TGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGC
GTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCG
TTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCC
GGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGT
GTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCCAGGCGTTGGTGTACCGGGTG
TAGGCGTTCCAGGCGTTGGTGTACCTGGTGTTGGCGTCCCGGGTGTAGGTATCCC
AGGCGTTGGTGTACCGGGTGTAGGCGTTCCAGGCGTTGGTGAGACCACTAGTTAA
ATGAAT*AAATGCACGTCTTAA*AAGCTT

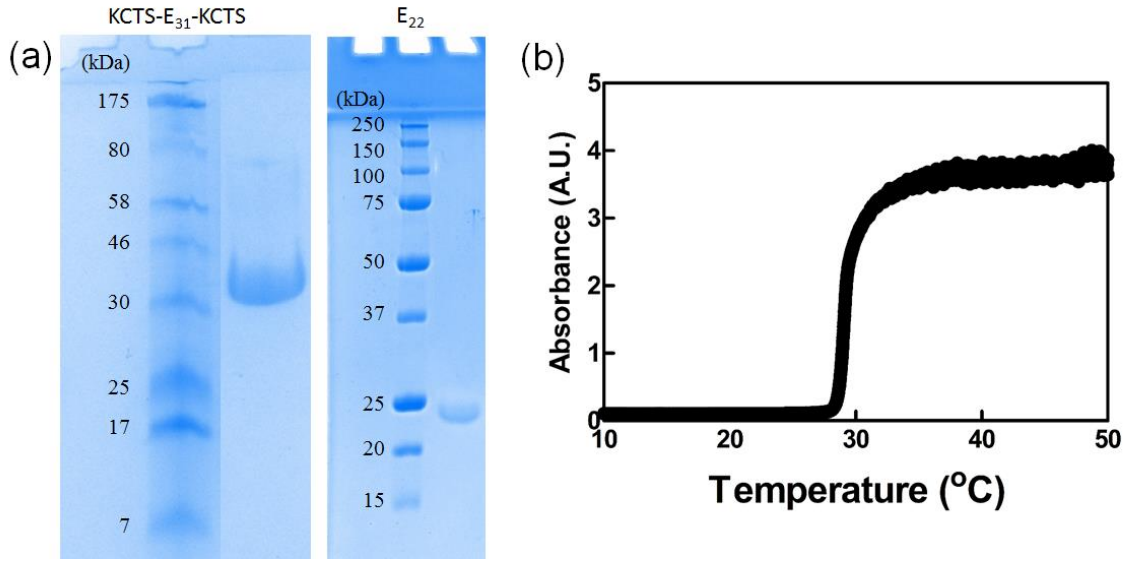

Figure S1. (a) Protein gel of KCTS-E_{31}-KCTS and E_{22} proteins after purification. (b) UV-Vis plot showing the transition temperature of a 1% (w/v) solution of ELP.

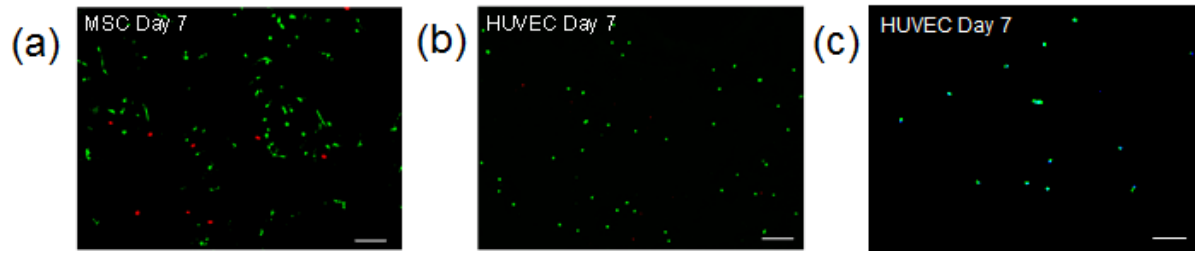

Figure S2. *In vitro* cell seeding on ELP hydrogels. (a-b) Calcein-AM (green)/ethidium homodimer (red) LIVE/DEAD assay on ELP hydrogels seeding with MSCs (a) or HUVECs (b) at day 7 of culture (scale bar = 200 μm). (c) Phalloidin (green)/DAPI (blue) staining for F-actin/cell nuclei of ELP with HUVECs at day 7 of incubation (scale bar = 100 μm).

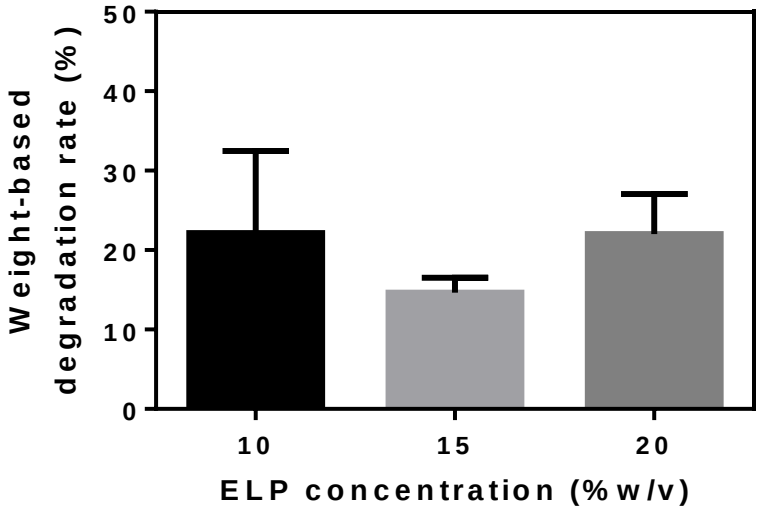

Figure S3. Enzymatic degradation rate of ELP gels *in vitro* with digestion with proteinase K for 6 hours.

Table S1. Mechanical characterization of photocrosslinked ELP hydrogels.

ELP concentration (% (w/v))	Elastic modulus (kPa)	Stress at break (kPa)	Strain at break (%)	Compressive modulus (kPa)	Energy loss (%)
10	1.28 ± 0.17	6.46 ± 0.35	419 ± 25	3.01 ± 0.44	35.13 ± 2.55
15	1.72 ± 0.11	7.71 ± 0.53	395 ± 10	6.15 ± 0.28	42.10 ± 4.37
20	2.21 ± 0.36	10.09 ± 1.81	388 ± 12	13.05 ± 1.20	51.15 ± 2.90