1

2   Table S1. Primer sequences for qPCR

Gene	Forward	Reverse
GAPDH	5'-CAAGGCTGAGAACGGGAAGC-3'	5'-AGGGGGCAGAGATGATGACC-3'
COL 1a1	5'-ACCGCCCTCCTGACGCAC-3'	5'-GCAGACGCAGATCCGGCAG-3'
RUNX2	5'-TTCATCCCTCACTGAGAG-3'	5'-TCAGCGTCAACACCATCA-3'
ALP	5'-AACATCAGGGACATTGACG-3'	5'-GTATCTCGGTTTGAAGCTC-3'
OCN	5'-TCACAGTCCGGATTGAGCTCA-3'	5'-CAAAGGTGCAGCCTTTGTGTC-3'

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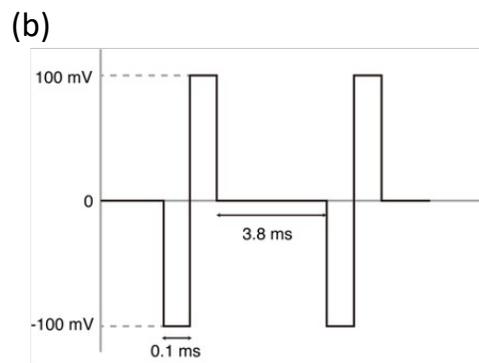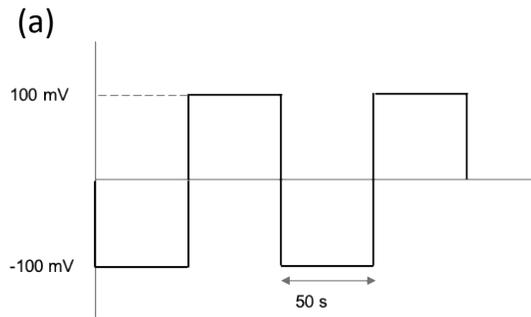
Figure S1 (a) Wave model of electrical stimulation for hASC osteogenesis (b) Wave model of electrical stimulation for PC12 neural differentiation
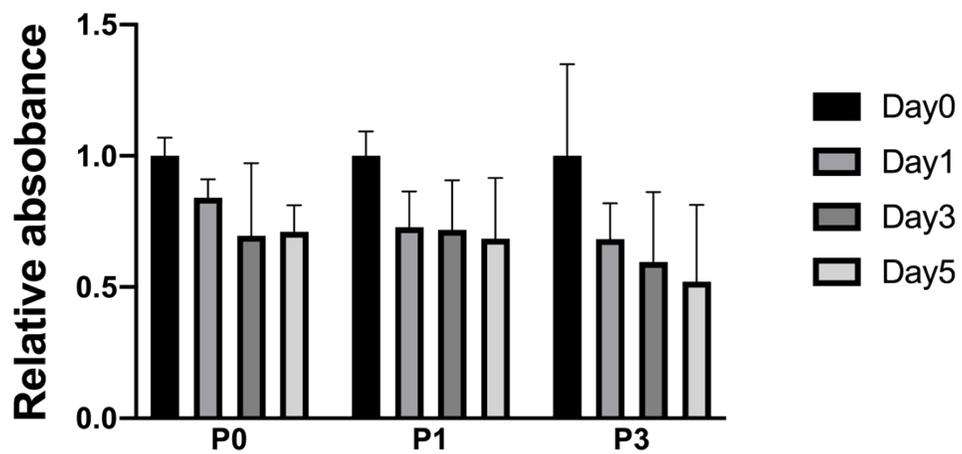
Figure S2. Cell activity of PC12 cultured in PEDOT:PSS/MWCNT extract tested by Alamar Blue assay
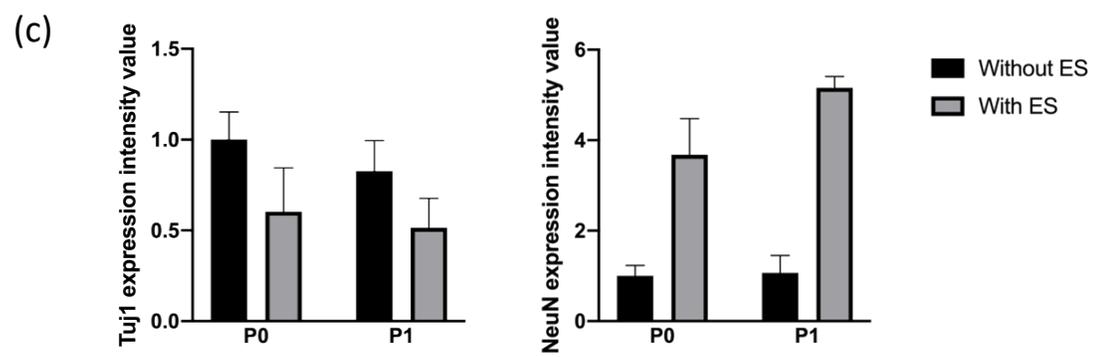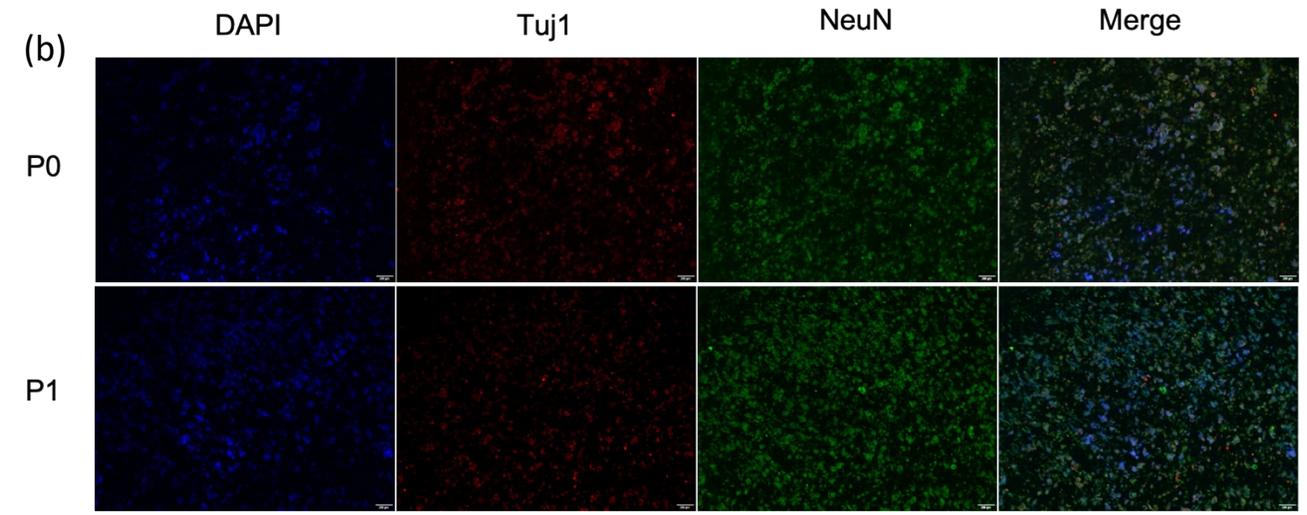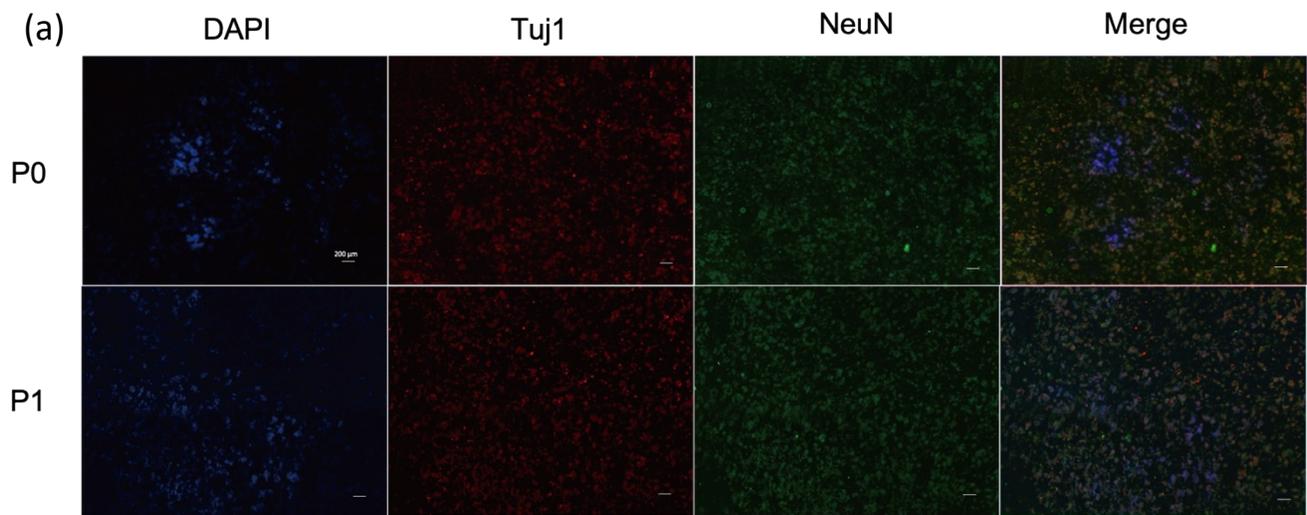
Figure S3. (a) Gene expression of PC12 neurogenesis after 5 days differentiation without ES. (b) Gene expression of PC12 neurogenesis after 5 days differentiation with ES. (c) Semi-quantification of gene expression measured from immunofluorescence images. Expression intensity are normalized by P0 without ES group.

20
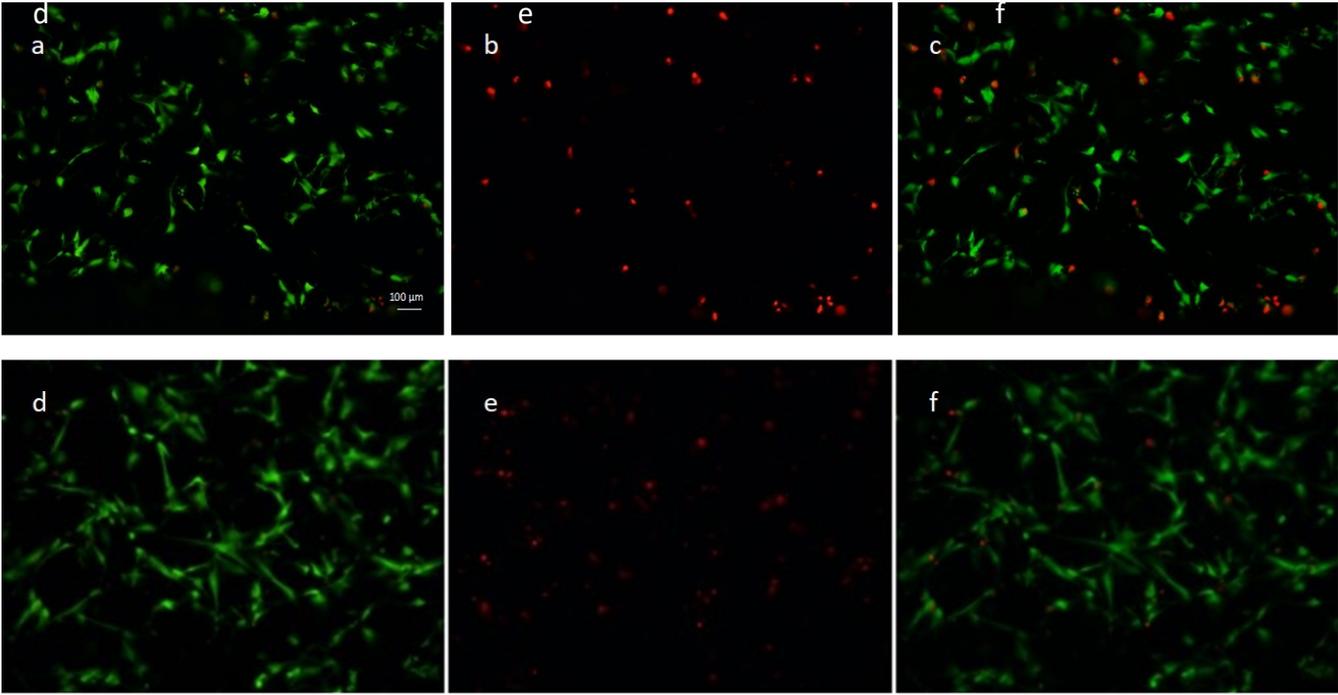
21

22   Figure S4. Live/Dead images of hASCs in P3 scaffolds at (a-c) day 1 and (d-f) day 7.

23

P0

| **1% GOPS** | **3% GOPS** | **5% GOPS** | **10% GOPS** |
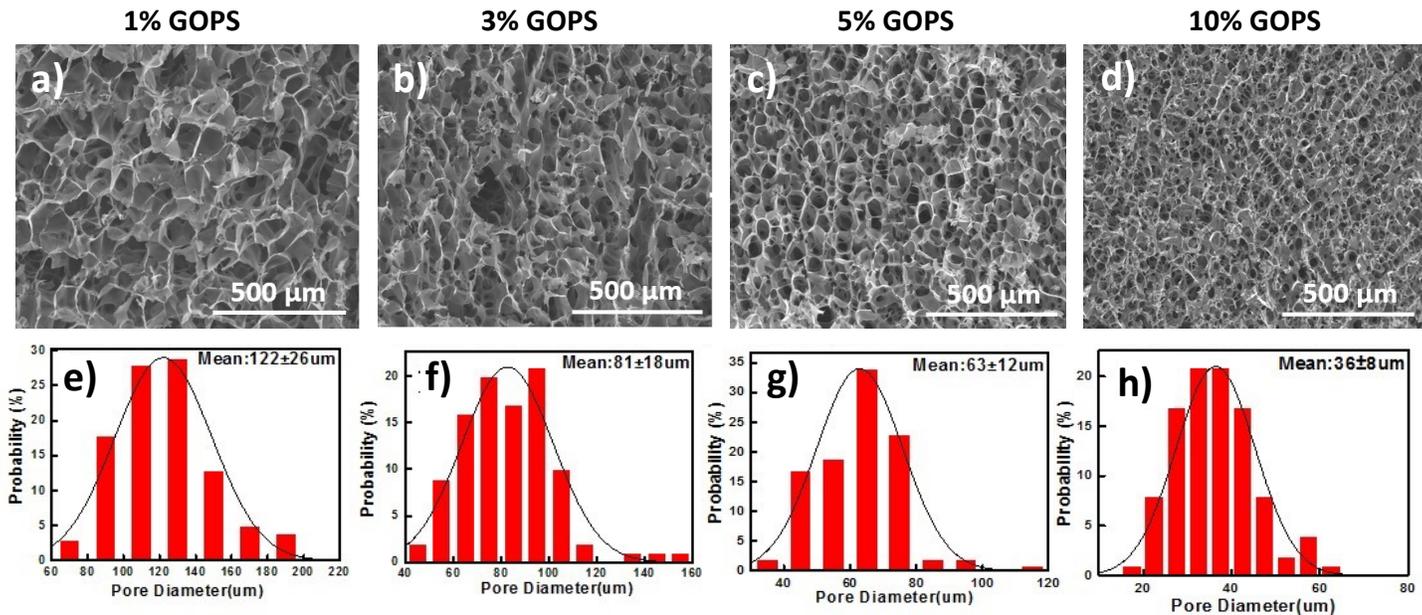
Figure S5. SEM images and the pore size distribution of P0 scaffolds with (a, e)1%, (b, f)3%, (c, g)5%, and (d, h)10 % GOPS.