Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Synergy Between 3D-Extruded Electroconductive Scaffolds and Electrical Stimulation to Improve Bone Tissue Engineering Strategies

(Supplementary Information)

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Prepared for *Journal of Materials Chemistry B*, November 2023; **Revised January 2024**

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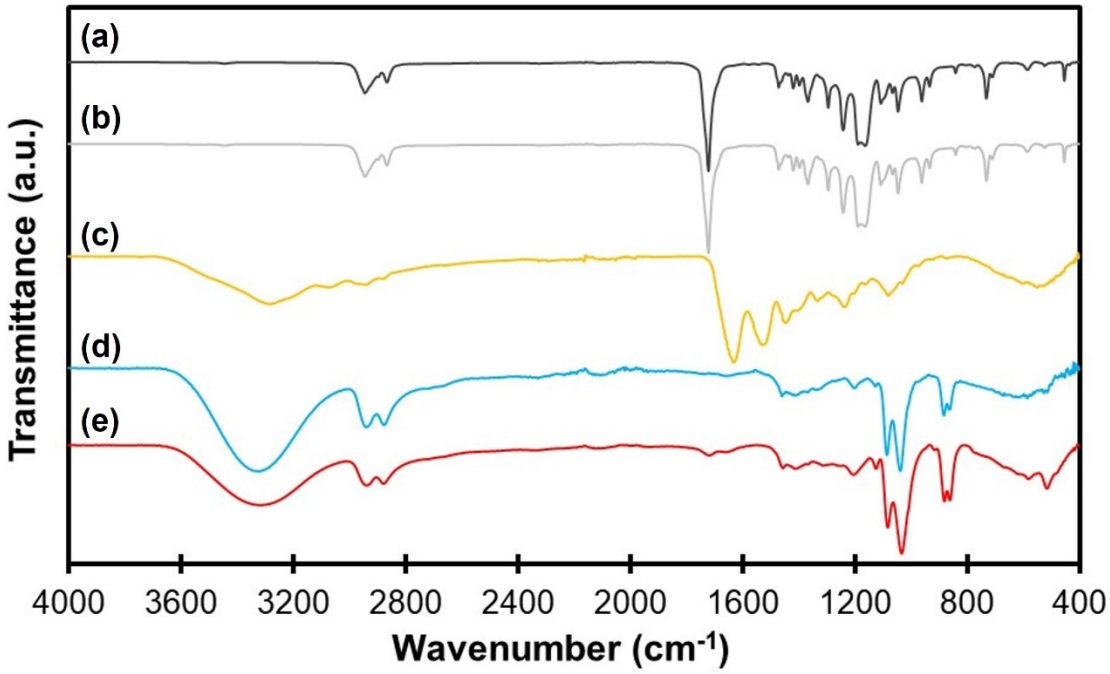


Figure S1: FTIR profile of the materials used in the design of PCL-PEDOT scaffolds: (**a**) PCL, (**b**) PCL(NaOH), (**c**) Gelatin, (**d**) PEDOT:PSS:GOPS, (**e**) PEDOT:PSS:DVS.

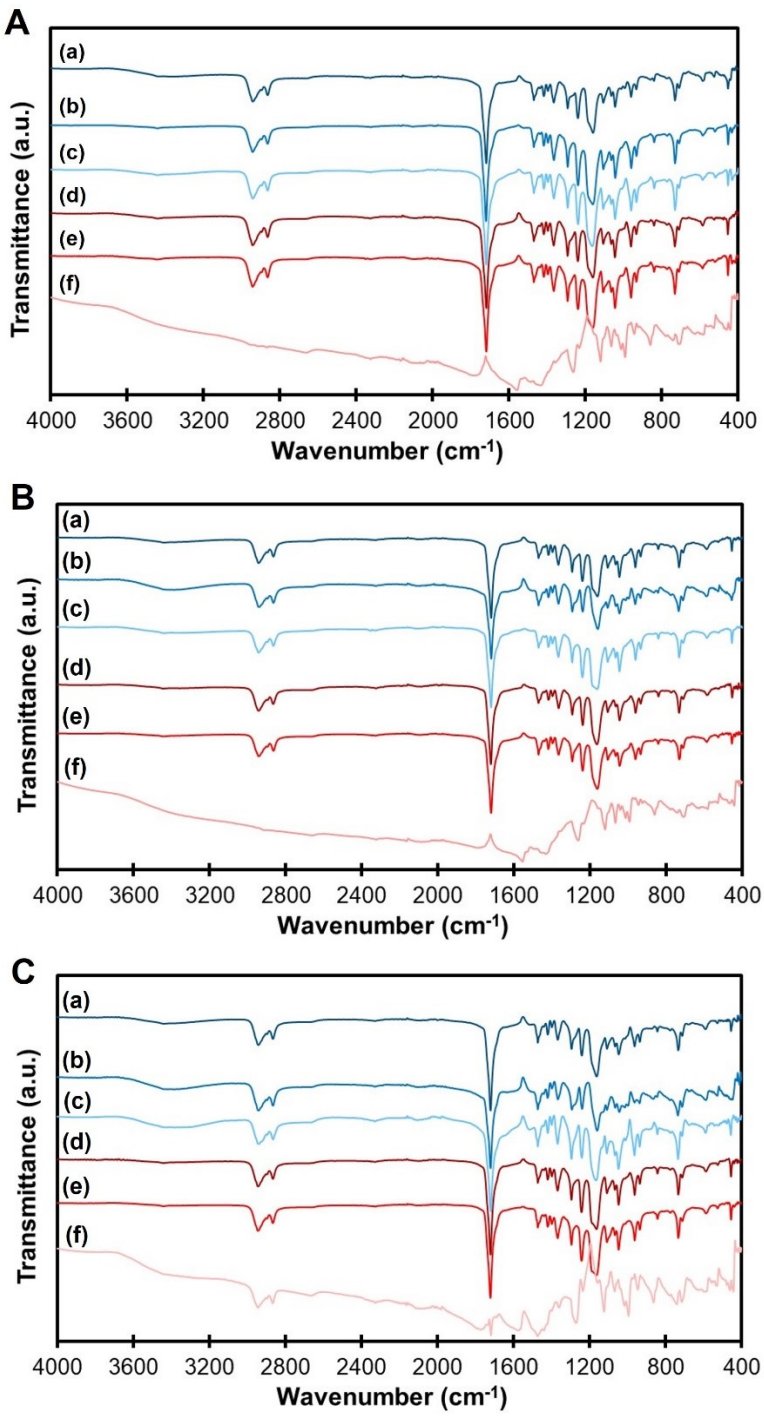
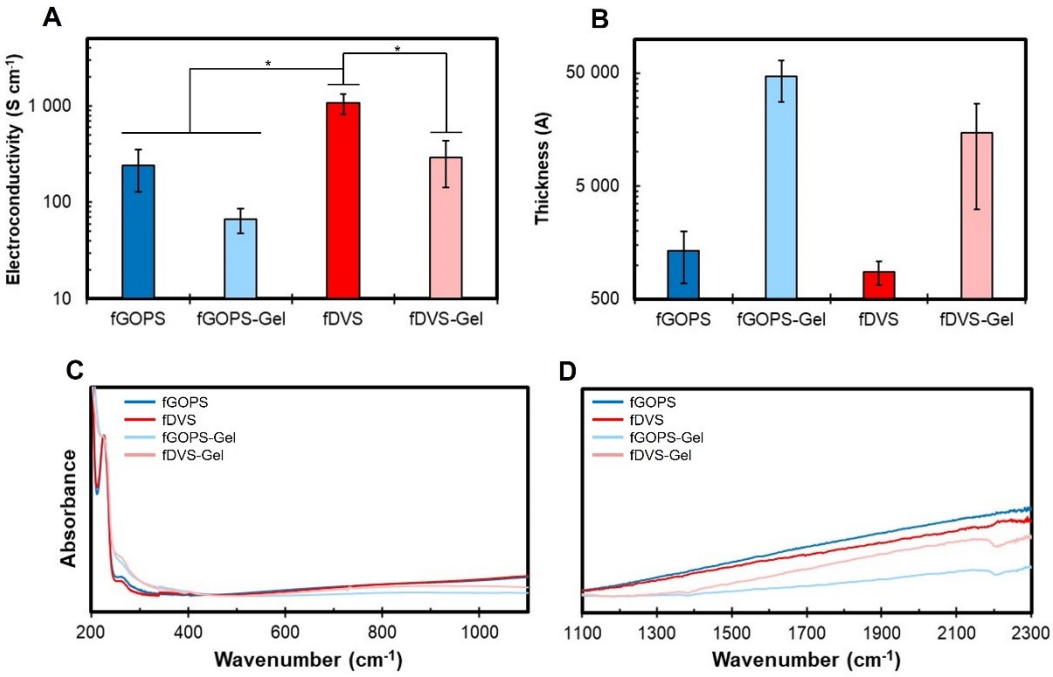


Figure S2: Stability assay results for the different PEDOT-based coatings tested on 3D-printed PCL films. Chemical changes on the samples were accompanied using FTIR also at (**A**) day 1, (**B**) day 7 and (**C**) day 14; (**a**) GOPS, (**b**) GOPS(NaOH), (**c**) GOPS(NaOH)-Gel, (**d**) DVS, (**e**) DVS(NaOH), (**f**) DVS(NaOH)-Gel.



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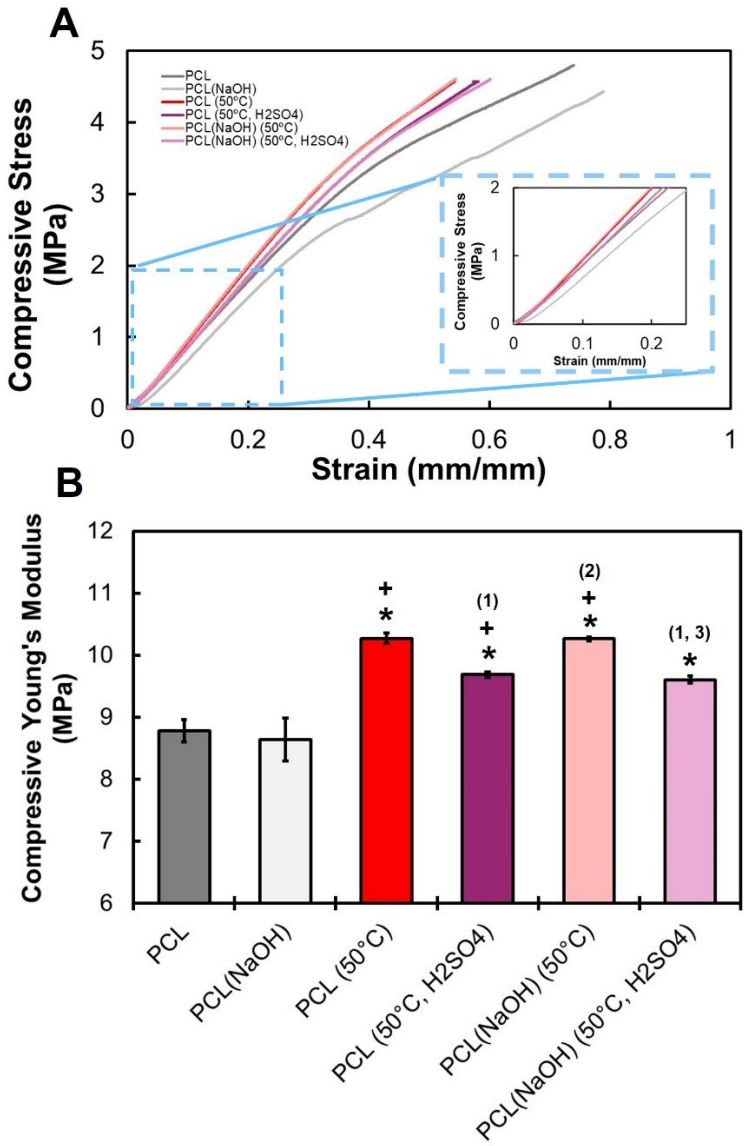
59 **Figure S3**: Study of the properties of PEDOT:PSS spin-coated films on glass.
60 (**A**) Electroconductivity of the obtained films (mean ± std, n = 4, * means $p < 0.05$)
61 and (**B**) respective thickness (mean ± std, n = 4). Spectrometric analysis of the
62 obtained films, including (**C**) UV/Vis and (**D**) NIR.



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64 **Figure S4**: Effect of different chemical/thermal conditions on the mechanical
65 properties of PCL and PCL(NaOH) scaffolds: (**A**) Stress-strain curves and (**B**)
66 Compressive Young's Modulus (mean ± std, n = 5; (*) means $p < 0.05$ when
67 compared with PCL; (+) means $p < 0.05$ compared to PCL(NaOH); (1) means p
68 < 0.05 compared to PCL (50ºC); (2) means $p < 0.05$ compared to PCL (50ºC,
69 H2SO4); (3) means $p < 0.05$ compared to PCL(NaOH) (50ºC)).

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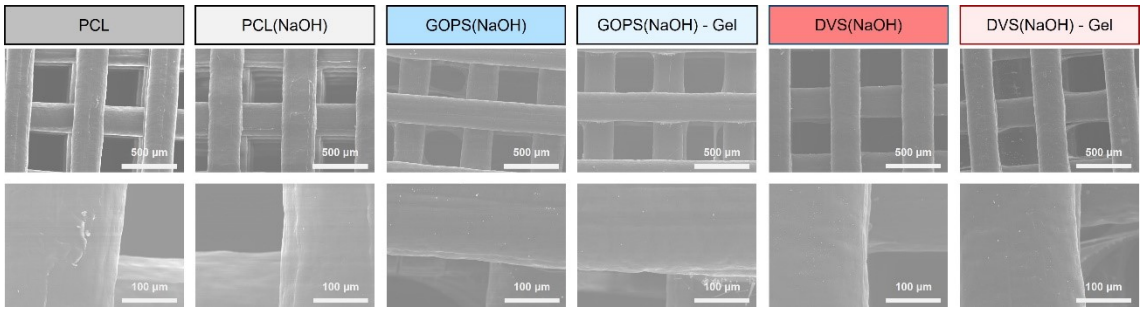

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72 **Figure S5**: SEM images of the different scaffolds after 7 days of mineralization.

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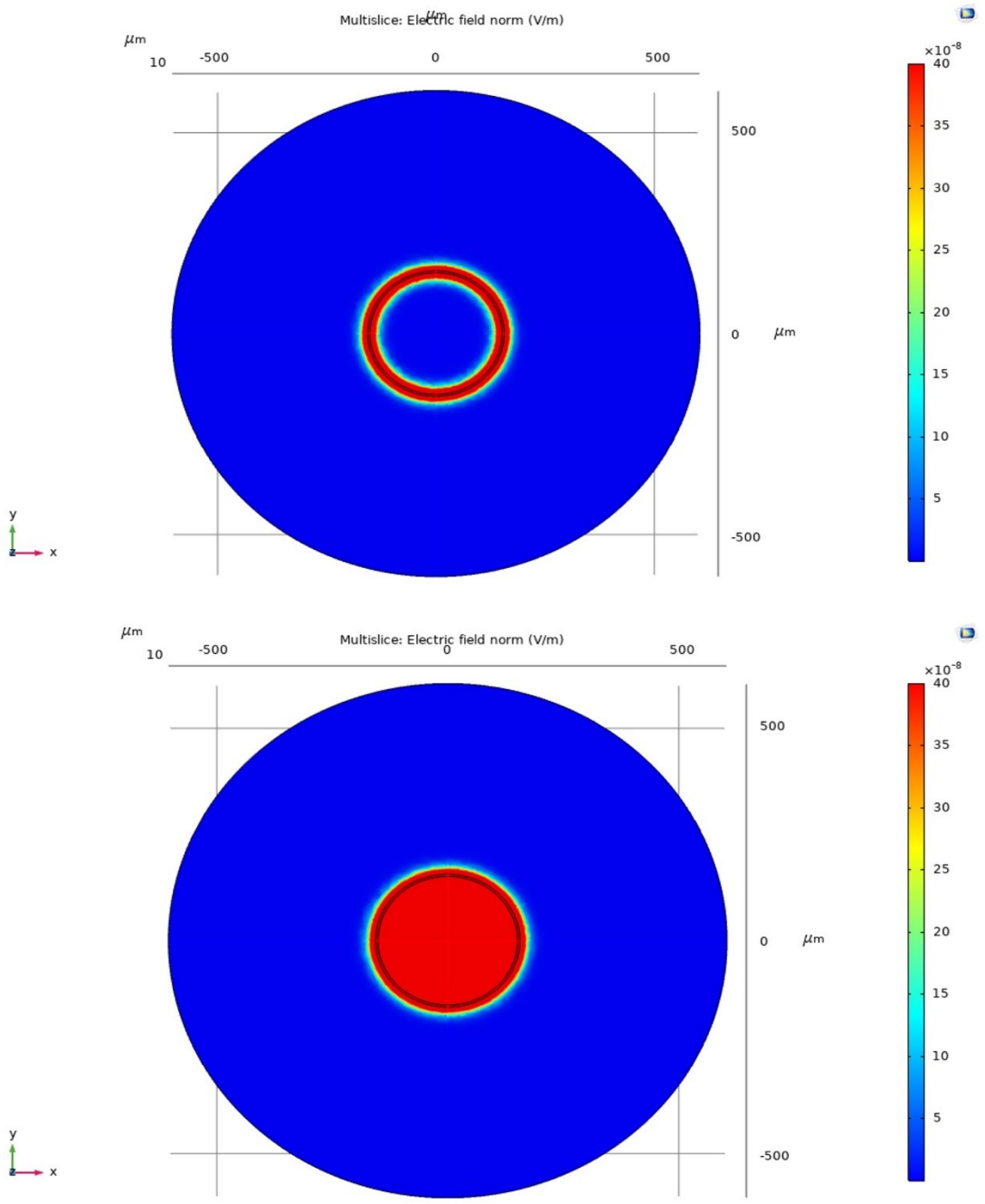

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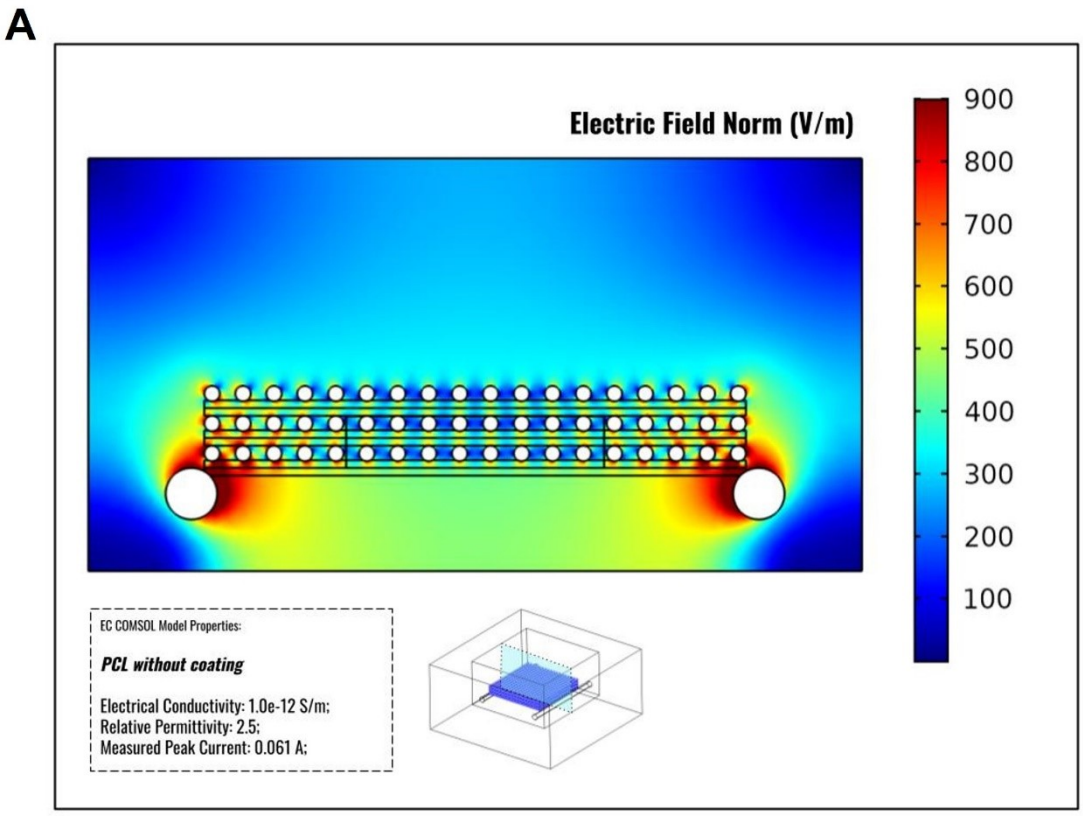
76 **Figure S6**: FEA analysis of electrical field intensity on the filaments using different
77 configurations. On the right the results from a thin homogeneous coating; on the
78 left the results from a whole electroconductive fiber.



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80 **Figure S7(A):** FEA analysis of electrical field intensity on the different PCL-

81 PEDOT samples tested: Pristine PCL scaffolds.

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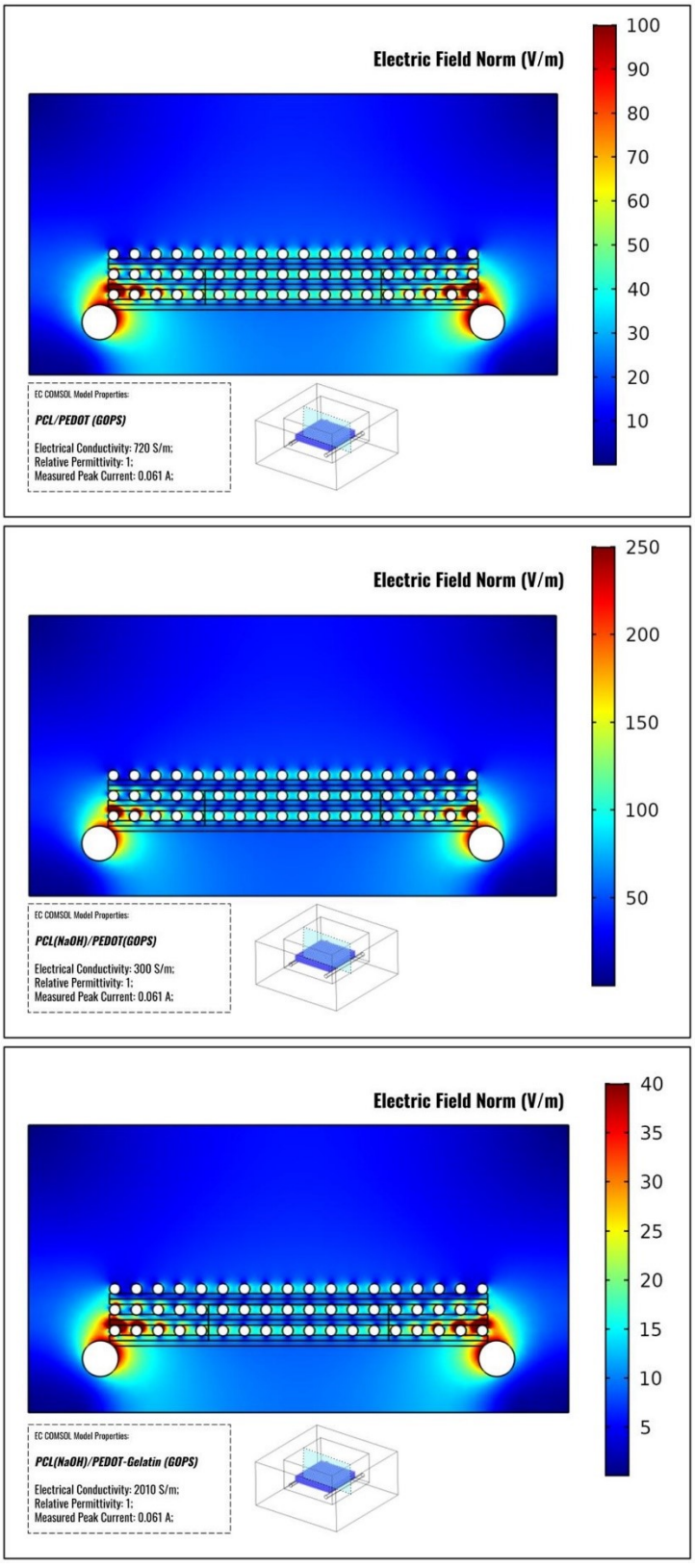

Figure S7(B): FEA analysis of electrical field intensity on the different PCL-PEDOT samples tested: scaffolds with GOPS-based coatings.

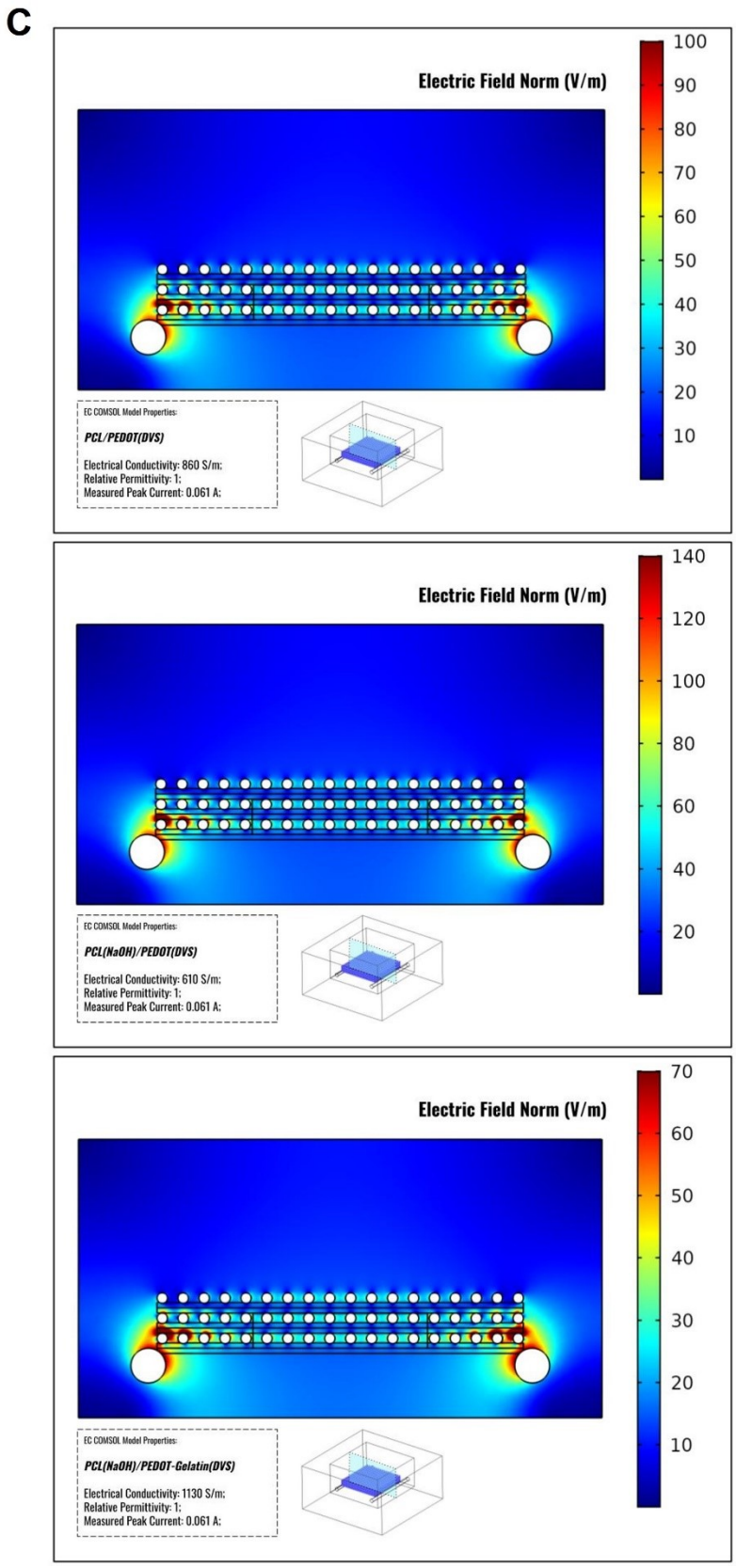

Figure S7C: FEA analysis of electrical field intensity on the different PCL-PEDOT samples tested: scaffolds with DVS-based coatings.

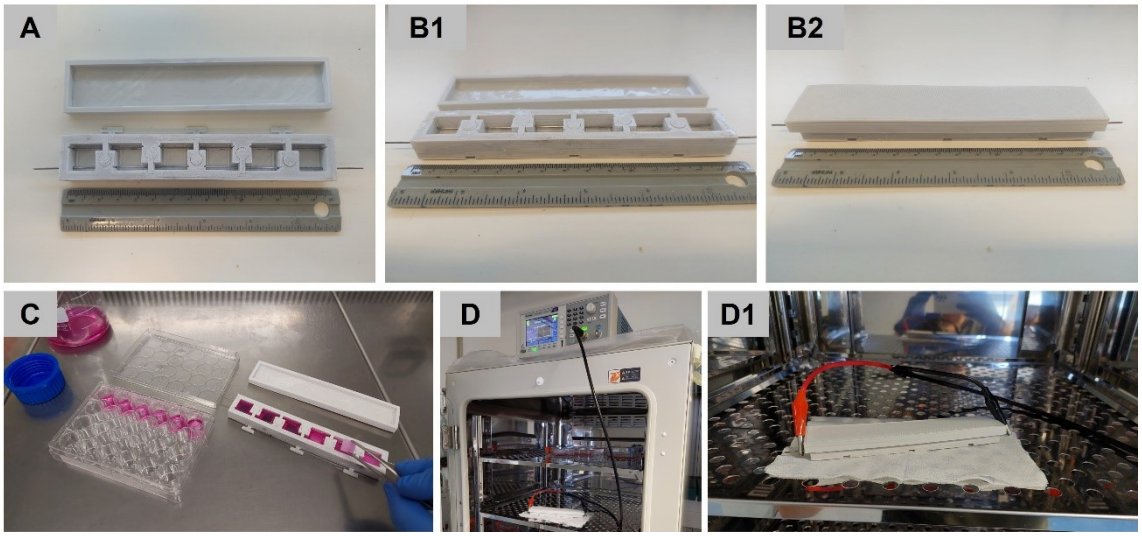

Figure S8: Visual aspect of the custom cell-culture plates used for electrical stimulation. (**A**) Top-view; (**B**) Side-view of the setup (**B1**) without and (**B2**) with the lid on; (**C**) Transferring of PCL and PCL-PEDOT:PSS scaffolds to the setup; (**D**) On going stimulation of scaffolds inside the setup and (**D1**) respective close-up., where the cathode (red) and anode (black) electrodes are visible.

Table S1: Properties of the materials used in FEA simulation (1* means: unkown values for electric permittivity that were considered as 1).

Material	Electroconductivity ($S\ m^{-1}$)	Electric Permittivity
C8 composite	1×10^{-14}	2.5
Stainless Steel 316LVM	1×10^{6}	1
Culture Medium	1.741 (Experimental)	80.1
PCL	1×10^{-12}	2.5
PCL(NaOH)	1×10^{-12}	2.5
GOPS	720 ± 320 (This work)	1*
GOPS(NaOH)	300 ± 270 (This work)	1*
GOPS(NaOH)-Gel.	2010 ± 570 (This work)	1*
DVS	860 ± 420 (This work)	1*
DVS(NaOH)	610 ± 400 (This work)	1*
DVS(NaOH)-Gel.	1130 ± 320 (This work)	1*