

Supplementary Information for: Flexible Circumferential Bioelectronics to Enable 360-degree Recording and Stimulation of the Spinal Cord

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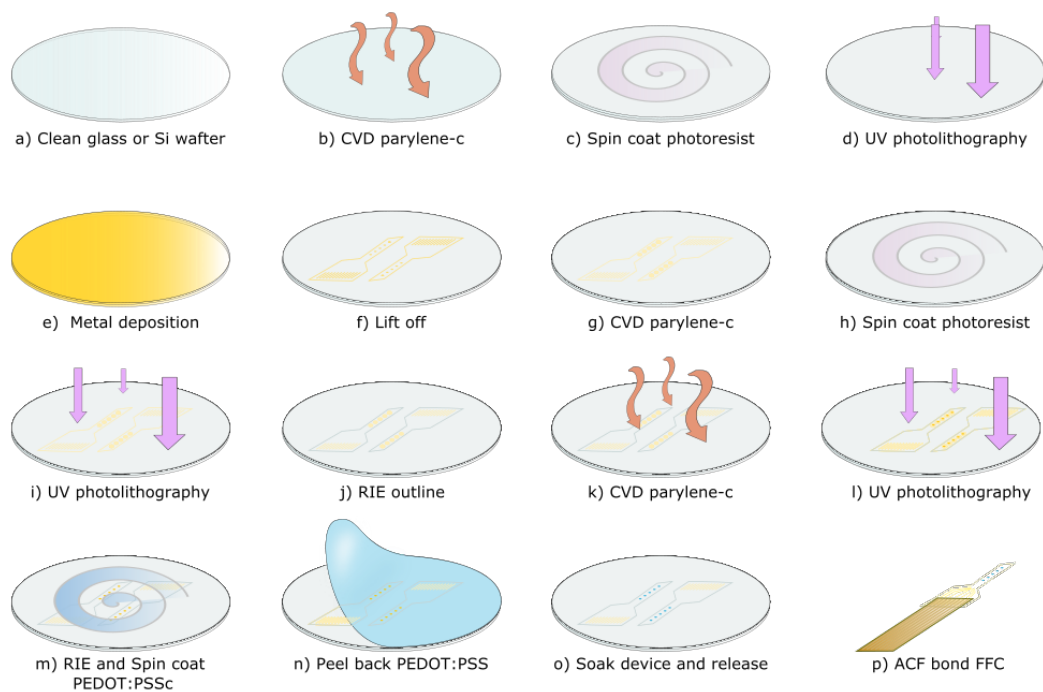


Figure S1 - Full fabrication process for the i360 device

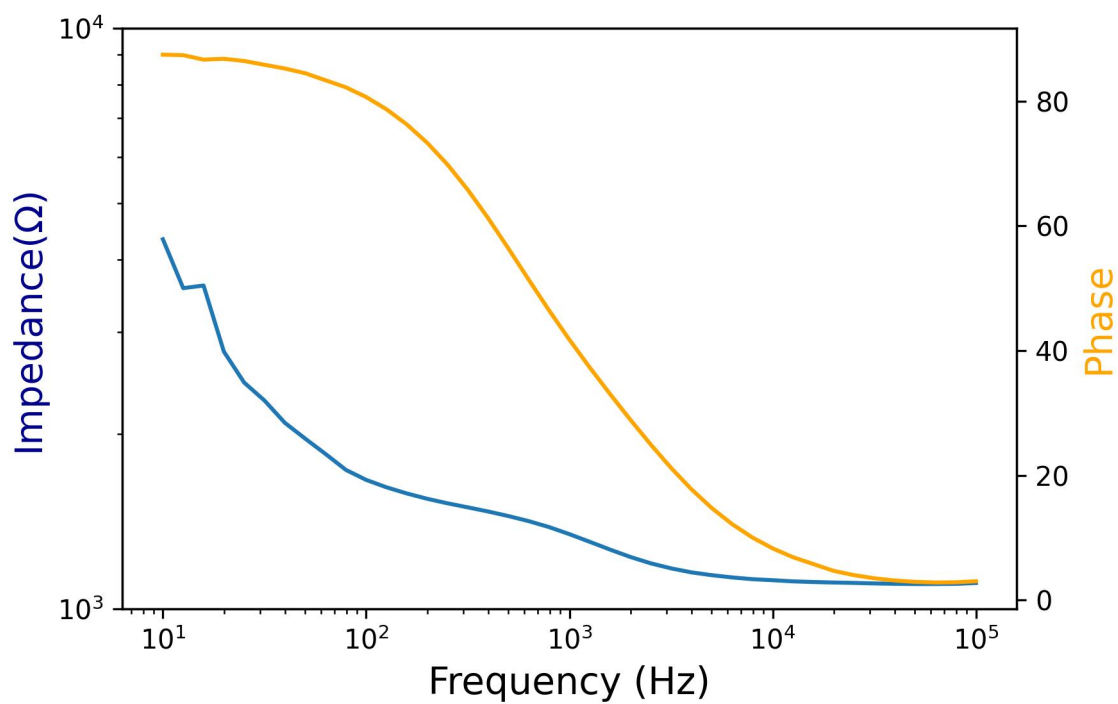


Figure S2 - A representative Bode plot for a single i360 electrode, derived from frequency response analysis

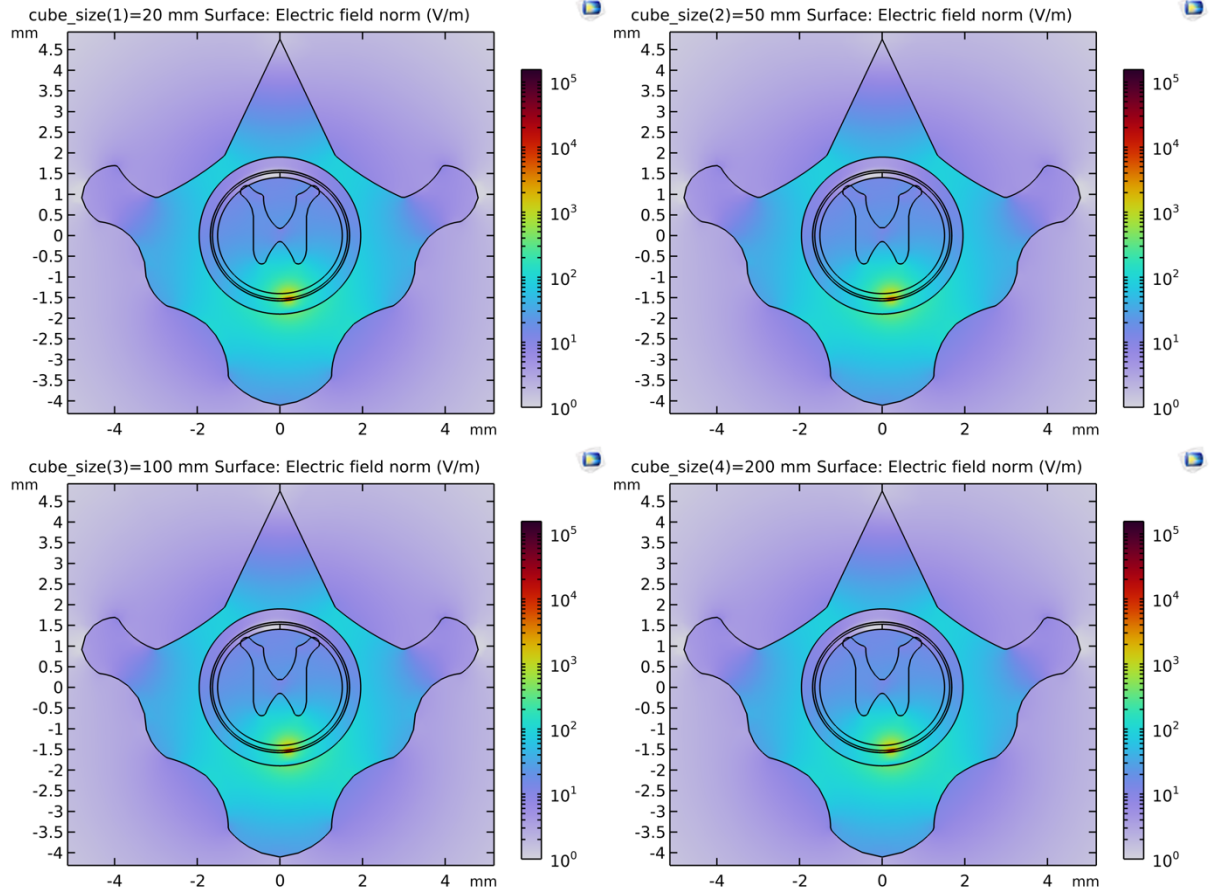


Figure S3 - Simulation experiment investigating the effect that global grounding distance has on stimulation spread

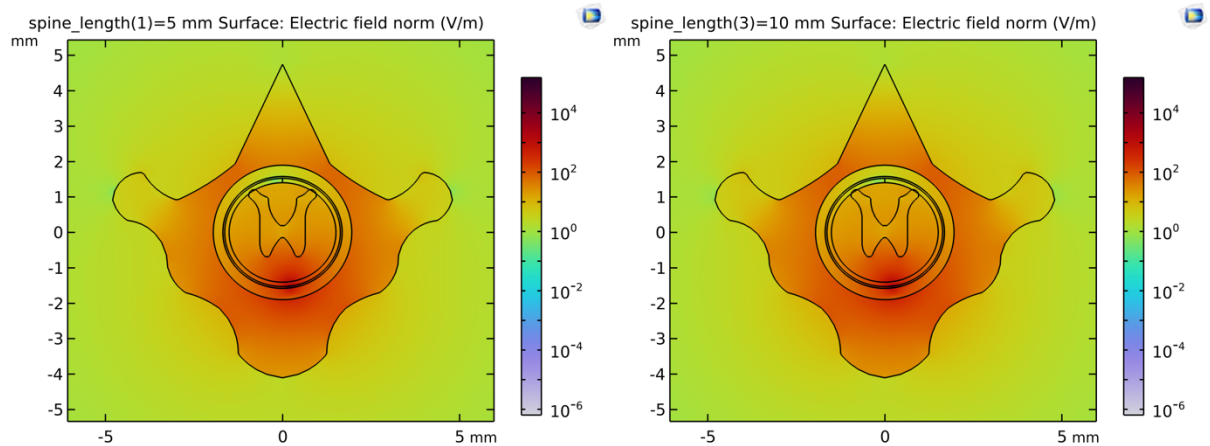


Figure S4 - Simulation experiment investigating the effect that spinal cord length has on stimulation spread

In order to verify that the size of the grounded box surrounding the spine model and the spine length does not influence the electric field distribution within the spine, the simulation for a 200 μA injection current was repeated for box sizes of (50 x 50) mm^2 , (50 x 50) mm^2 , (100 x 100) mm^2 , and (200 x 200) mm^2 and for a spine length of 5 mm, 8 mm, and 10 mm. Figure XXXX shows the results.

Figure S5 - Conductivities of the spinal model used for simulation studies.

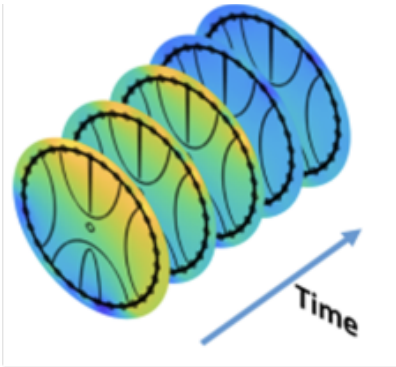


Figure 6 - Temporal representation of evolved neural recordings.

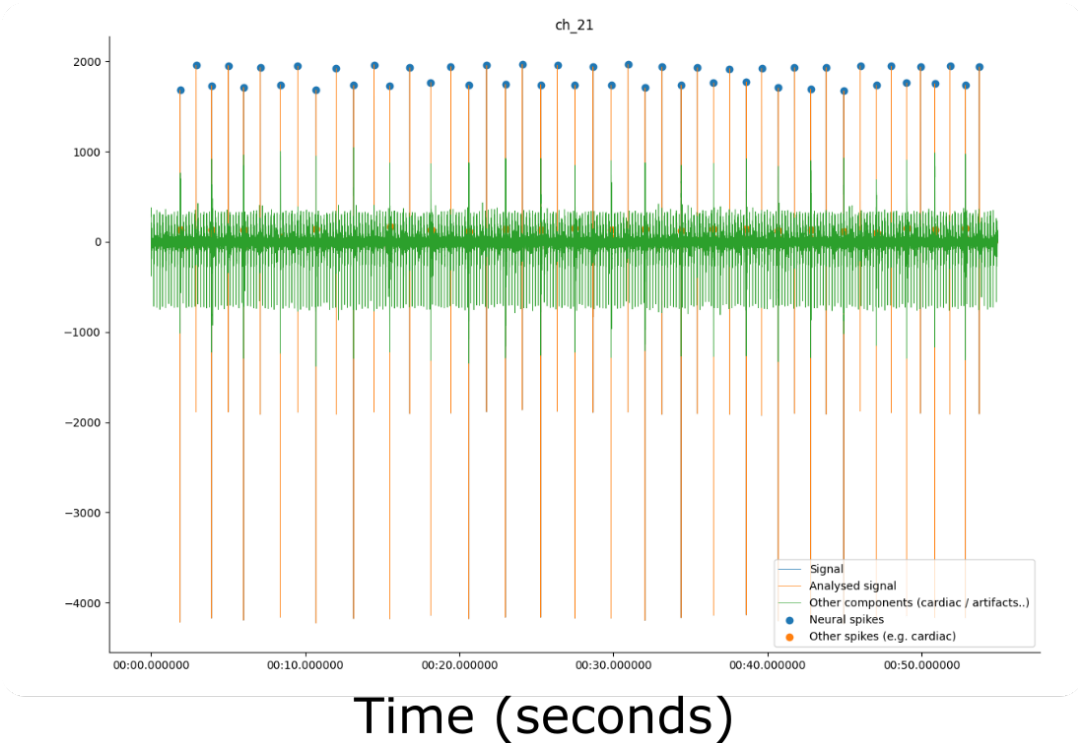
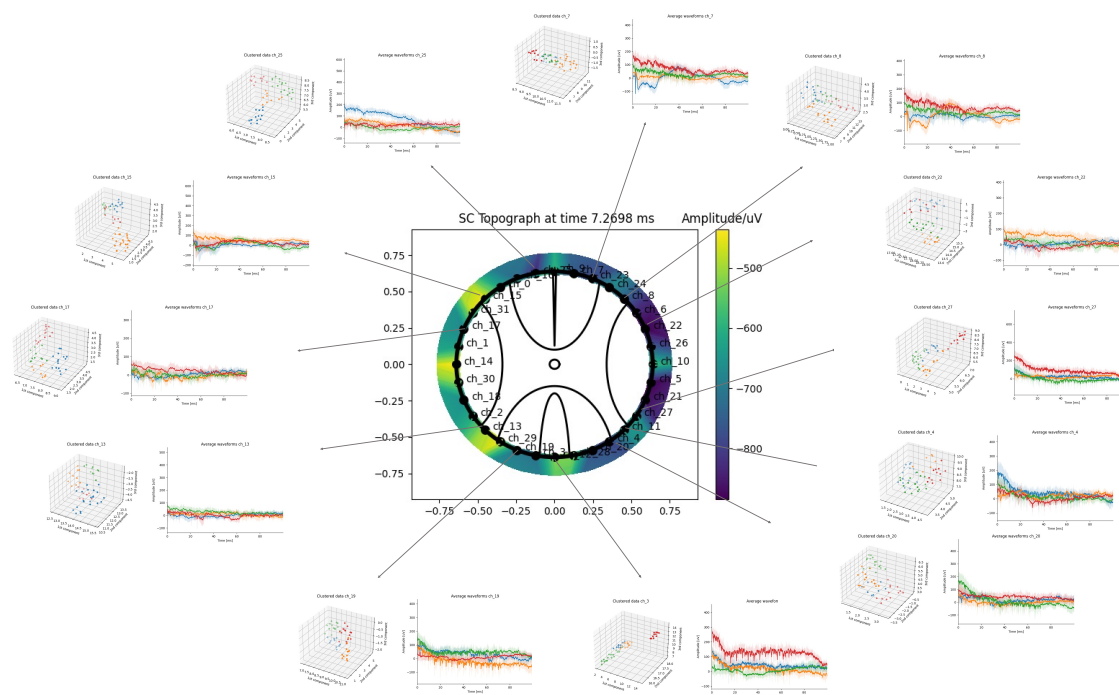


Figure S7 - Wavelet decomposition analysis showing neural signals labelled in blue and other signals labelled in orange. Here other signals are dominated by cardiac peaks.

Left SEP, Right SEP, Left MEP, Right MEP



42

Figure S8 - Principal component analysis of the spinal cord recordings. Multiple recordings are shown during an experiment in which four inputs were used: Left sensory, right sensory, left motor, and right motor.

44

Peroneal vs tibial stimulation

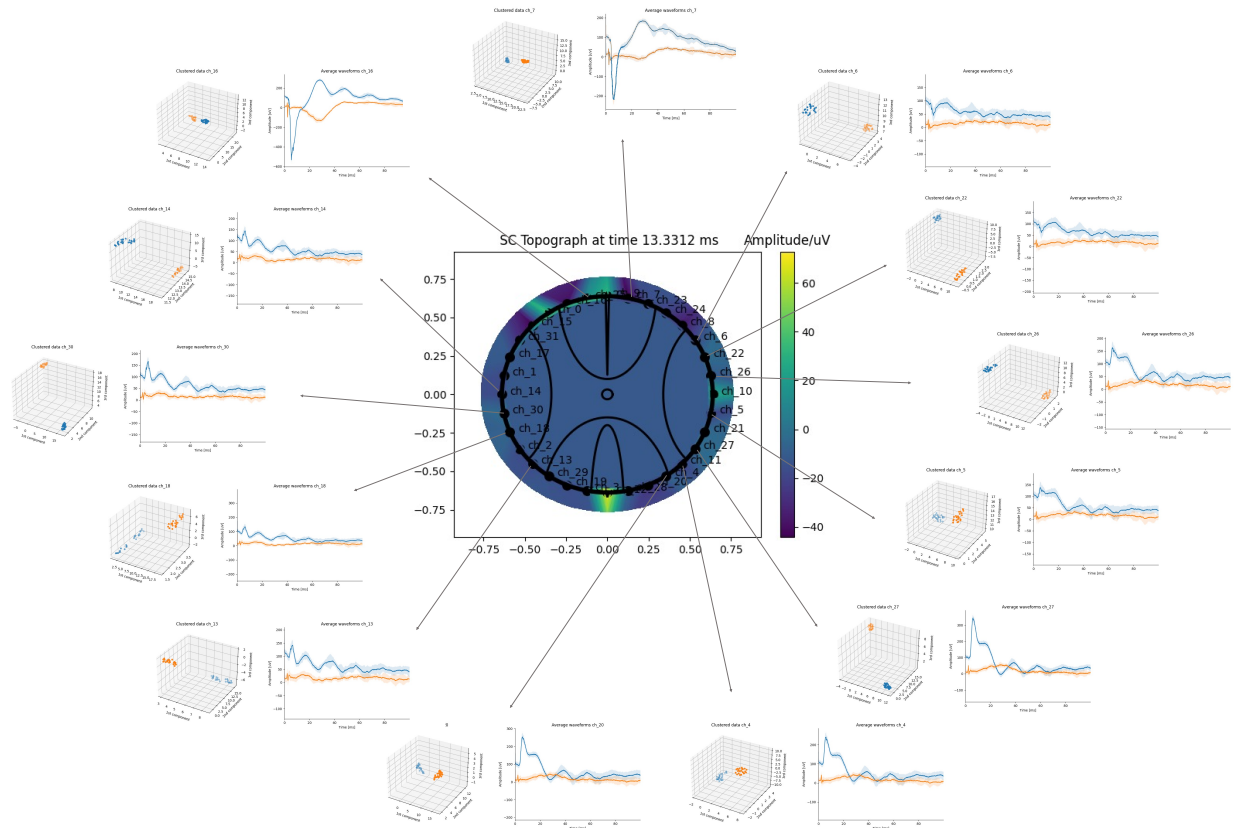


Figure S9 - Principal component analysis of the spinal cord recordings. Multiple recordings are shown during an experiment in which two sensory inputs were used: Peroneal and Tibial tonic stimulation using a hook electrode.