

Supplementary Information

A Comb-Shaped, Silicone-Scaffolded Hydrogel Electrode for Stable Overnight EEG Acquisition in Assistive BCI Applications

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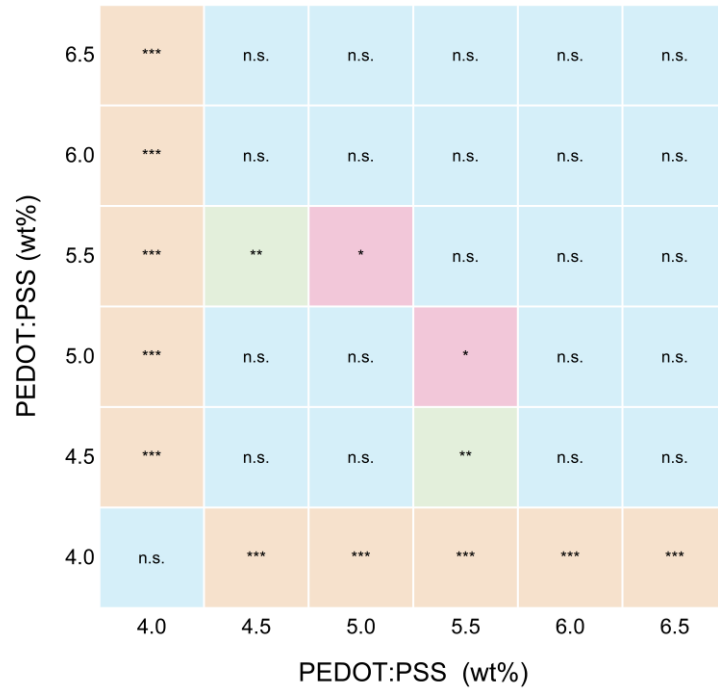


Fig. S1 Statistical comparison of impedance at 10 Hz for hydrogel formulations with different PEDOT:PSS concentrations (4.0-6.5 wt%).

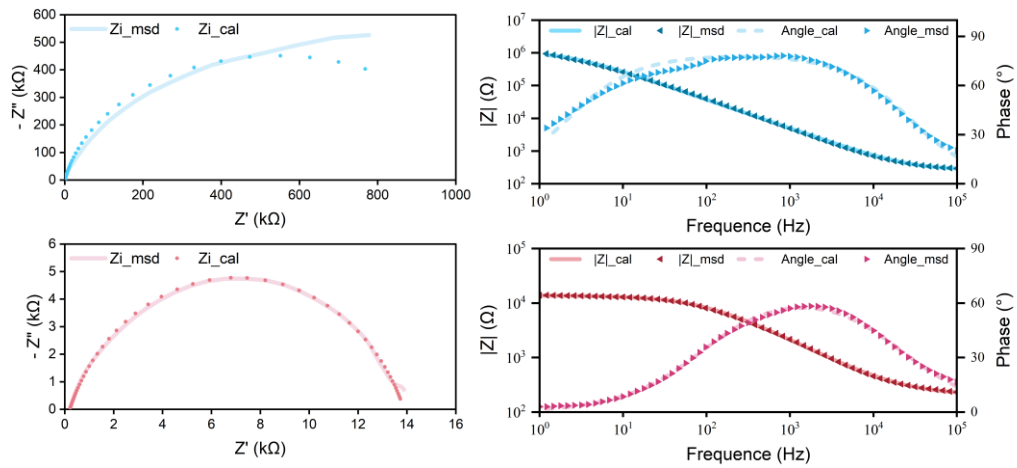
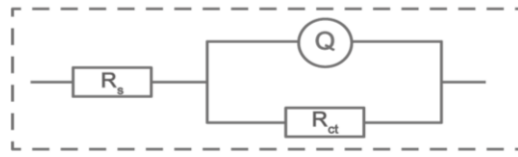


Fig. S2 Measured and fitted electrochemical impedance spectra of hydrogel electrodes without (blue) and with (red) PEDOT:PSS (5.5 wt%). Equivalent circuit fitting was performed using the R(QR) model.



	0.0 wt% PEDOT:PSS	5.5 wt% PEDOT:PSS
R_s	264.9	203.5
R_{ct}	1.12E6	1.37E4
Y_0	9.19E-09	5.25E-7
n	0.88	0.78

Fig. S3 Charge transfer resistance (R_{ct}) of hydrogels with different PEDOT:PSS concentrations.

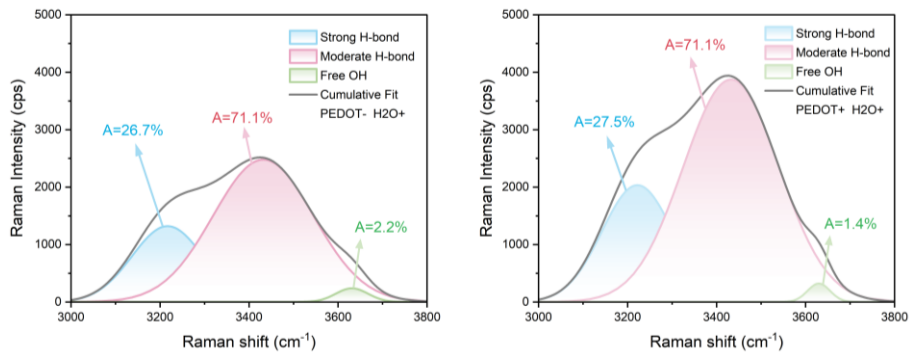


Fig. S4 Deconvolution of the O-H stretching band for hydrogels with and without PEDOT:PSS.

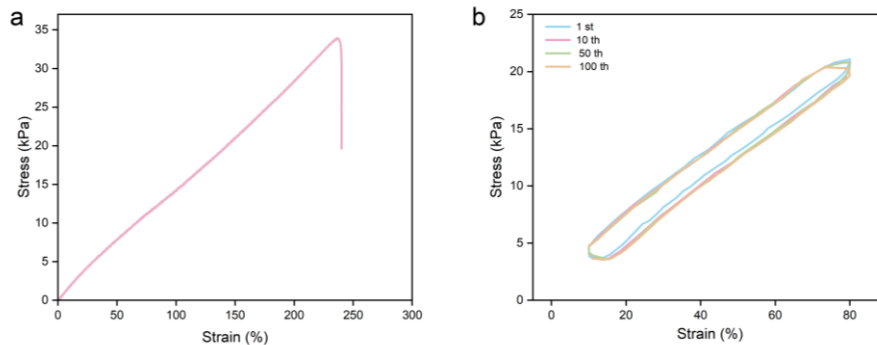


Fig. S5 Mechanical properties of the silicone scaffold (Ecoflex 00-30). (a) Stress-strain curve under uniaxial tensile loading. (b) Cyclic tensile loading-unloading curves over 100 cycles.

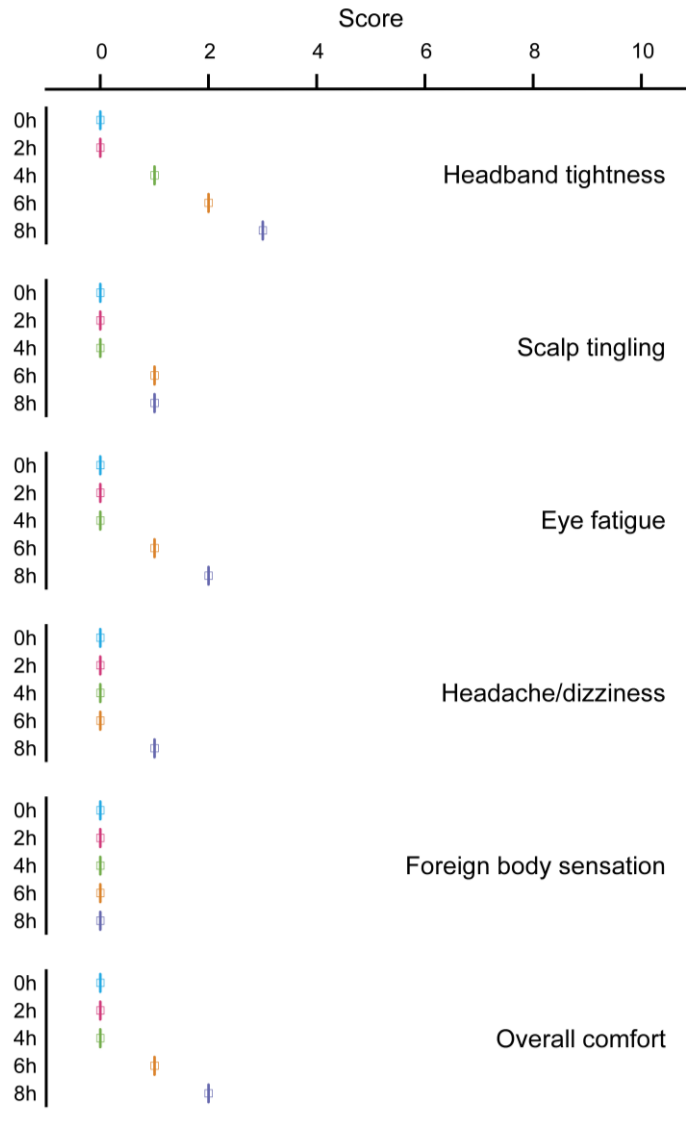


Fig. S6 Visual analog scale (VAS) scores for wearing comfort evaluation. The scores range from 0 to 10, where 0 indicates no discomfort, 1-3 mild discomfort, 4-6 moderate discomfort, 7-9 severe discomfort, and 10 extreme discomfort. The table shows the scores for headband tightness, scalp tingling, eye fatigue, headache/dizziness, foreign body sensation, and overall comfort at 0, 2, 4, 6, and 8 hours.