

Supplementary material

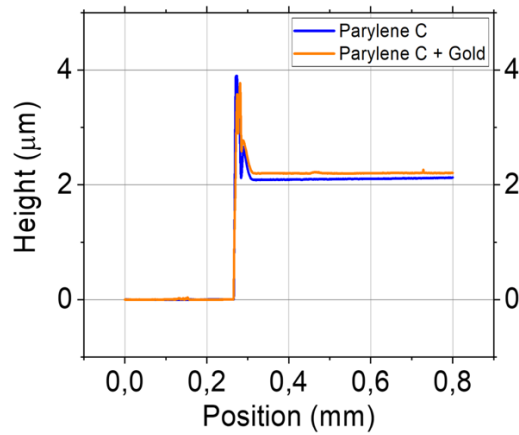


Figure S1. Profile measurements of the ultra-thin Parylene C membrane (blue curve) and ultra-thin gold-on-Parylene C film (orange curve).

Table S1. Thickness of Parylene C and gold films measured by mechanical profilometry, reported as mean $\pm$ standard deviation ($n = 3$ independent samples).

Material	Height profile (mean)	Height profile (standard deviation)
Parylene C	2.13 μm	0.023 μm
Gold	130 nm	20 nm

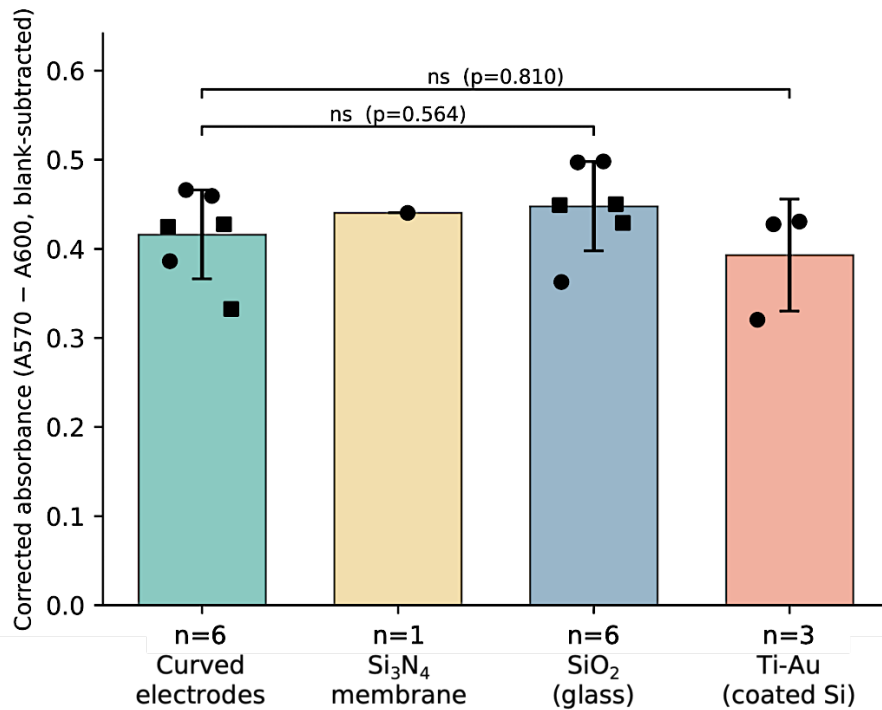


Figure S2. Biocompatibility evaluation of the curved electrode substrates. Quantitative analysis of the corrected absorbance values extracted from the PrestoBlue assay. Bars: mean $\pm$ s.d.

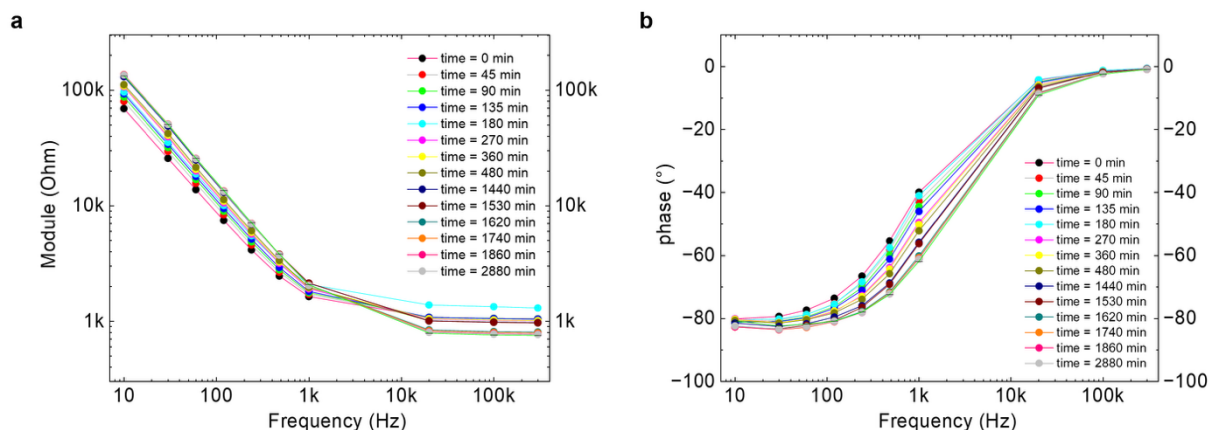


Figure S3. Temporal evolution of the electrical impedance of a representative ultrathin Au/Parylene C electrode during 48 h of continuous immersion in PBS. **(a)** Impedance magnitude, $|Z|$, and **(b)** phase angle, ϕ .

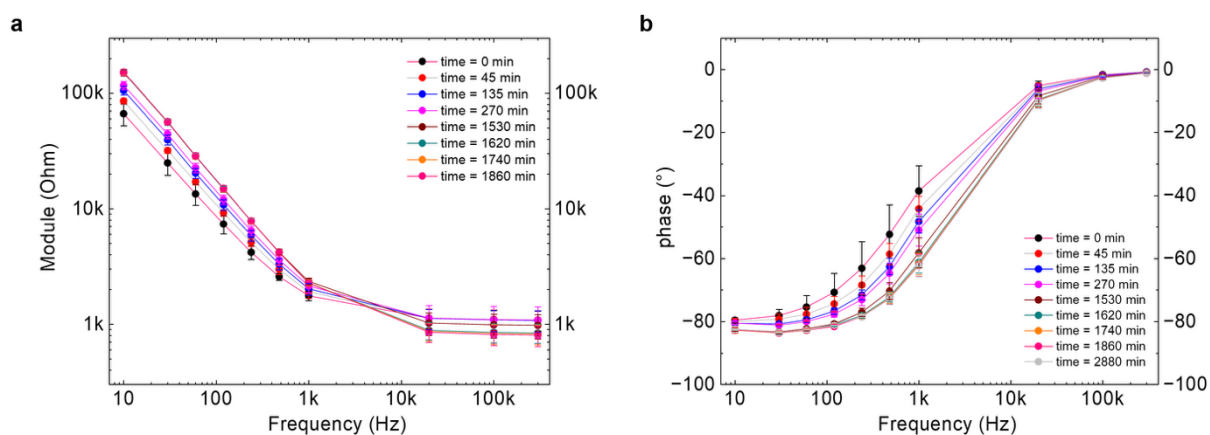


Figure S4. Reproducibility of the electrical impedance response of ultrathin Au/Parylene C electrodes during 48 h of continuous immersion in PBS. **(a)** Mean impedance magnitude, $|Z|$, and **(b)** mean phase angle, ϕ , obtained from five different electrodes. Error bars represent standard deviation ($n=5$ electrodes).

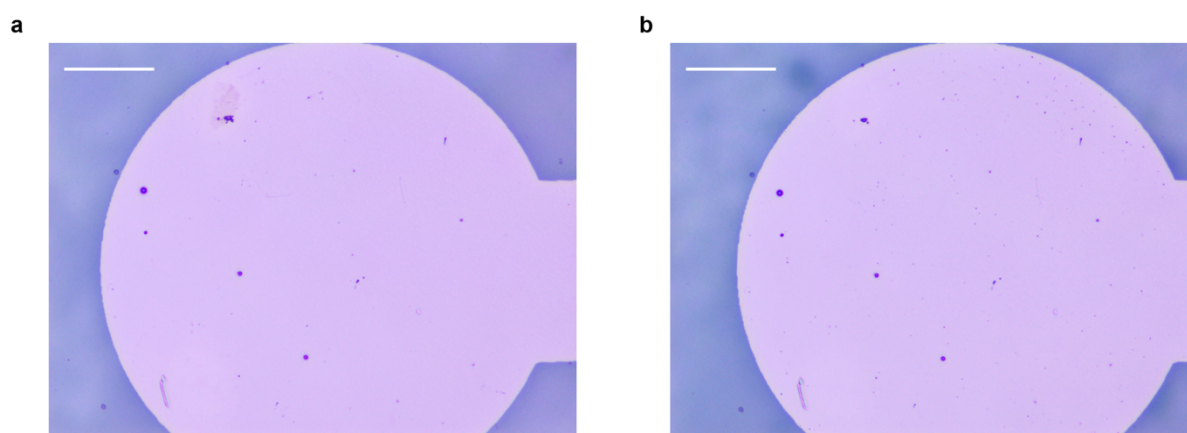


Figure S5. Representative optical microscopy images of the Au/Parylene C electrode acquired **(a)** before and **(b)** after 48 h of immersion in PBS. Scale bars: 100 μm .

Table S2. Comparison between the present platform and flexible/wearable wound monitoring systems and planar ECIS.

	This work	Ref. 1	Ref. 2	Ref. 3	Ref. 4
Electrode	Au, $r = 100\ \mu\text{m}$, $500\ \mu\text{m}$ pitch	Mo, bioresorbable	temperature sensor	Au ink	Au, $250\ \mu\text{m}$ diam. (8W1E)
Substrate / thickness	Parylene C, $2.1\ \mu\text{m}$	PLGA/bioresorbable polymer, tens of μm	PDMS-encapsulated flexible electronics	Polymide, $0.3\ \text{mm}$	Rigid polycarbonate/glass
Fabrication	Photolith. + wet etch on carrier, wet transfer	Laser cutting / transfer printing	Flexible PCB + PDMS	Screen printing	Photolith. on rigid
Conformability	Transferred onto curved lens	Conformal to mouse skin	Flexible dressing	Flexible dressing	Planar only
Spatial resolution	Single pair / wound; multiple pairs	Single pair	Single-point T	None	Single electrode/well
Modality	Plateau current, $10\ \text{mV}$ step, $5\ \text{Hz}$	Impedance + electrotherapy, wireless	Temperature	Bipolar AC impedance	Impedance $4\ \text{kHz}$ – $64\ \text{kHz}$
Configuration	Front-facing electrode pair,	2-electrode, NFC	Resistive	2-electrode, wireless	2-electrode vs large CE
Validation	In vitro, HEK-293, curved	In vivo, diabetic mouse	In vivo, rat wound	In vivo diabetic mice	In vitro, planar
Temporal resolution	3-6 h, 36 h total	Continuous (daily readouts)	Real-time	30s, 24 days	Minutes
Parameter	Ionic conductance	Exudate conductivity	Wound temperature	$ Z $ at $20\ \text{kHz}$	Cell coverage/impedance
Optical access	Yes	No	No	No	No

References

1. Song et al., Sci. Adv. 2023, 9, eade4687. DOI: 10.1126/sciadv.ade4687.
2. Pang et al., Adv. Sci. 2020, 7, 1902673. DOI: 10.1002/advs.201902673.
3. Yang, R, et al. Lab Chip 2026, 26 (18): 5075–5087. DOI: 10.1039/d6lc00270f.
4. Keese et al., PNAS 2004, 101, 1554 (ECIS). DOI: 10.1073/pnas.0307588100.