Supporting Information

Pectin-based flexible bioelectrodes for EMG signal recording

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Fig. S1. The circular disc electrode automatically generates crevices during room temperature drying process which indicate poor interfacial adhesion between pectin and PANI-ES.

Introducing glycerol into the Pectin/PDMS composite results in the development of micropores on the surface, as shown in **Fig. S2(d).**

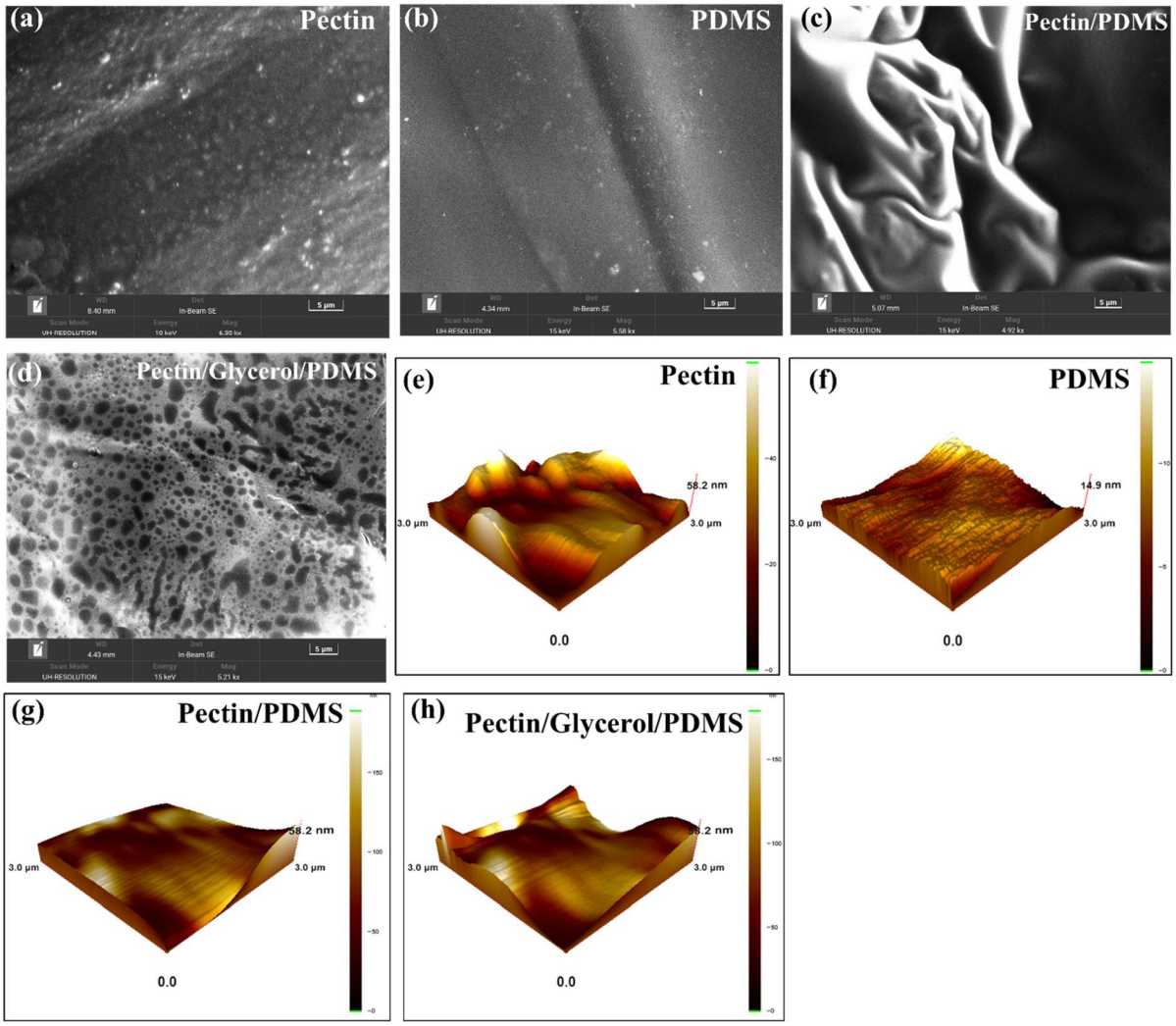


Fig. S2. (a-d) SEM and (e-h) 3D AFM images of Pectin, PDMS, Pectin/PDMS, and Pectin/Glycerol/PDMS

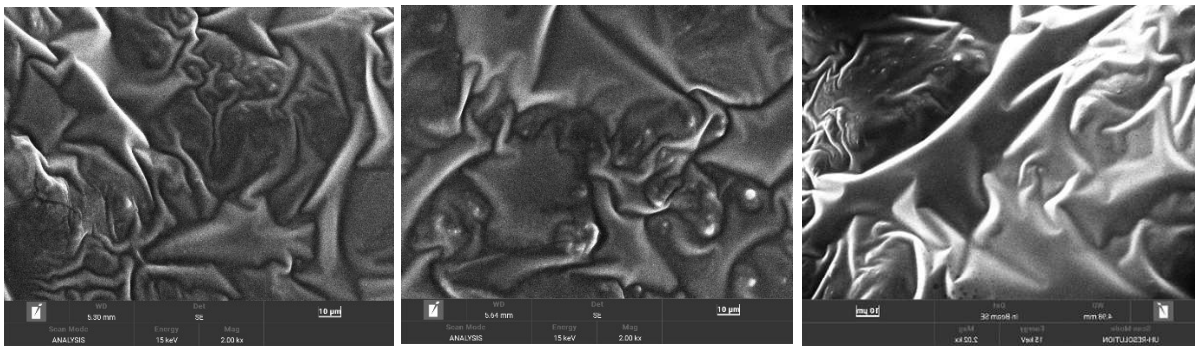


Fig. S3. SEM images of the PPGP electrode acquired from three randomly selected regions across the surface of the same sample.

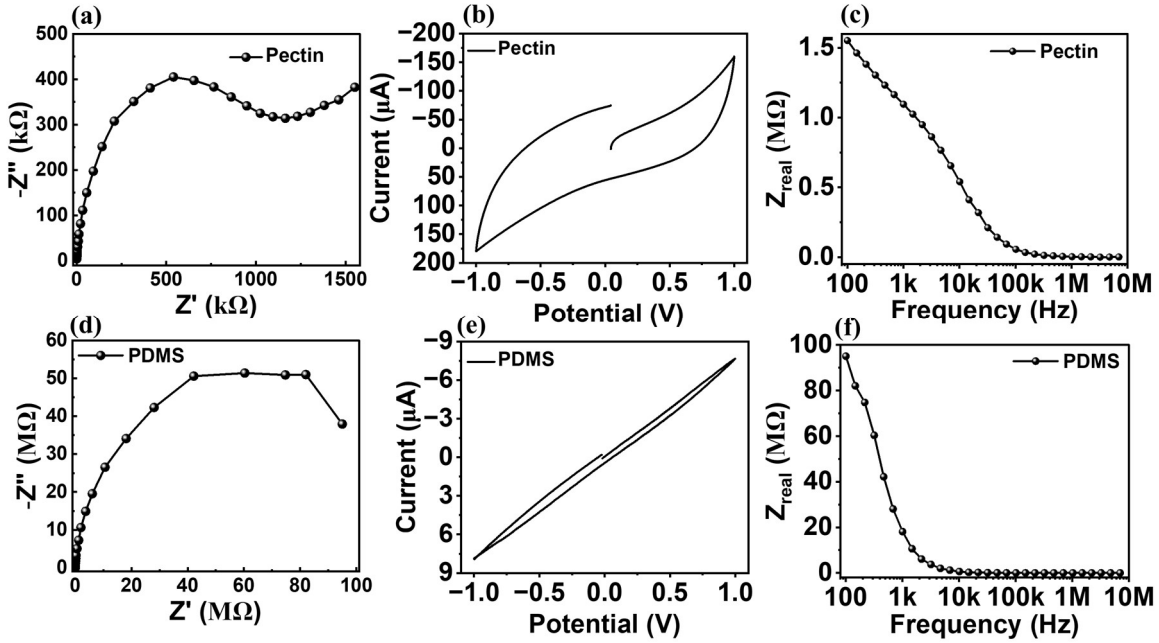


Fig. S4. (a) Nyquist plot (b) cyclic voltammogram (c) real impedance vs. frequency plot of a pectin only. (d) Nyquist plot (e) cyclic voltammogram (f) real impedance vs. frequency plot of a PDMS only

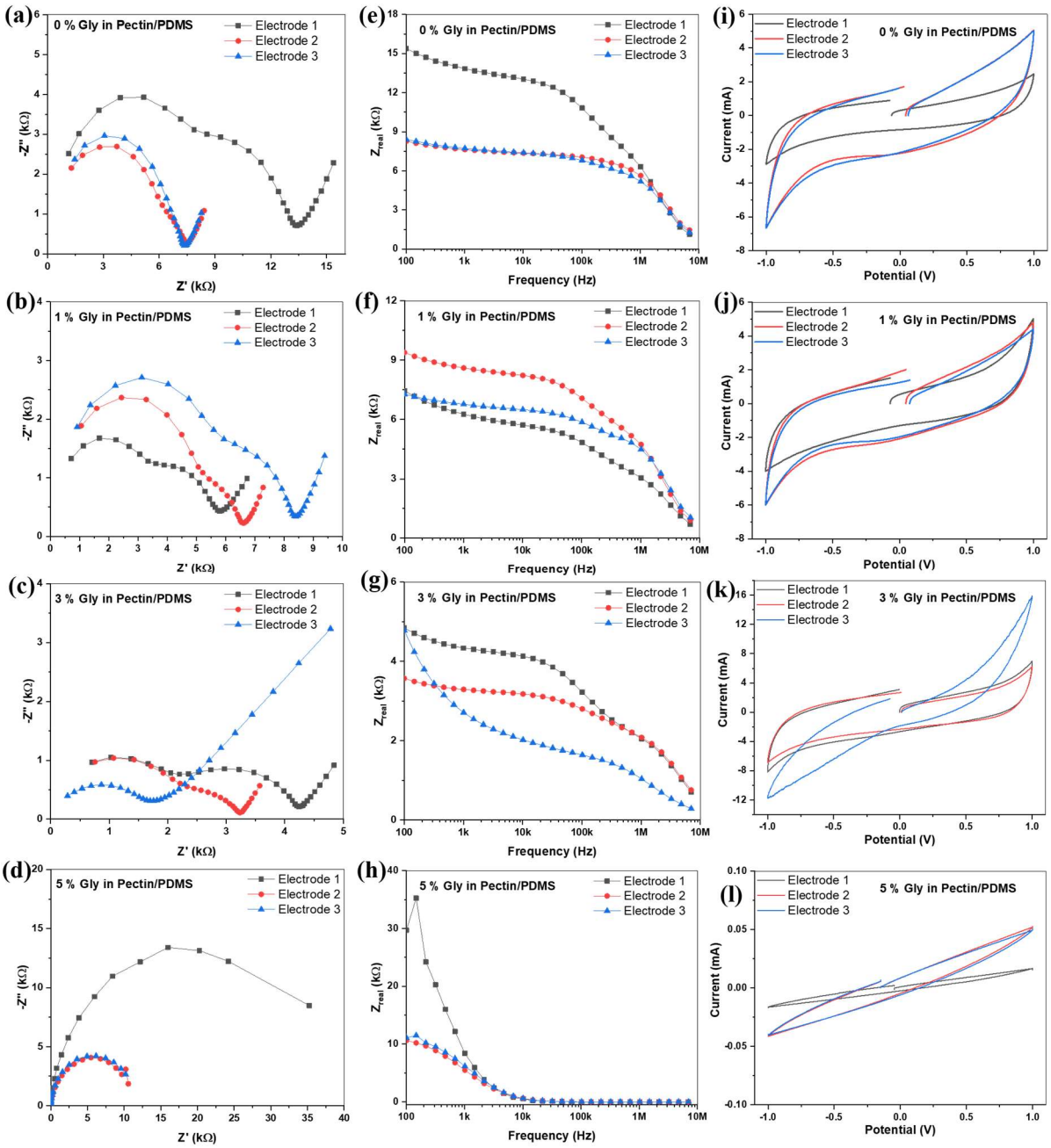


Fig. S5. Varying percentages of glycerol (0, 1, 3, and 5 %) in Pectin/PDMS. (a-d) Nyquist plot (e-h) Real impedance vs. frequency spectra to determine the real impedance at 1 kHz frequency (i-l) cyclic voltammogram

Table S1. Electrode composition for glycerol-modified Pectin/PDMS electrodes

Pectin %	PDMS %	Gly %	Bulk Res. (kΩ)	Z at 1 kHz (kΩ)	Conductivity (S/cm)	CSC ($\mu C/cm^2$)
78	22	0	1.29 ± 0.16	9.73 ± 3.55	$(1.98 \pm 0.25) \times 10^{-4}$	99 ± 40
77	22	1	0.89 ± 0.17	7.21 ± 1.23	$(2.94 \pm 0.60) \times 10^{-4}$	101 ± 16
75	22	3	0.58 ± 0.25	3.44 ± 0.82	$(5.25 \pm 3.07) \times 10^{-4}$	179 ± 57
73	22	5	0.36 ± 0.11	6.68 ± 1.53	$(7.43 \pm 2.21) \times 10^{-4}$	0.75 ± 0.31

Note: All values were calculated from three independently fabricated replicates for each formulation to ensure statistical reliability. All experimental data are presented as mean ± standard deviation (n = 3)

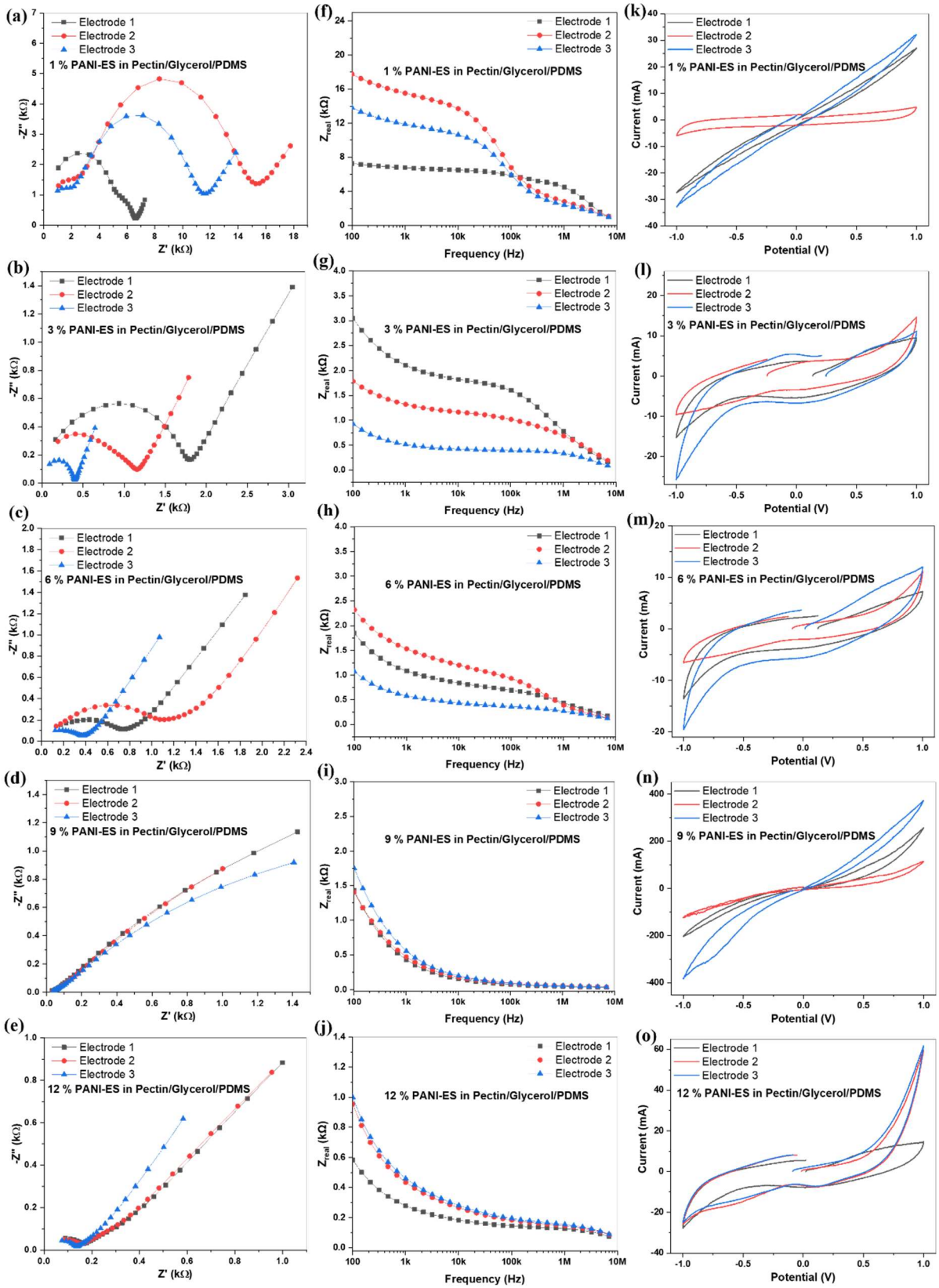


Fig. S6. Varying percentages of PANI-ES (1, 3, 6, 9, and 12 %) in Pectin/PDMS/Glycerol composite. (a-e) Nyquist plot (f-j) Real impedance vs. frequency spectra to determine the real impedance at 1 kHz frequency (k-o) cyclic voltammogram

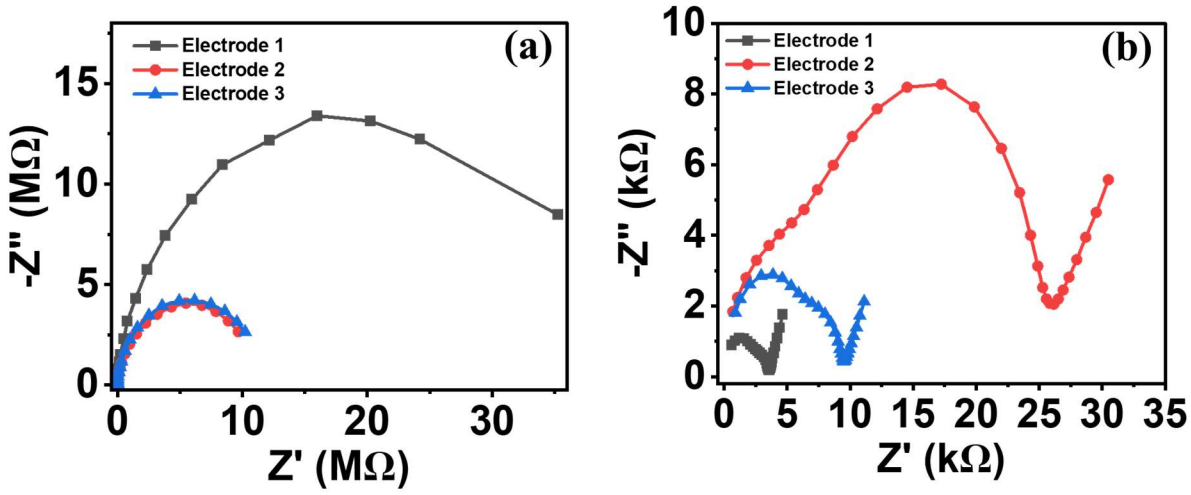


Fig. S7. Nyquist plot of 3 different electrodes of (a) Pectin/PDMS and (b) Pectin/Glycerol/PDMS.

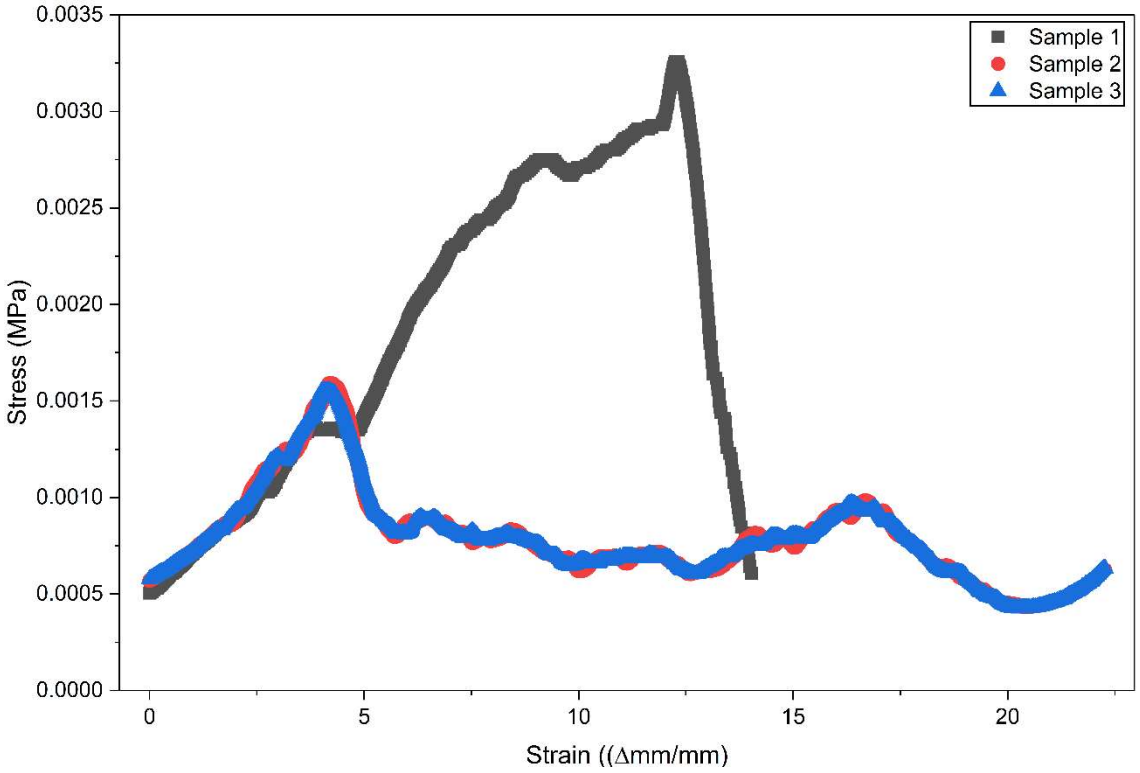


Fig. S8. Stress-strain curve of three different PPGP electrodes.

Table S2. Young's Modulus of three different electrodes

Electrodes	Young's Modulus	Reference
Sample 1	0.31	This Work
Sample 2	0.065	This Work
Sample 3	0.175	This Work