Supplementary

Dependence of Skin-Electrode Contact Impedance on Material and Skin Hydration

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Table S1. Impedance model fitting parameters obtained for impedance response across SS electrodes of 4 cm^2 and 9 cm^2 area electrodes on a dry phantom. R_d and R_{sc} represent the resistance of the deeper tissue layer and stratum corneum respectively. Constant phase element CPE_{sc} and exponent α represent stratum corneum capacitance and CPE_c and exponent β represent contact capacitance. Values in the Table are shown as computed ± error.

Electrode Area (SS and dry)	R_d (kΩ)	R_{sc} (MΩ)	CPE_{sc} (nSs^{α})	α	CPE_c (μSs^{β})	β
4 cm^2	1.77 ± 0.00	1.62 ± 0.00	182 ± 3.77	0.9 ± 0.005	1.02 ± 0.03	0.56 ± 0.003
9 cm2	1.75 ± 0.03	0.70 ± 0.04	500 ± 10.8	0.8 ± 0.011	2.02 ± 0.42	0.56 ± 0.010

Table S2. Impedance model fitting parameters obtained for impedance response across SS and Ti on a dry and hydrated phantom. Impedance normalized to the area is shown. R_d and R_{sc} represent the resistance of the deeper tissue layer and stratum corneum respectively. Constant phase element CPE_{sc} and exponent α represent stratum corneum capacitance and CPE_c and exponent β represent contact capacitance. Values in the Table are shown as computed ± error.

Electrode Material (Phantom Hydration status)	R_d ($k\Omega cm^2$)	R_{sc} ($M\Omega cm^2$)	CPE_{sc} ($nSs^{\alpha}cm^{-2}$)	α	CPE_c ($nSs^{\beta}cm^{-2}$)	β
Ti (dry)	9.3 ± 0.20	6.4 ± 0.36	47.7 ± 1.08	0.9 ± 0.01	424 ± 45.6	0.50 ± 0.012
SS (dry)	9.3 ± 0.00	6.4 ± 0.00	47.7 ± 0.00	0.9 ± 0.00	170 ± 2.75	0.56 ± 0.002
Ti (hydrated)	9.3 ± 0.00	3.0 ± 0.00	200 ± 0.00	0.9 ± 0.00	652 ± 11.1	0.52 ± 0.002
SS(hydrated)	9.3 ± 0.00	3.0 ± 0.00	200 ± 0.00	0.9 ± 0.00	327± 4.65	0.59 ± 0.002

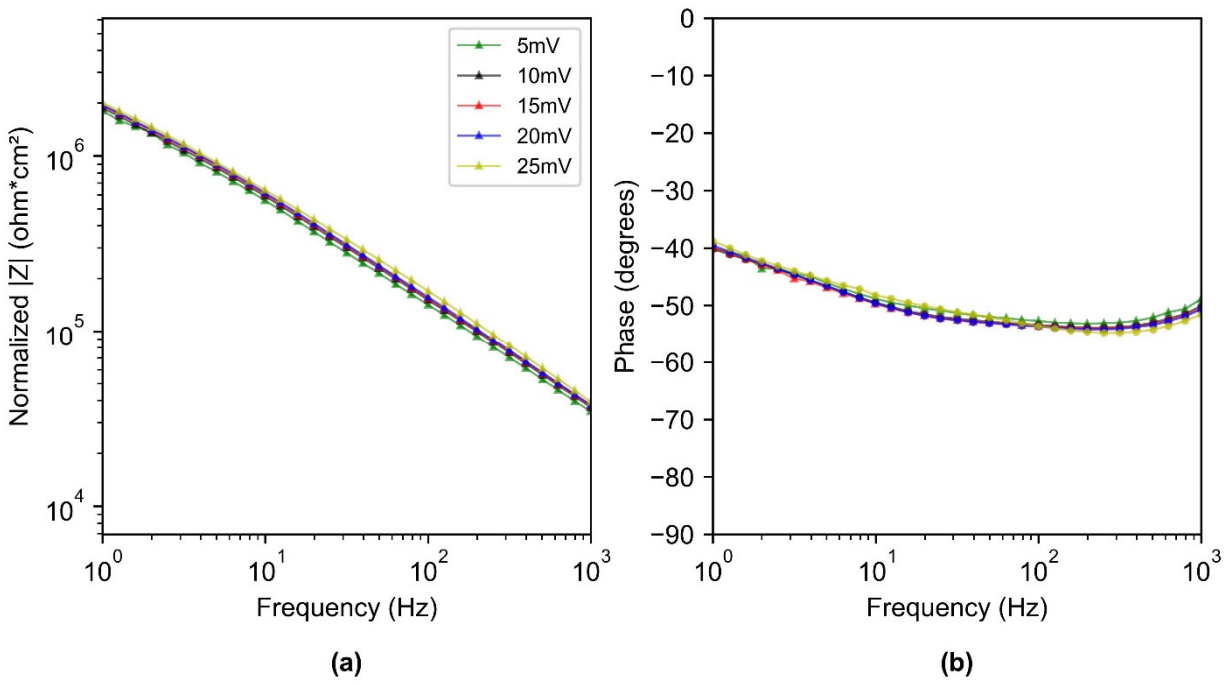

Figure S1. Bode plot depicting the a) normalized impedance magnitude with respect to area and b) phase for SS (9 cm^2) on a hydrated phantom obtained with the excitation voltage of 5 mV, 10 mV, 15 mV, 20 mV and 25 mV.