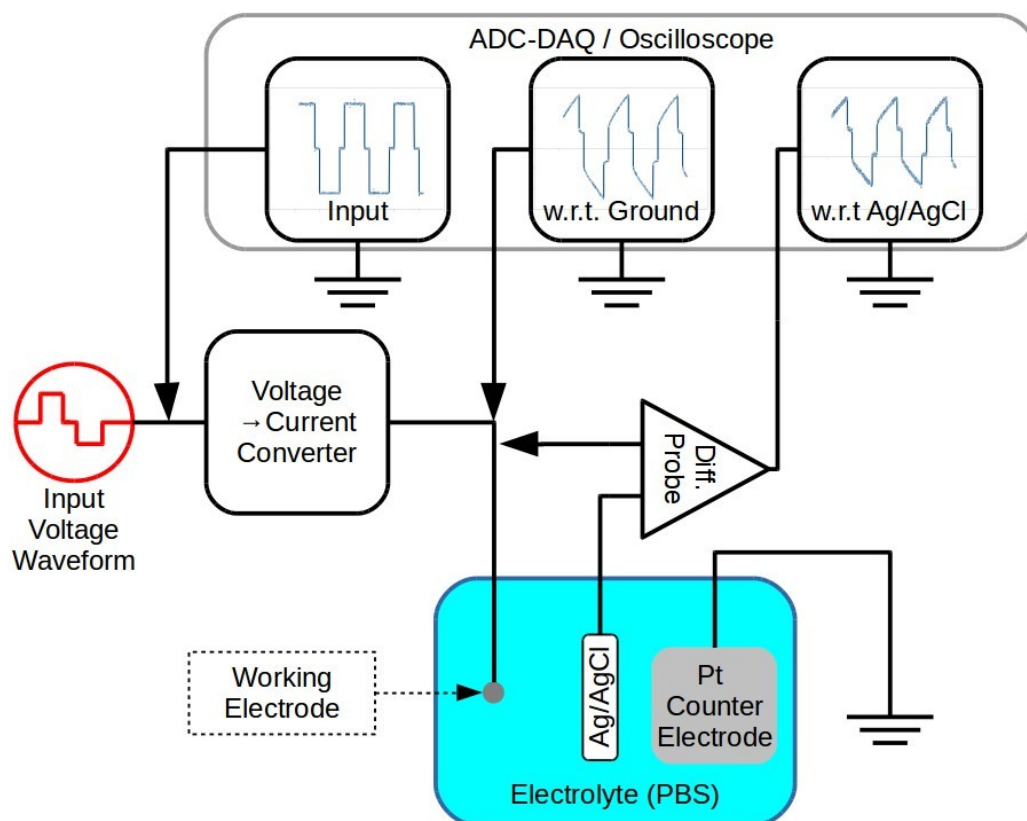


Supplementary Materials

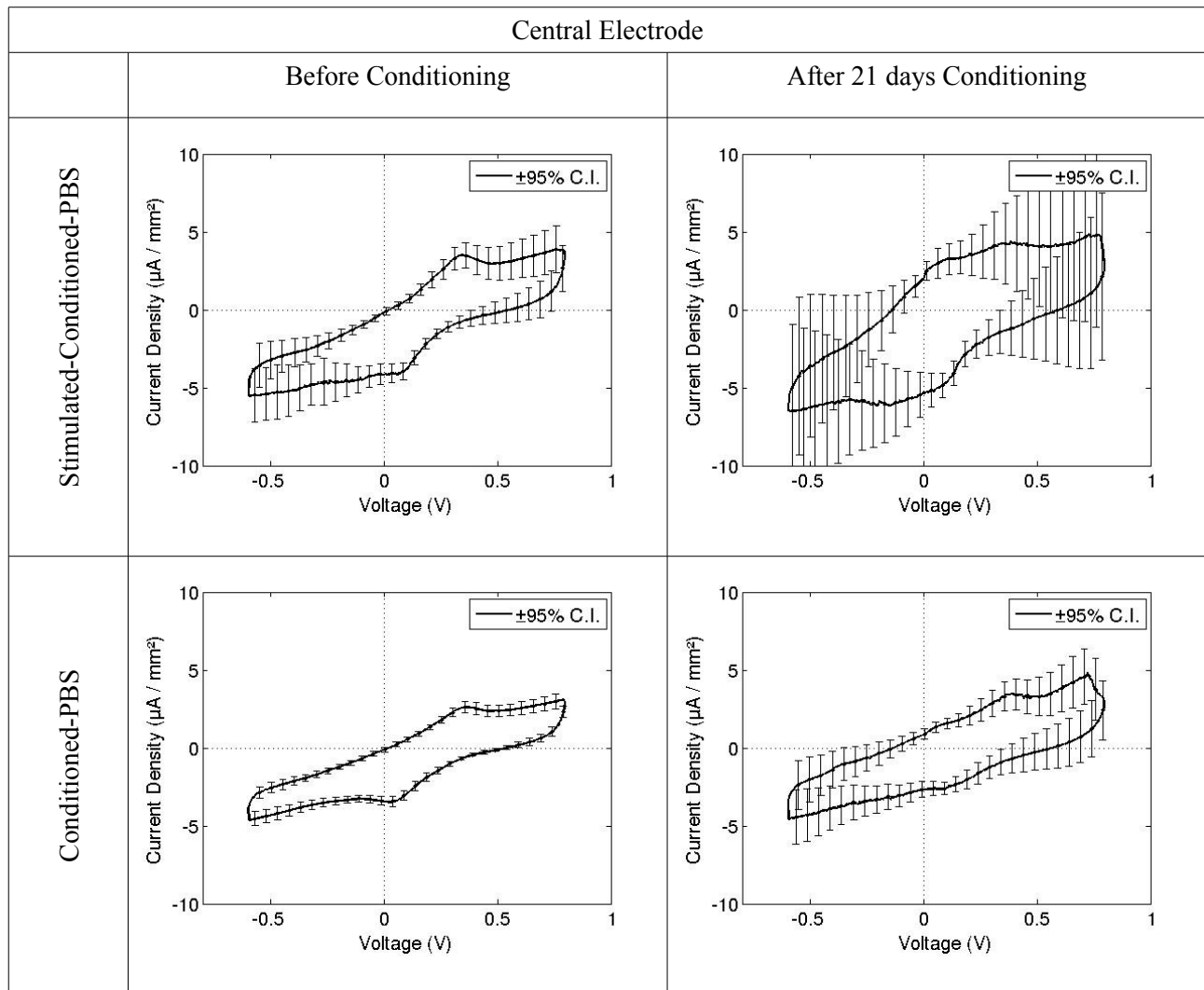
Carnicer-Lombarte A., Lancashire H. T., and Vanhoestenbergh A., 'In vitro biocompatibility and electrical stability of thick-film platinum/gold alloy electrodes printed on alumina'.

Supplementary Methods

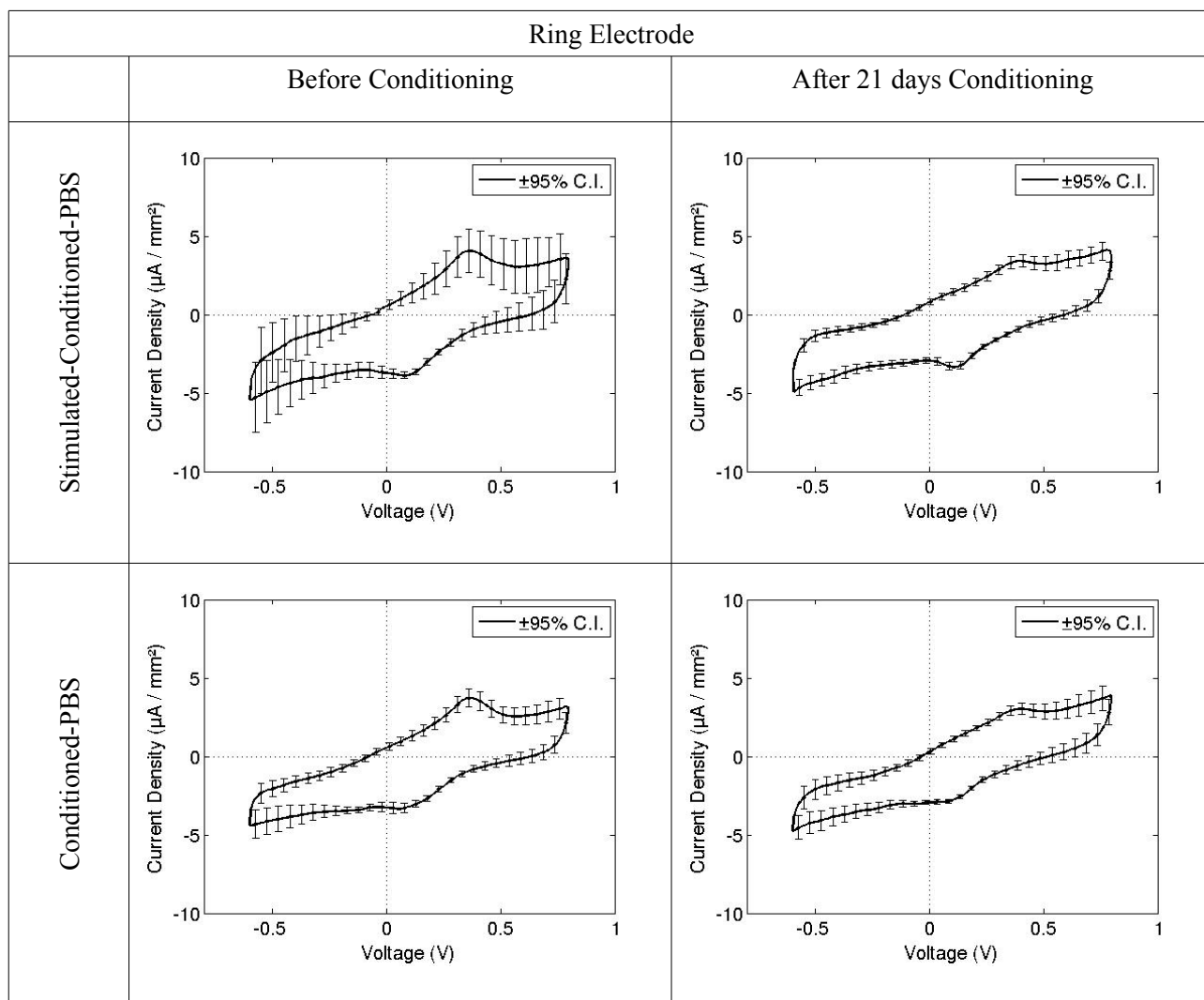


Supplementary Figure 1. Diagram describing charge injection limit measurements. To determine the charge injection capacity, electrode arrays were placed in phosphate buffered saline. Charge controlled biphasic waveforms were applied at 1kHz through the central electrode (working electrode) using an Ag/AgCl reference electrode and a platinum counter electrode. The maximum negative potential excursion (E_{mc}) and maximum positive potential excursion (E_{ma}) were determined from the voltage transient waveform which was measured differentially vs Ag/AgCl (Cogan 2008). The charge injection limit was defined as the charge applied which polarises the electrode to the water window limits, -0.6 V (E_{mc}) or $+0.8\text{ V}$ (E_{ma}) vs. Ag/AgCl. Supplementary figure 6 shows an example voltage transient waveform measured at the working electrode.

Supplementary Results

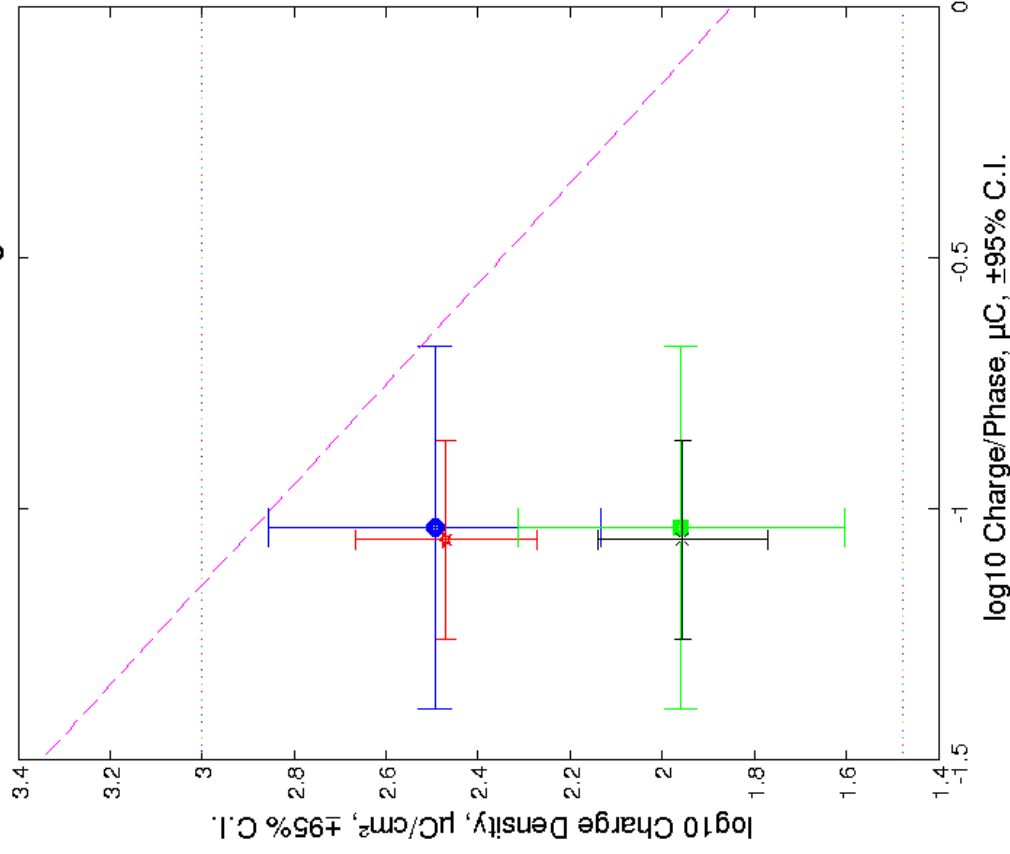


Supplementary Figure 2. Cyclic Voltammetry responses for central electrodes of Pt-Au electrode arrays in phosphate buffered saline. Voltage vs. a saturated calomel electrode. Sweep rate of 50 mV/s. Mean current density \pm 95% confidence intervals are shown, $n = 10$.

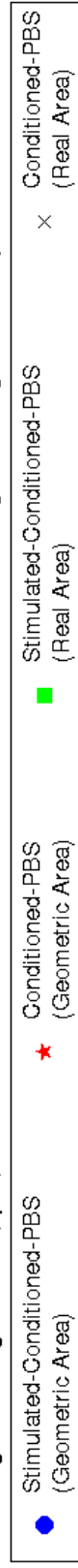
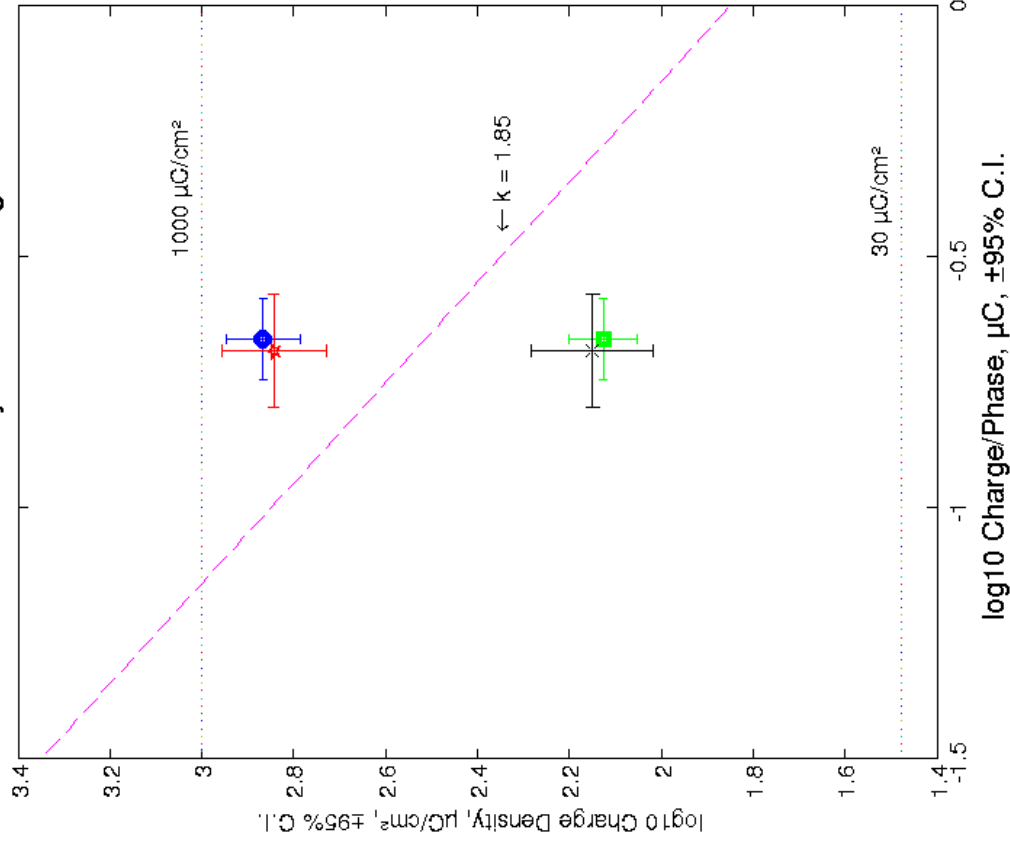


Supplementary Figure 3. Cyclic Voltammetry responses for ring electrodes of Pt-Au electrode arrays in phosphate buffered saline. Voltage vs. a saturated calomel electrode. Sweep rate of 50 mV/s. Mean current density \pm 95% confidence intervals are shown, $n = 10$.

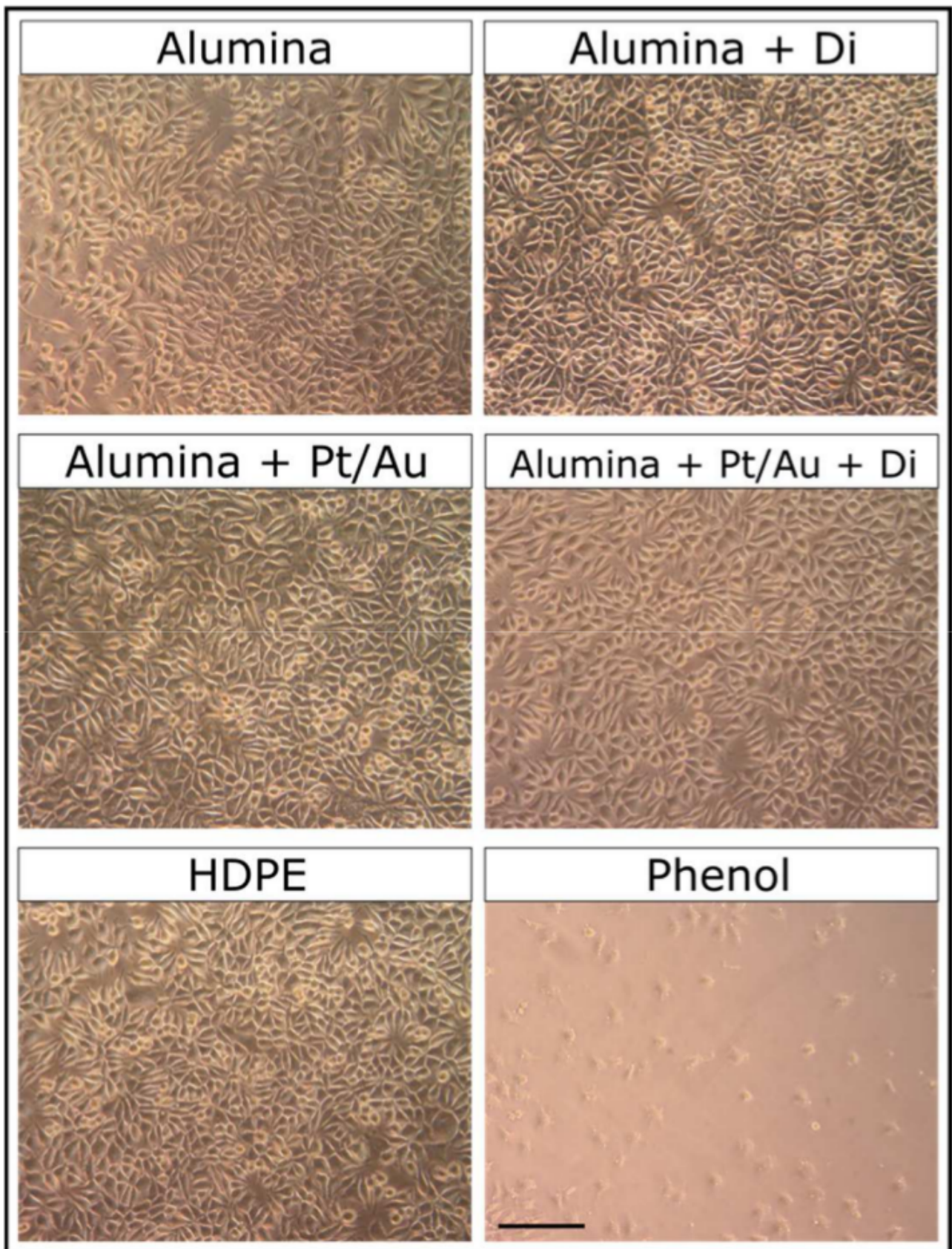
Before Conditioning



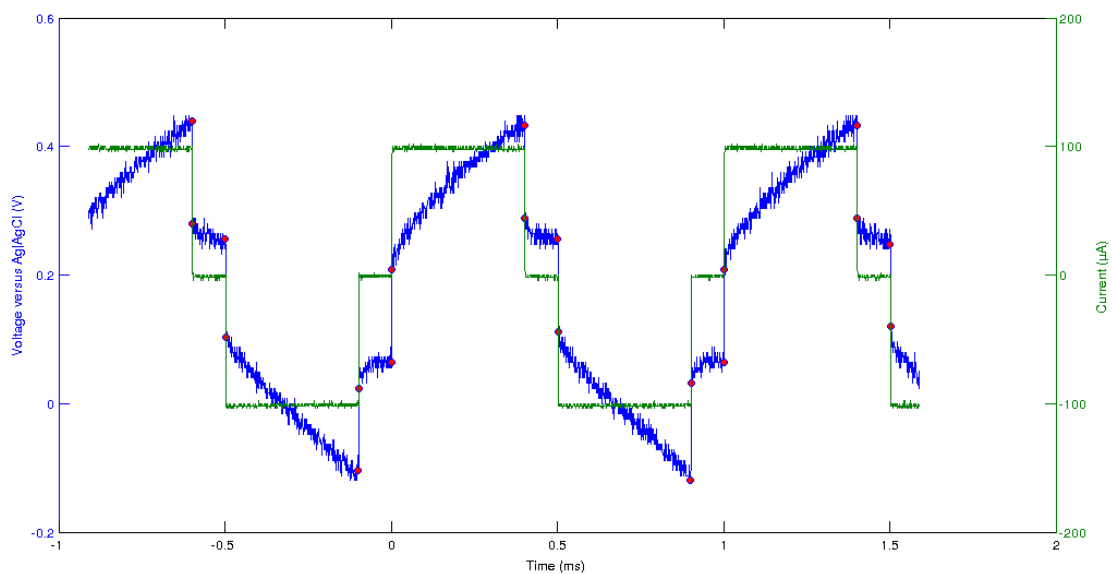
After 21 Days Conditioning



Supplementary Figure 4. Charge injection limits of central electrodes in phosphate buffered saline. Measurements made before and after 21 days conditioning in PBS. Densities reported with respect to geometric area (red, blue) and real area (green, black) calculated by Vertical Scanning Interferometry. Means \pm 95% confidence intervals, n = 5. The effect of stimulation (blue, green) compared with no stimulation (red, black) is shown. A safe charge injection limit, derived from the Shannon Equation using $k = 1.85$ is reported (Shannon 1992, Cogan *et al* 2016).



Supplementary Figure 5. Optical images of representative L929 cell cultures after 48 hours exposure to electrode array extracts. Scale bar: 150 μm . Di = dielectric; Pt/Au = platinum gold alloy; HDPE = high density polyethylene, negative control; Phenol = positive control.



Supplementary Figure 6. Example voltage transient (blue) of Pt/Au electrode in response to at 1 kHz charge balanced square wave of $\pm 100 \mu\text{A}$ with $100 \mu\text{s}$ interphase delay (green). Voltage measured w.r.t. Ag|AgCl reference electrode. Points (red) are marked to determine E_{mc} and E_{ma} .