Electronic Supplementary Material (ESI) for Lab on a Chip


# Electronic Supplementary Information for:

# Rapid and Specific Electrochemical Detection of Prostate Cancer Cells Using an Aperture Sensor Array

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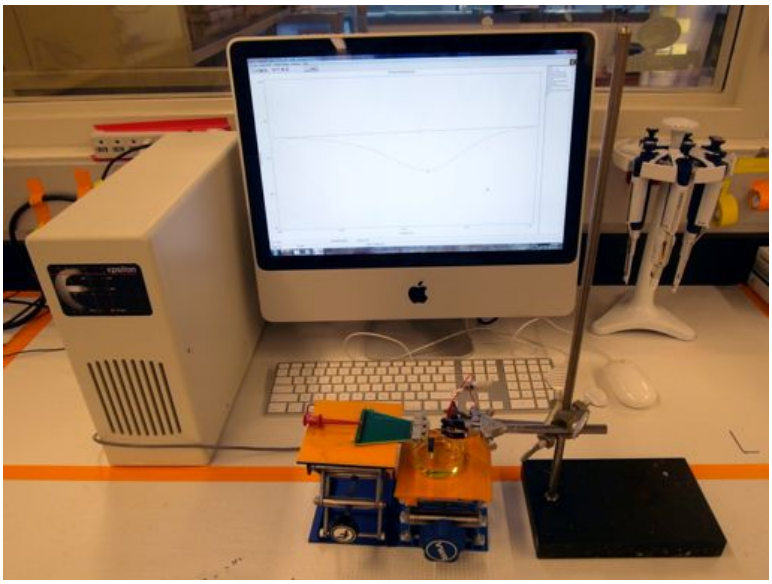
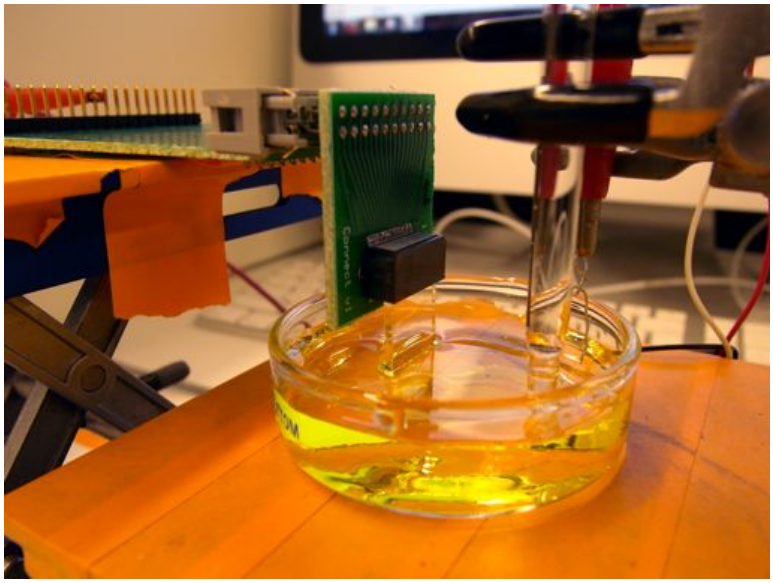
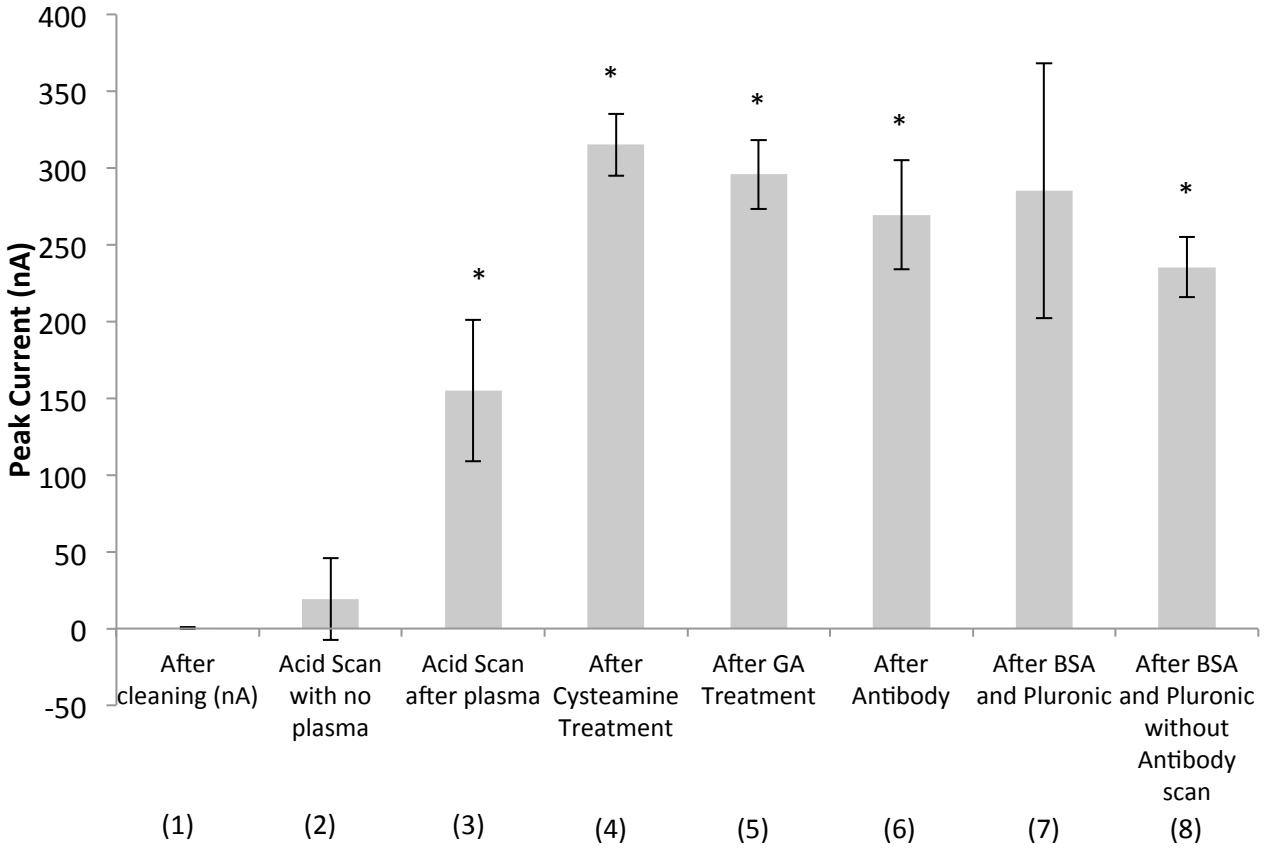
(a)



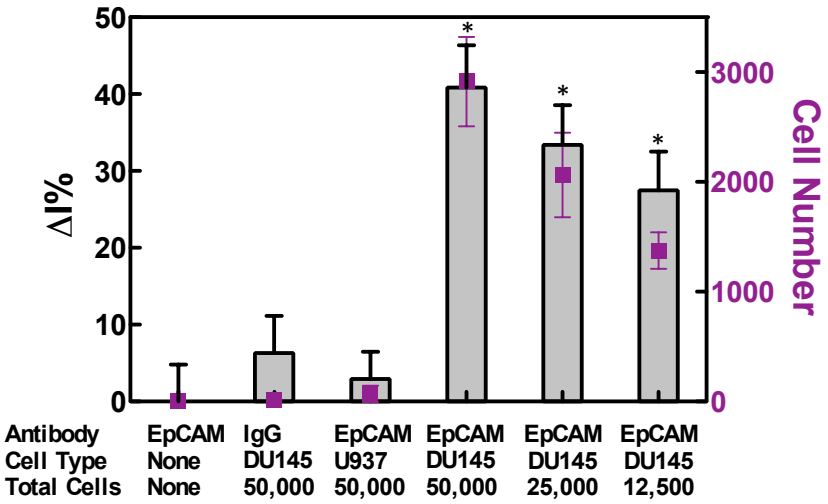
(b)



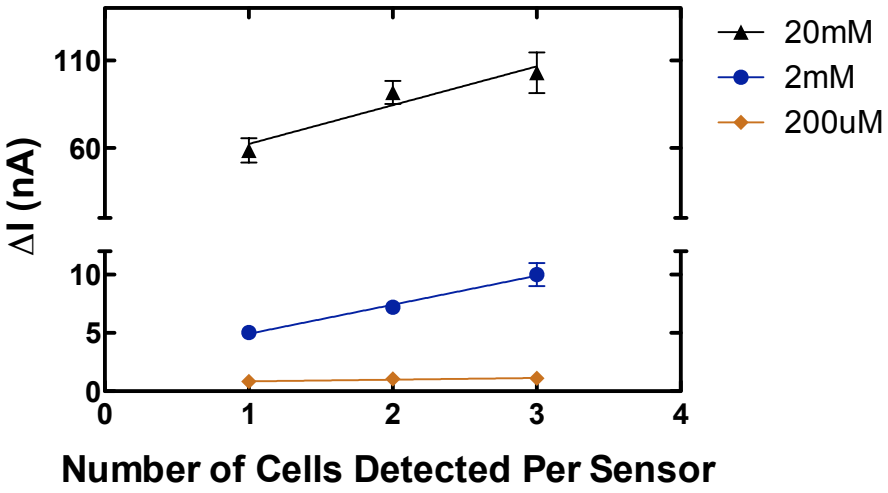
**Supplementary Figure 1 | Experimental setup.** (A) BASi Potentiostat (B) Close-up of electrochemical analysis set-up. Three-electrode system consisting of an Ag/AgCl electrode as the reference electrode, platinum wire as the auxiliary electrode, and the glass chip as the working electrode. Electrochemical signals were measured in 1X PBS containing 2mM Potassium Ferricyanide ($K_3[Fe(CN)_6]$) and 2mM Potassium Ferrocyanide ($K_4[Fe(CN)_6]$).




**Supplementary Figure 2 |** Peak current from DPV method after every reaction step in the antibody conjugation method. Error bars represent ± standard deviation, n=6. Numbers in brackets signify the step number.




**Supplementary Figure 3 | Cell counting using macro electrodes.** Validation of detection method via antibody functionalization of 1.6mm diameter circular gold electrodes. 100µg/mL of anti-EpCAM or IgG monoclonal antibody was immobilized as described in text. DU145 prostate cancer cell detection was validated against two negatives i.e. IgG antibody incubated with target DU145 cells, and anti-EpCAM antibody incubated with non-target U937 cells. Percent change in electrochemical signal upon binding event (grey bars), and number of cells on the sensor surface to correlate signal with correct binding event (purple squares). Cell number was measured by counting under a light microscope. Values represent mean ± SD, $n = 9$. * denotes $P < 0.05$ between target DU145 cells and both negatives.




**Supplementary Figure 4 | Effect of solution concentration on signal.** 50μm aperture glass chips were scanned using different concentrations of ferricyanide and ferrocyanide after DU145 prostate cancer cell incubation i.e. 20mM, 2mM, 200μM. Linear regression was applied to the data set and corresponding r-squared values were determined. Electrolyte concentration-dependent changes in DPV signal were observed. 2mM ferricyanide and ferrocyanide concentrations showed the greatest correlation with an r-squared value of 0.9951. Values represent mean ± SD, *n* = 6.