Electronic Supplementary Information (ESI)

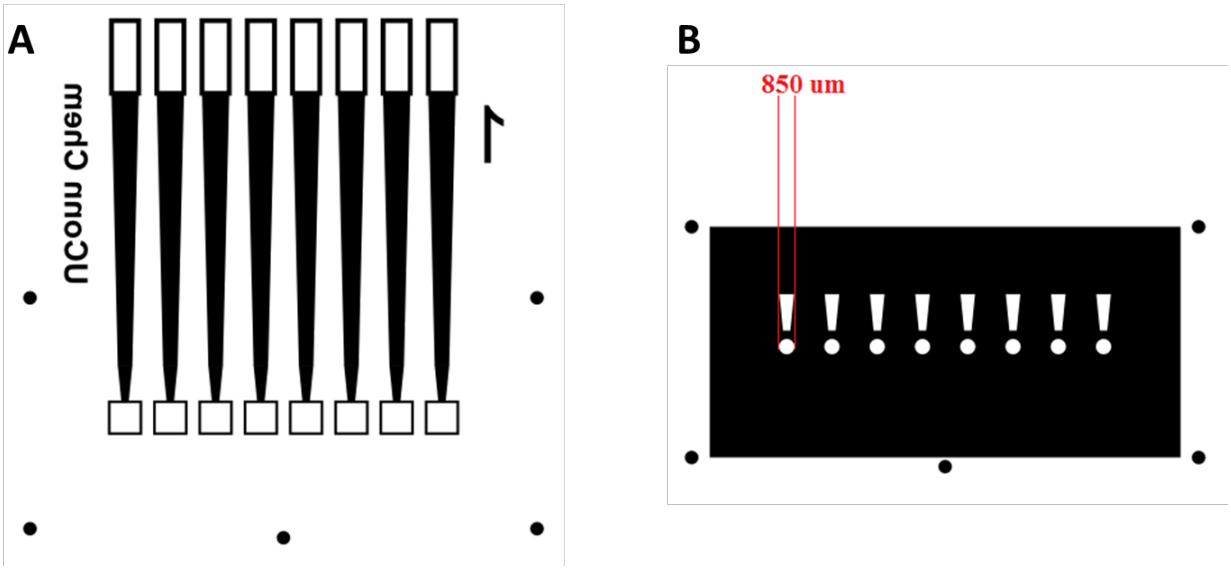
Fabrication of immunosensor microwell arrays from gold compact discs for ultrasensitive detection of cancer biomarker proteins

Chi K. Tang,[a] Abhay Vaze,[a] and James F. Rusling[*,a,bc]

[a] *Department of Chemistry, University of Connecticut, Storrs, Connecticut 06269, United States*
[b] *Department of Cell Biology, University of Connecticut Health Center, Farmington, Connecticut 06032, United States*

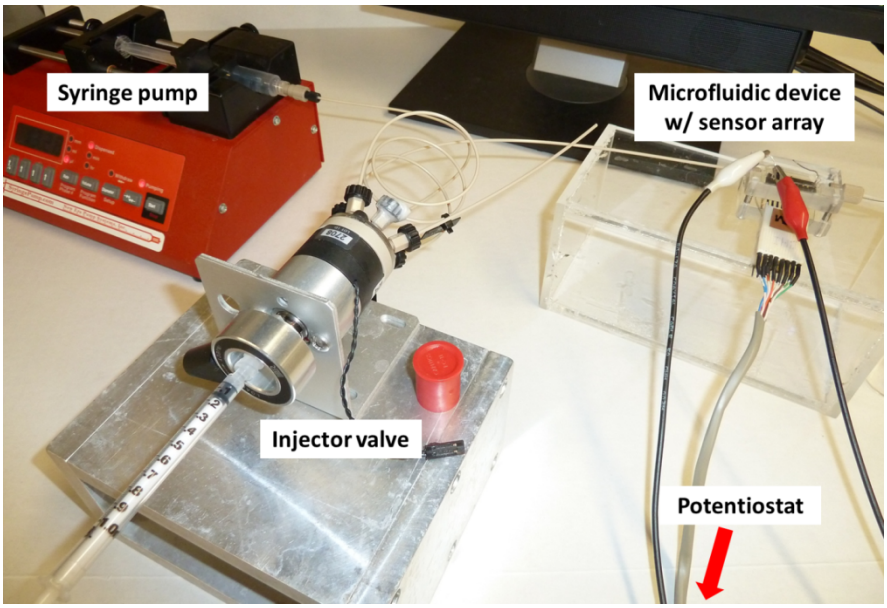
**Correspondence should be addressed to J.F.R (james.rusling@uconn.edu)*

Supplementary Figures

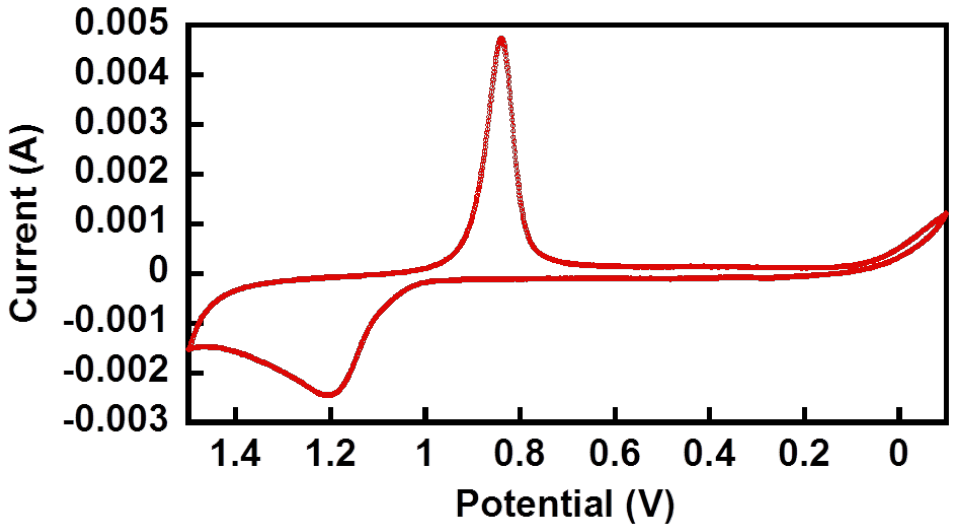


Supplementary Figure S1. (a) A computer generated pattern of the sensor array with 8 sensor spots using Canvas 11 graphical software. A mirror image is printed to get proper transference of the laserjet toner onto the gold CD-R surface. (b) A computer generated pattern of the second layer. Each circle represents on sensor spot with a diameter of 850 µm. The second layer helps define the electrode area and also form hydrophobic wells around the sensors. The five dots around the patterns are used to align the arrays and the second layer manually.

Supplementary Figure S2. Side view of the finished sensor array with 1 µL droplets of PBS contained by the hydrophobic microwell on each sensor spot.



Supplementary Figure S3. Microfluidic system[1] using syringe pump to establish continuous flow of deoxygenated PBS into the device at a flow rate of 100 µL min^{-1}. Injections were performed by loading the 100 µL sample loop of the injector valve with a mixture of deoxygentated 100 µM H_2O_2 and 1 mM hydroquinone and injecting into the microfluidic device at 100 µL min^{-1}. A 3M test clip was used to connect the sensor array to an eight electrode CHI 1030 electrochemical workstation.



Supplementary Figure S4. Typical cyclic voltammetry (CV) of bare gold sensor array in 0.18 M sulfuric acid vs. Ag/AgCl reference electrode in microfluidic device between -0.1 V to +1.5 V at 100 mV s^{-1}. It shows similar peaks to those from bulk gold (data not shown) with the formation of gold oxide at ~+1.2 V and the reduction back to bulk gold at ~+0.9V[2]. This is also a cleaning method for the gold surface by removing the gold oxide layer. All immunosensor arrays undergo potential sweeping in sulfuric acid before immunoassay development.

References

1 B. V. Chikkaveeraiah, V. Mani, V Patel. J. S. Gutkind, and J. F. Rusling, *Biosens. Bioelectron.*, In press, 2011

2 S. H. Cadle and S. Bruckenstein, *Anal. Chem.*, 1974, **46**, 16-20.