

Electronic Supplementary Material (ESI) for Nanoscale. This journal is © The Royal Society of Chemistry 2018

**Parallel profiling of cancer cell and protein using graphene oxide functionalized ac-EHD SERS Immunoassay**

*K Kamil Reza<sup>a</sup>, Shuvashis Dey<sup>a</sup>, Alain Wuethrich<sup>a</sup>, Abu Ali Ibn Sina<sup>a</sup>, Darren Korbie<sup>a</sup>, Yuling Wang<sup>c</sup> and Matt Trau<sup>a,b\*</sup>*

a. Centre for Personalized Nanomedicine, Australian Institute for Bioengineering and Nanotechnology (AIBN), Corner College and Cooper Roads (Bldg 75), The University of Queensland, Brisbane QLD 4072, Australia.

b. School of Chemistry and Molecular Biosciences, The University of Queensland, Brisbane, QLD 4072, Australia

c. Department of Chemistry and Biomolecular Sciences, Faculty of Science and Engineering, Macquarie University, Sydney, NSW, 2109, Australia.

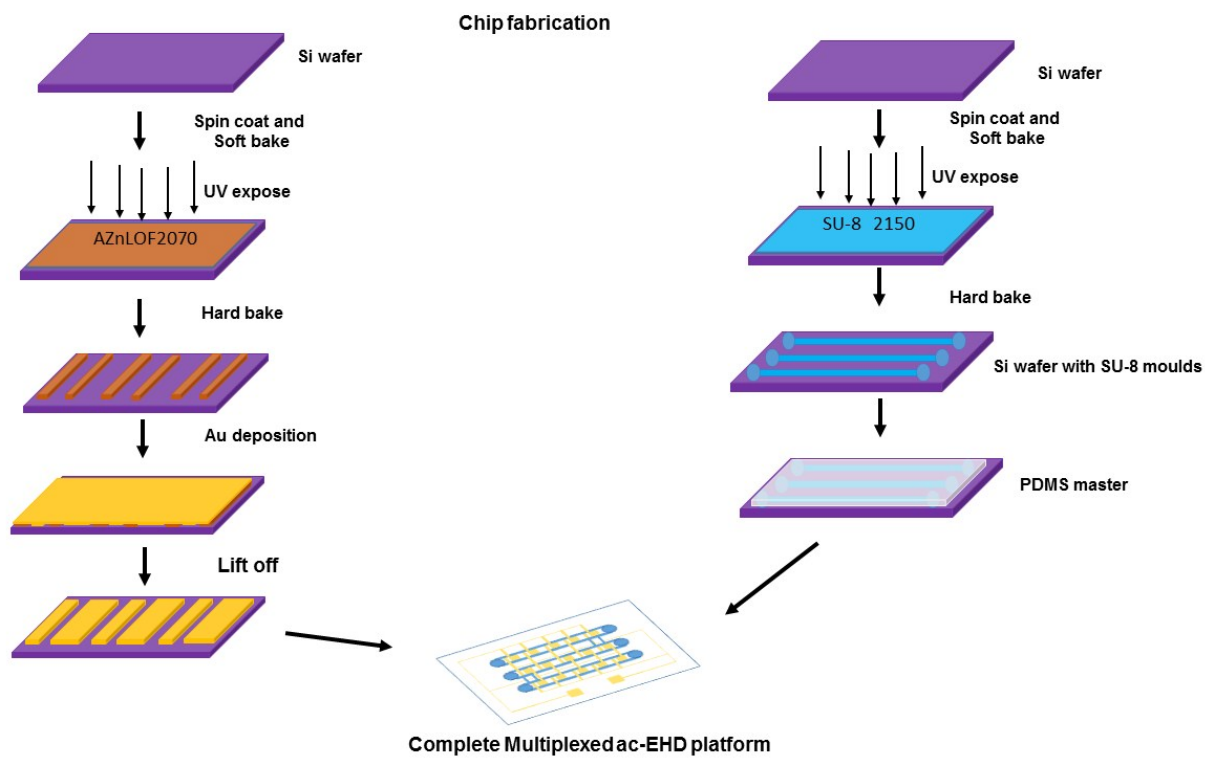
## TABLE OF CONTENTS

Figure. S1: The complete ac-EHD chip fabrication steps.

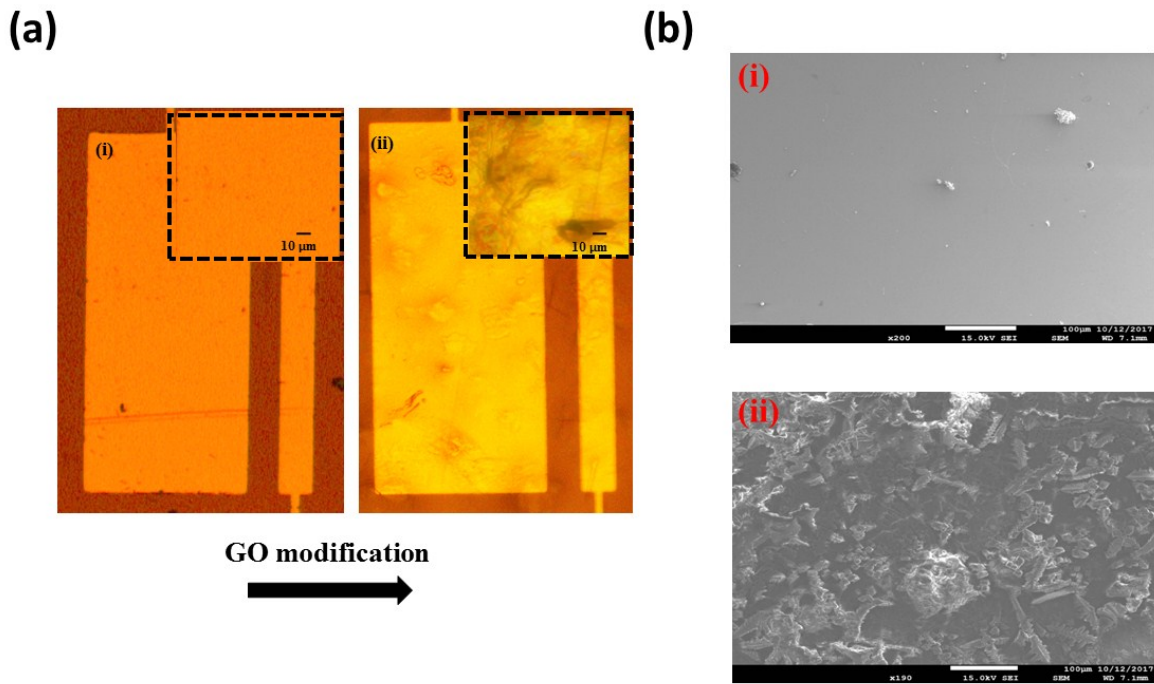
Figure S2: (a) The microscopic image of (i) the gold electrode without graphene oxide coating and (ii) the gold electrode with graphene oxide coating (insets show the magnification). (b) The SEM images of the bare gold electrode and (ii) the gold electrode with graphene oxide coating showing non-homogeneous coating.

Figure S3: (a) The optimized parameter for the GO ac EHD immunoassay for target protein (HER2) capture. Maximum SERS intensity was observed for the frequency of 1.1 kHz and ac voltage of 120 mV (green bar). Each data point in all graphs represents the average of three separate trials ( $n = 3$ ) and error bars represent the standard deviation of measurements within each experiment.

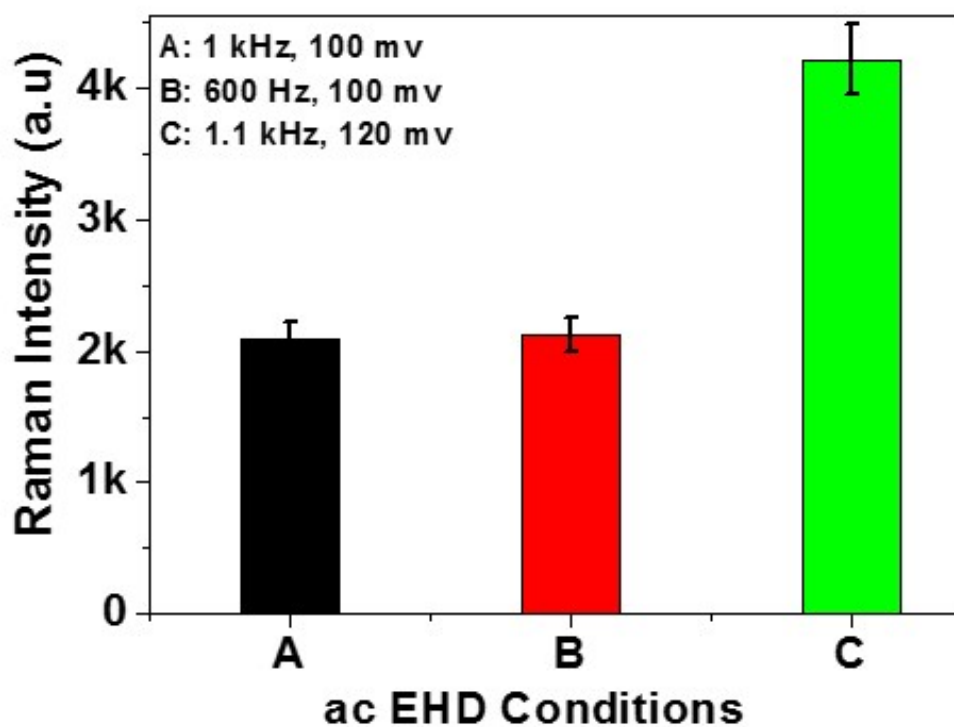
Figure S4: The calibration curve of HER-2 protein obtained from ELISA.



**Figure. S1:** The complete ac-EHD chip fabrication steps.



**Figure S2:** (a) The microscopic image of (i) the gold electrode without graphene oxide coating and (ii) the gold electrode with graphene oxide coating (insets show the magnification). (b) The SEM images of the bare gold electrode and (ii) the gold electrode with graphene oxide coating showing non-homogeneous coating.



**Figure S3:** (a) The optimized parameter for the GO ac EHD immunoassay for target protein (HER2) capture. Maximum SERS intensity was observed for the frequency of 1.1 kHz and ac voltage of 120 mV (green bar). Each data point in all graphs represents the average of three separate trials ( $n = 3$ ) and error bars represent the standard deviation of measurements within each experiment.

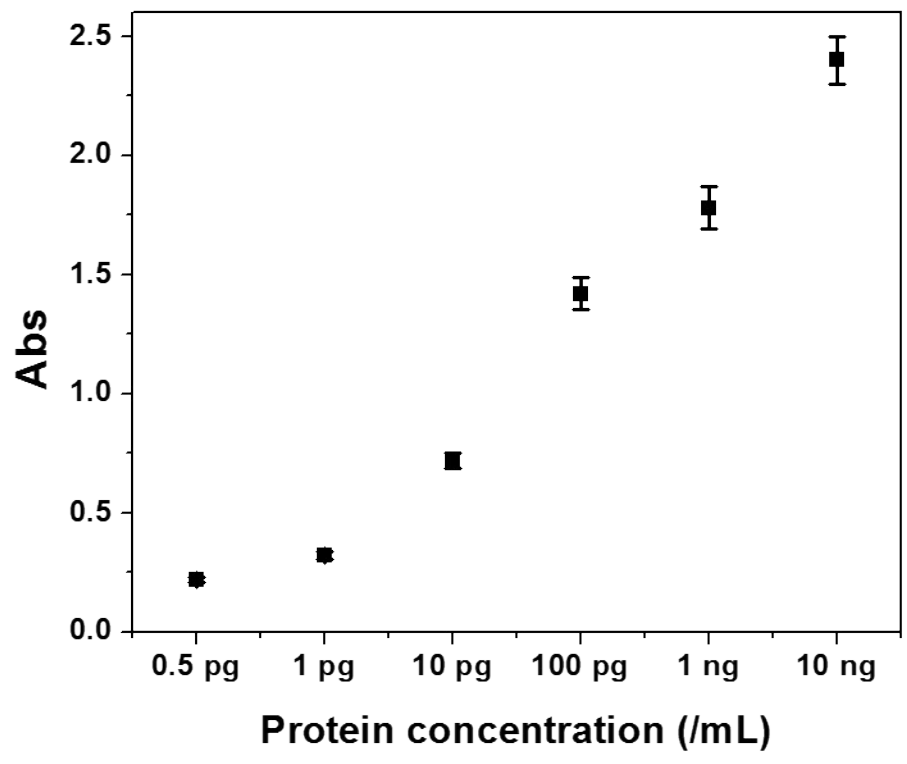


Figure S4: The calibration curve of HER-2 protein obtained from ELISA (LOD is 1 pg/mL)