

## Electronic Supplementary Information (ESI)

### Anti-epidermal growth factor receptor conjugated mesoporous zinc oxide nanofibers for breast cancer diagnostics†

Md. Azahar Ali<sup>\$a</sup>, Kunal Mondal<sup>\$a</sup>, Chandan Singh<sup>b</sup>, Bansilal Malhotra<sup>#c</sup> and  
Ashutosh Sharma<sup>\*a</sup>

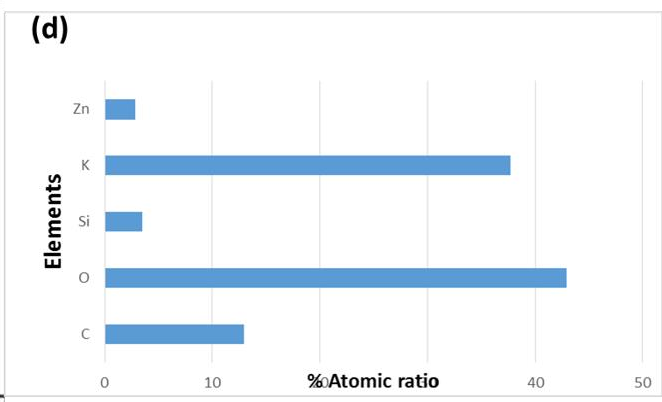
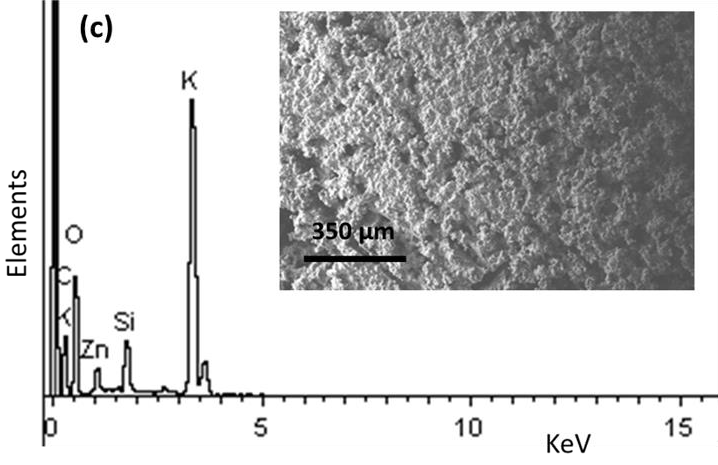
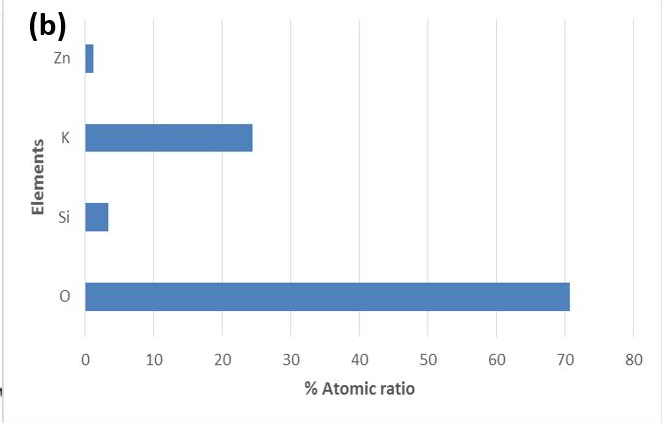
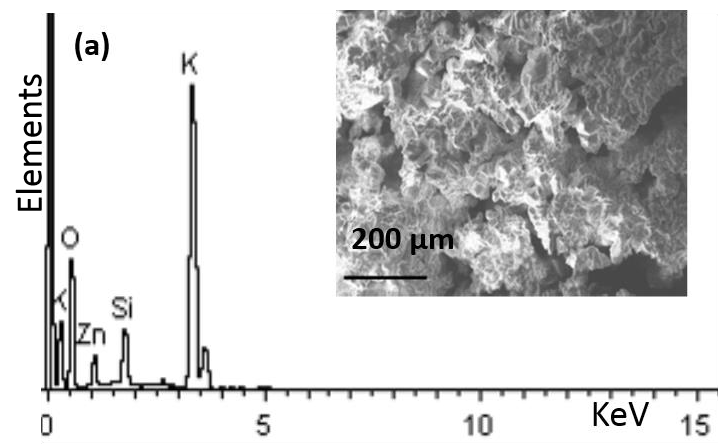
<sup>a</sup>Department of Chemical Engineering, Indian Institute of Technology, Kanpur, India

<sup>b</sup>Department of Science and Technology Centre on Biomolecular Electronics, Biomedical Instrumentation  
Section, CSIR-National Physical Laboratory, New Delhi, India

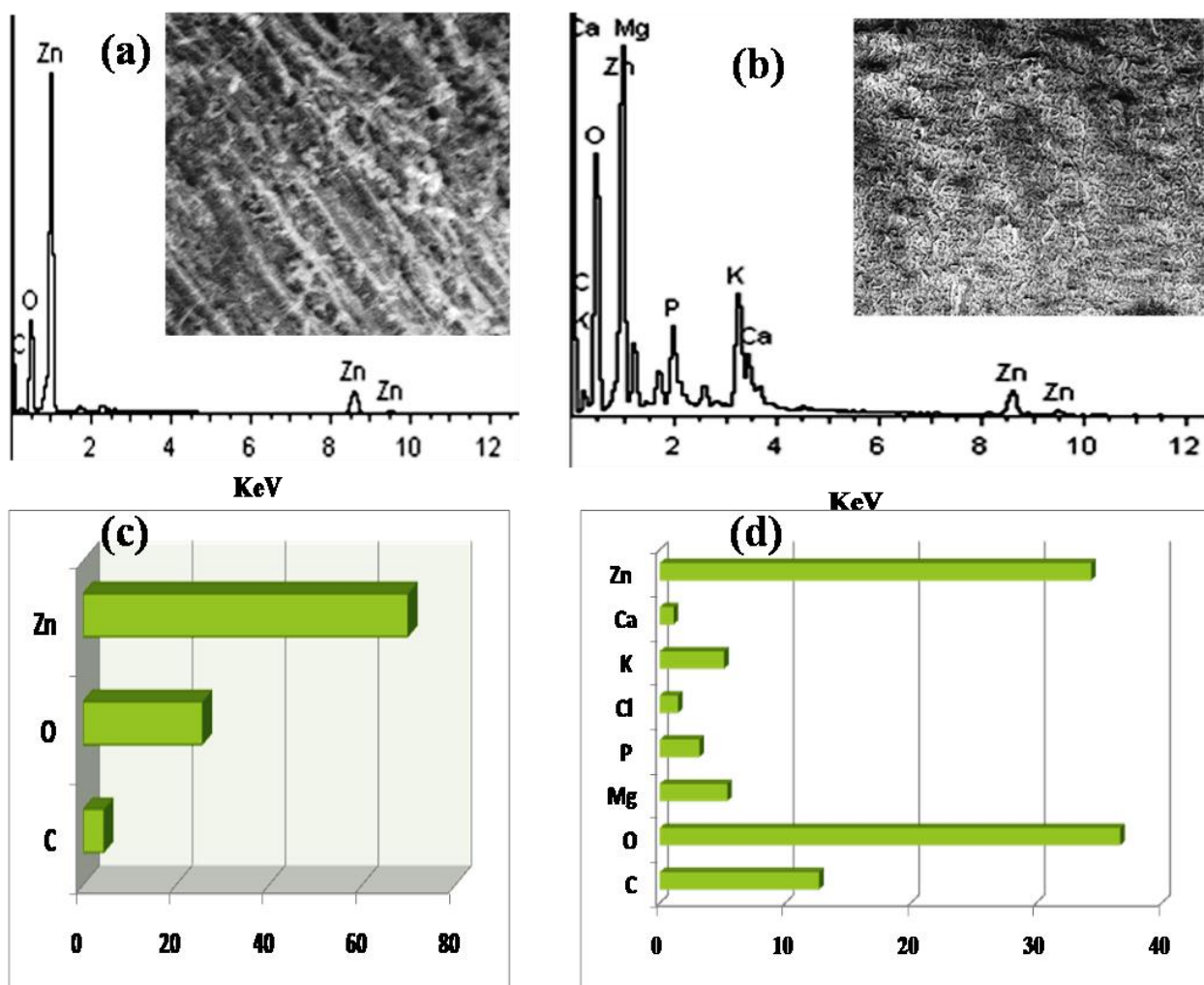
<sup>c</sup>Department of Biotechnology, Delhi Technological University, Delhi, India

Corresponding Authors. E-mail: bansi.malhotra@gmail.com<sup>#</sup> and ashutos@iitk.ac.in<sup>\*</sup>, <sup>\$</sup>These authors have contributed equally.

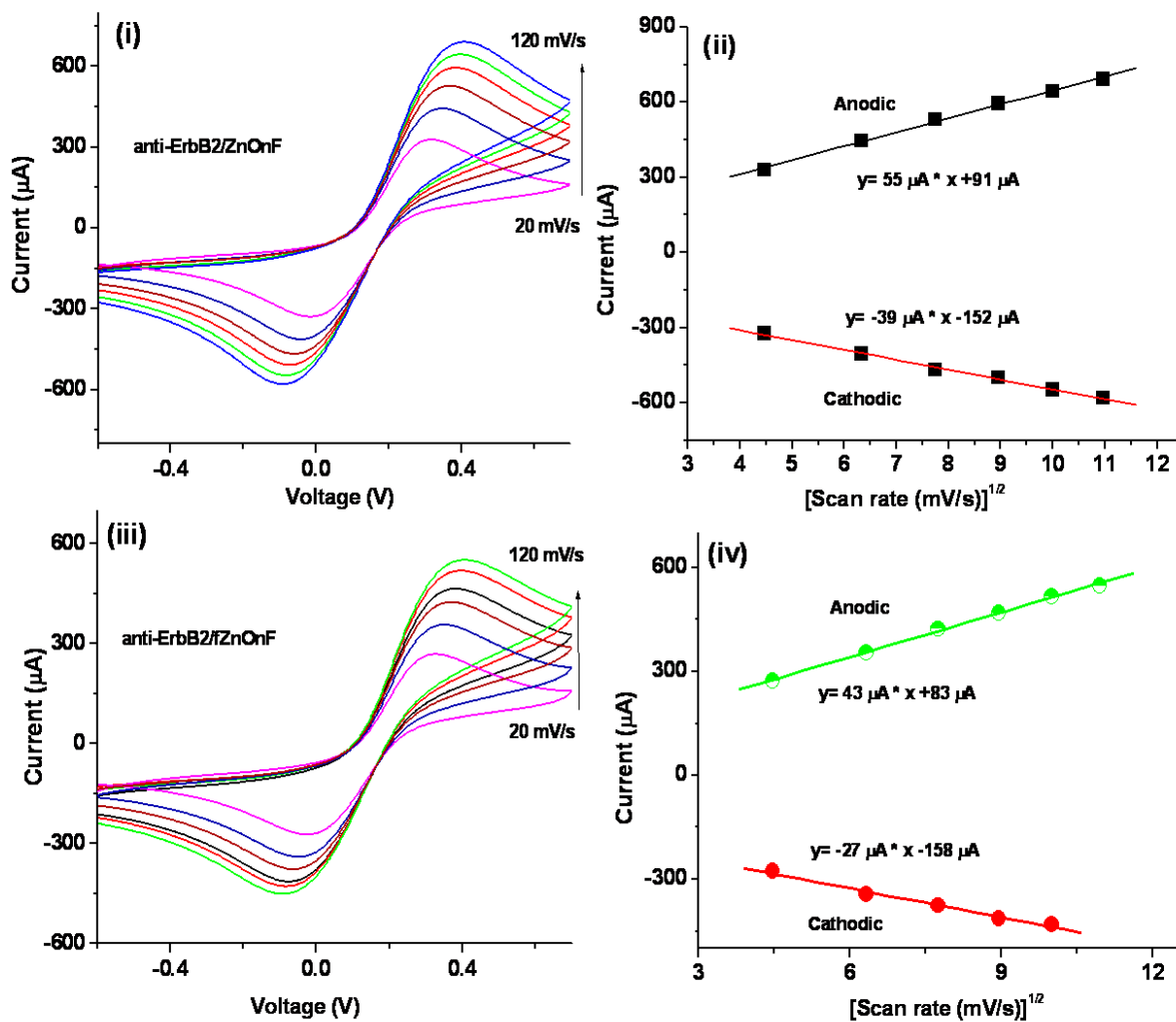
**Figure S1 (i):** EDX analysis for ZnOnF/ITO (a) and anti-ErbB2/ZnOnF/ITO (b). Histogram plots for various elements present in ZnOnF/ITO (c) and anti-ErbB2/ZnOnF/ITO (d) samples.



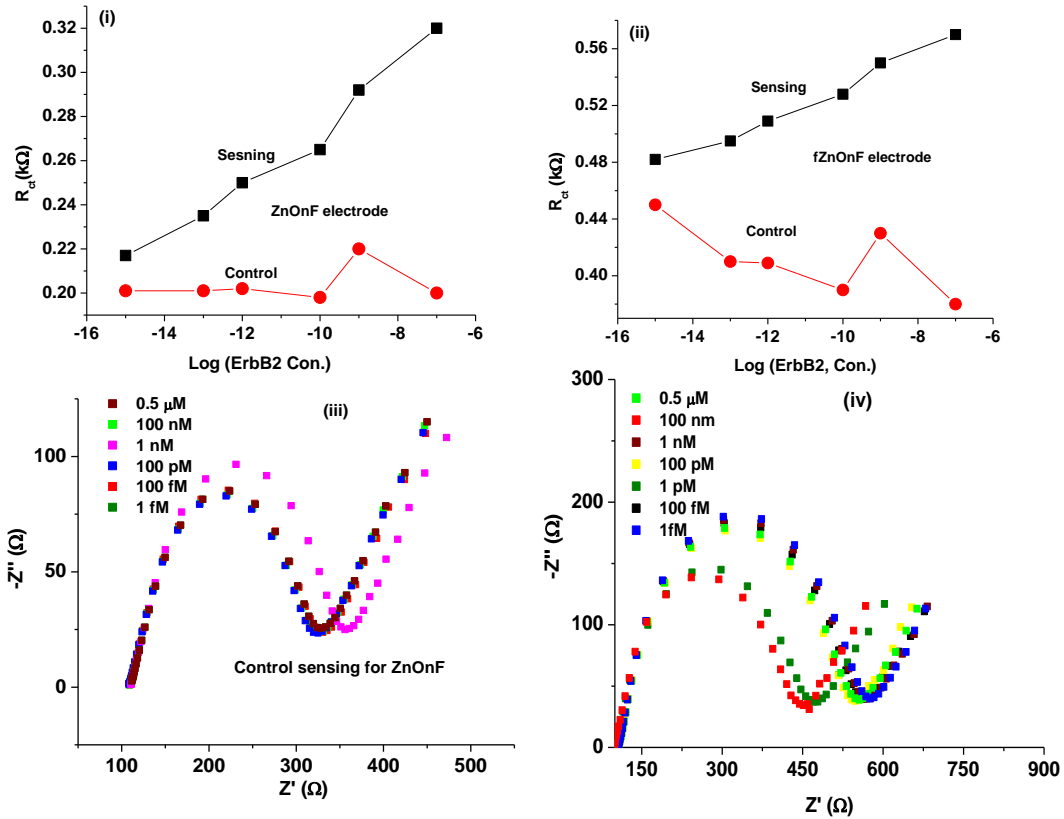
**Figure S1 (ii):** EDX analysis for fZnOnF/ITO (a) and anti-ErbB2/fZnOnF/ITO (b). Histogram plots for various elements present in fZnOnF/ITO (c) and anti-ErbB2/fZnOnF/ITO (d) samples.



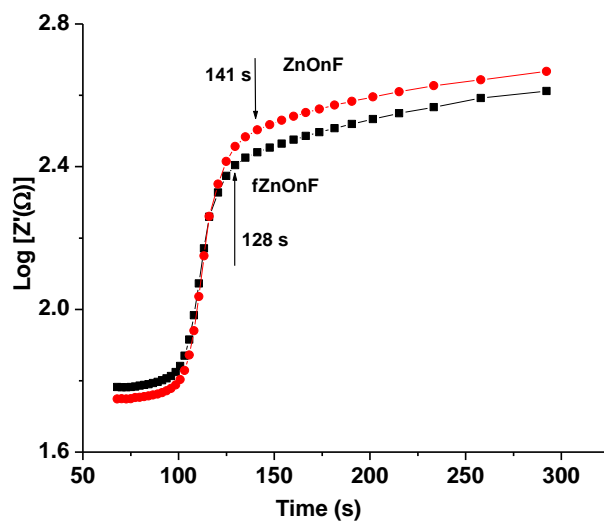
**Figure S2:** The figure shows scan rate analysis for anti-ErbB2 functionalized electrodes (i) as a function of scan rate and anodic and cathodic peak response with square root of scan rate (ii). Scan rate responses for anti-ErbB2/ZnOnF/ITO electrode (iii) as a function of scan rate and anodic and cathodic peaks responses with square root of scan rate (iv).



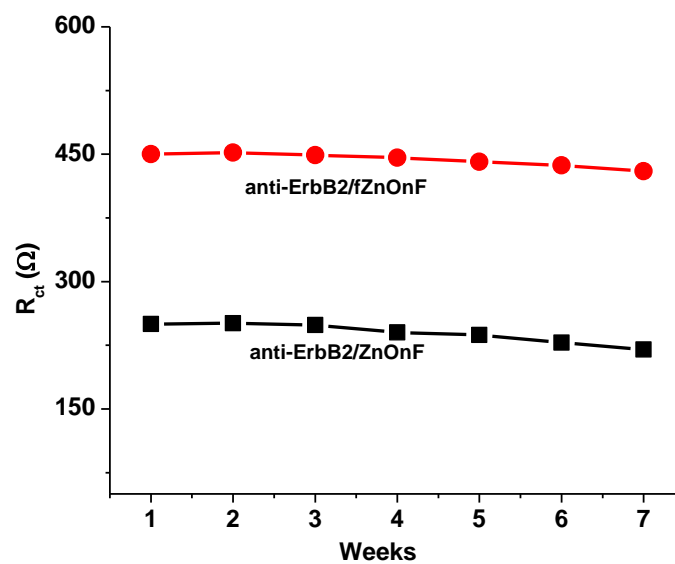
**Figure S3:** (i) The plots between  $R_{ct}$  and logarithmic value of ErbB2 concentration for ZnOnF with and without antibody immobilization. (ii) The plots between  $R_{ct}$  and logarithmic value of ErbB2 concentration for fZnOnF with and without antibody immobilization. The EIS curves for ZnOnF (iii) and fZnOnF (iv) electrodes for control measurements.



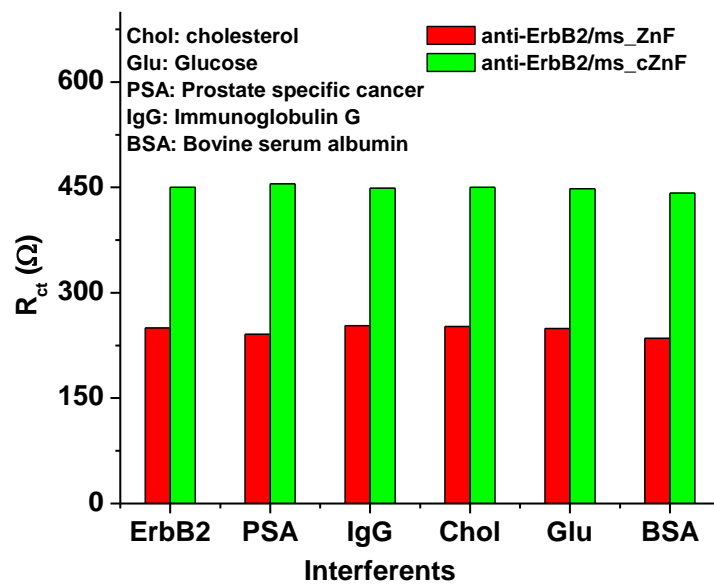
**Figure S4:** The time versus log of impedance plot of the anti-ErbB2/fZnOnF and anti-ErbB2/ZnOnF immunoelectrodes during detection of ErbB2 antigen.



**Figure S5:** Stability test for anti-ErbB2/fZnOnF and anti-ErbB2/ZnOnF immunoelectrodes using 1 pM ErbB2 concentration at 7 days regular interval.



**Figure S6:** Selectivity studies for both fZnOnF/ITO and ZnOnF/ITO immunoelectrodes in presence of 1 pM ErbB2 concentration with various concentration other biomolecules at normal concentration using EIS technique.



**Table S1:** Electrochemical parameters for various fabricated electrodes.

Electrodes	Diffusion coefficient (cm <sup>2</sup> /s)	Charge transfer resistance; R <sub>ct</sub> (Ω)	Constant element; (Farad)	phase CPE	Heterogeneous charge transfer constant (cm/s)
ZnOnF	$8.23 \times 10^{-8}$	$1.91 \times 10^2$	$2.98 \times 10^{-5}$		$11.1 \times 10^{-7}$
fZnOnF	$6.28 \times 10^{-8}$	$2.07 \times 10^2$	$2.83 \times 10^{-5}$		$10.3 \times 10^{-7}$
anti-ErbB2/ZnOnF	$3.64 \times 10^{-8}$	$4.12 \times 10^2$	$2.31 \times 10^{-5}$		$51.8 \times 10^{-8}$
anti-ErbB2/fZnOnF	$3.13 \times 10^{-8}$	$4.51 \times 10^2$	$2.72 \times 10^{-5}$		$47.3 \times 10^{-8}$