Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Electrochemical impedance aptasensor based on selenomolybdate nanodots/antimonene hybrid for platelet derived growth factor-BB

Shobhita Singal[ǂ1], Ashish Yadav[ǂ1], Kajal Sharma[2], Meenakshi Sharma**[2], Raj Kishore Sharma*[1]
[1]*Department of Chemistry, University of Delhi, Delhi-110 007*
[2]*Dr B.R. Ambedkar Center for Biomedical Research, University of Delhi, Delhi 110007*

***Corresponding author:** Raj K. Sharma (drrajksharma@yahoo.co.in)
****Co-corresponding author:** M. Sharma meenakshisharma@acbr.du.ac.in
ǂ Both authors contributed equally

Supporting Information

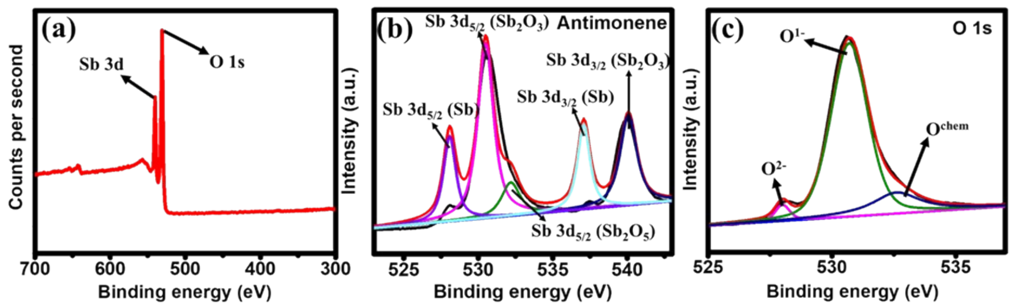

Figure S1: (a) Survey spectrum of antimonene; (b) X-ray photoelectron spectrum of Sb in antimonene; (c) O 1s spectrum.

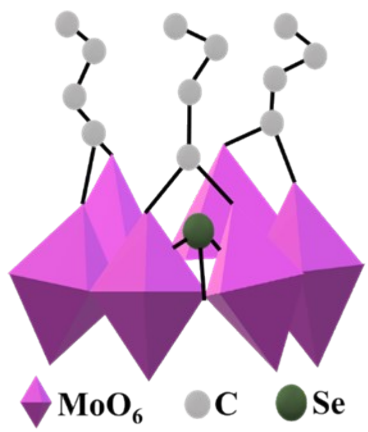

Figure S2: Polyhedral representation of $[(SeMo_6O_{21})(COO(CH_2)_2COO)_3]^{6-}$ polyoxometalate

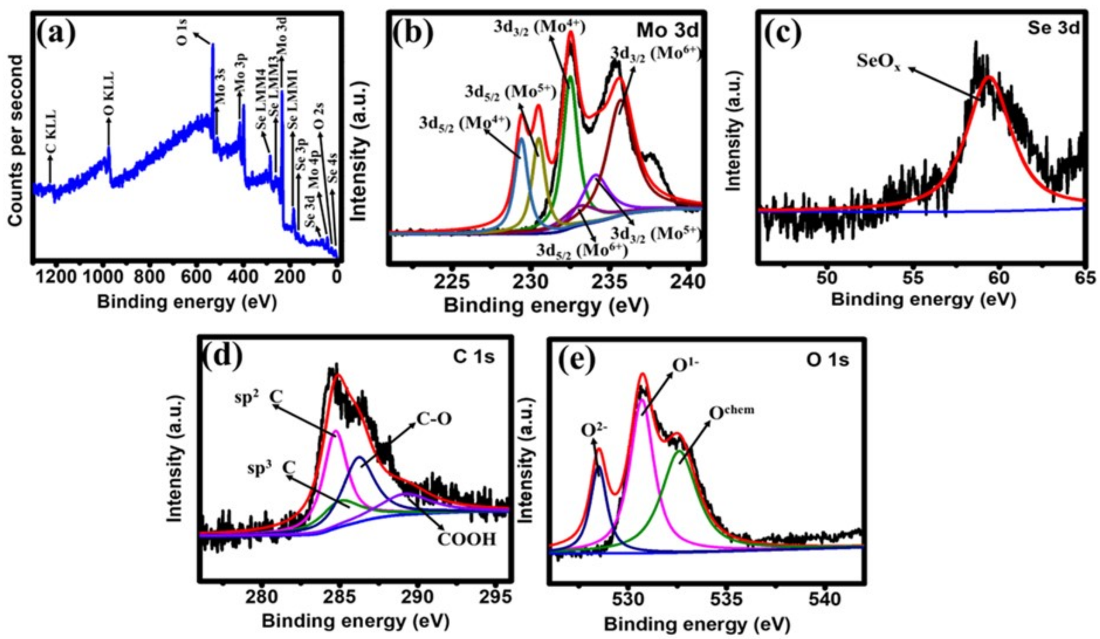

Figure S3: (a) Survey spectrum of POM; X-ray photoelectron spectrum of (b) Mo 3d; (c) Se 3d; (d) C 1s; (e) O 1s in POM.

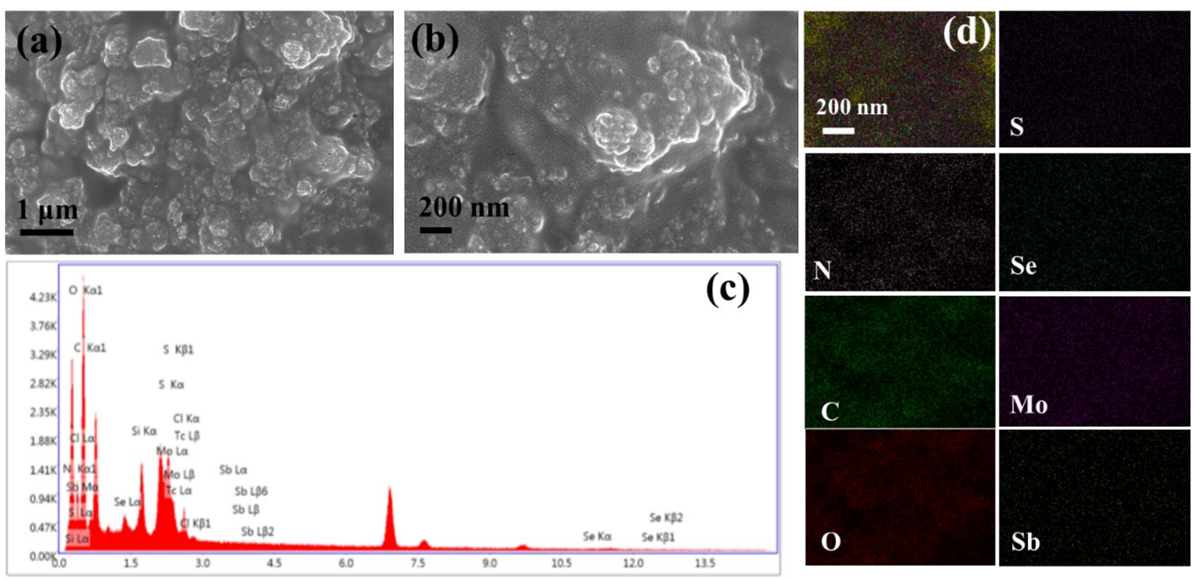

Figure S4: (a, b) FESEM image of BSA/aptamer-POM(SA)/antimonene on Si wafer at different magnifications; (c, d) corresponding EDAX and elemental mapping of different elements.

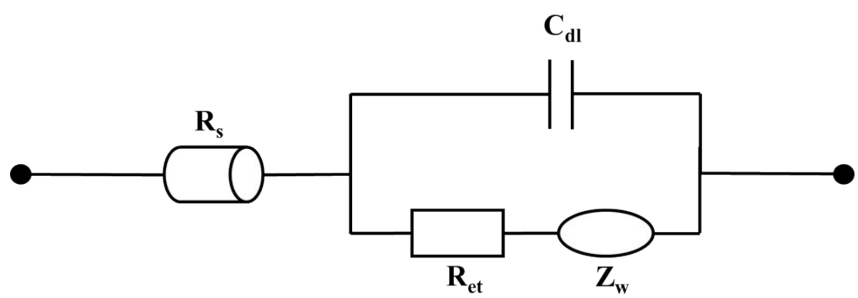

Figure S5: Randle's equivalent circuit

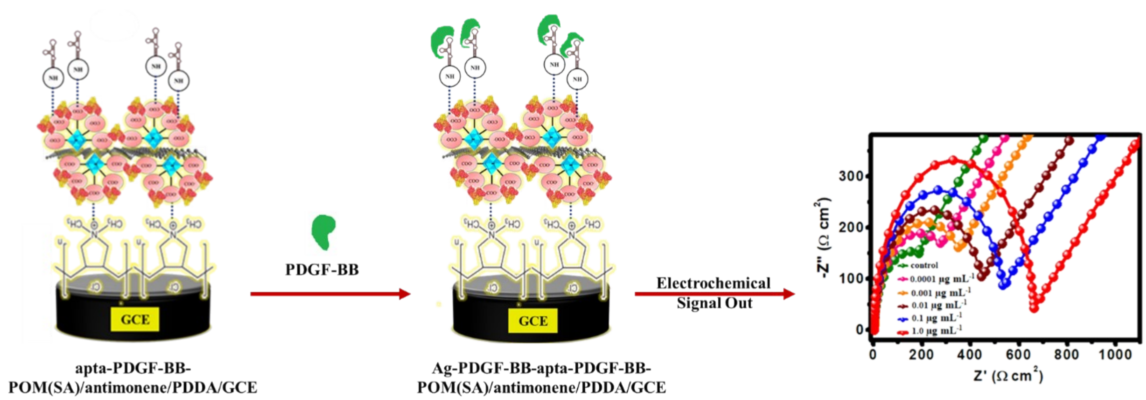

Figure S6: Schematic of immunoreaction at the electrode surface

Details of Dissociation constant (K_D) calculation for antigen-aptamer complex

The surface coverage can be calculated by comparing the charge transfer resistance (R_{et}) or capacitance (C_{dl}) to the value of K_d. We employed the R_{et} component for K_d measurement because minor variations in capacitance values were observed, thus we used a Langmuir adsorption isotherm and a linear relationship between the surface coverage (Θ) and R_{et-1} by Eqn. (1) & (2).

$$\Delta R_{et-1} = \Theta \, (\Delta R_{et-1})_{max} \qquad (1)$$

where $\Delta R_{et-1} = [(R_{et-1})_{\Theta=0} - R_{et-1}] / (R_{et-1})_{\Theta=0}$ (2)

and $\Delta(R_{et-1})_{max} = [(R_{et-1})_{\Theta=0} - (R_{et-1})_{max}] / (R_{et-1})_{\Theta=0}$ (3)

To avoid data overloading at low protein concentrations, the R_{et} change was converted to the Hanes-Woolf form, which may be characterized by Eqn. (4)

$[X]/\Delta R_{et-1} = [X] / \Delta(R_{et-1})_{max} + K_d / \Delta(R_{et-1})_{max}$ (4)

Where in the value of K_d was obtained by division of intercept by slope obtained from the Hanes-Woolf plot shown in Fig.9a of manuscript.