Electronic Supplementary Material (ESI) for RSC Advances.

Supplementary Information

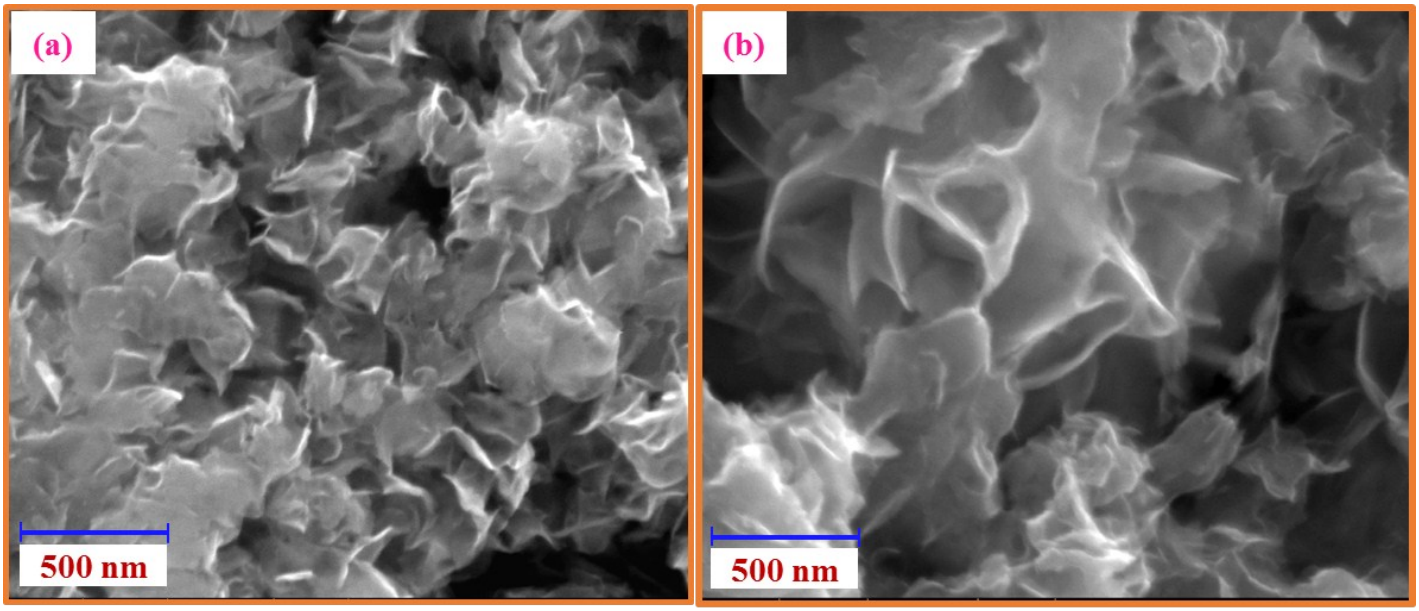
Nickel Oxide Decorated MoS_2 Nanosheets Based Non-Enzymatic Sensor for Selective Detection of Glucose

Gayathri Jeevanandham[1], R. Jerome[1], N. Murugan[1], M. Preethika[1], Kumaran Vediappan[1] and Ashok K. Sundramoorthy[1*]

[1]Department of Chemistry, SRM Institute of Science and Technology, Kattankulathur-603 203, Tamil Nadu, India

*Corresponding author:

Email: ashokkus@srmist.edu.in ; ashok.sundramoorthy@gmail.com



Supplementary Figures

Fig. S1. The high magnification FE-SEM images of MoS_2 and NiO/MoS_2 nanocomposite.

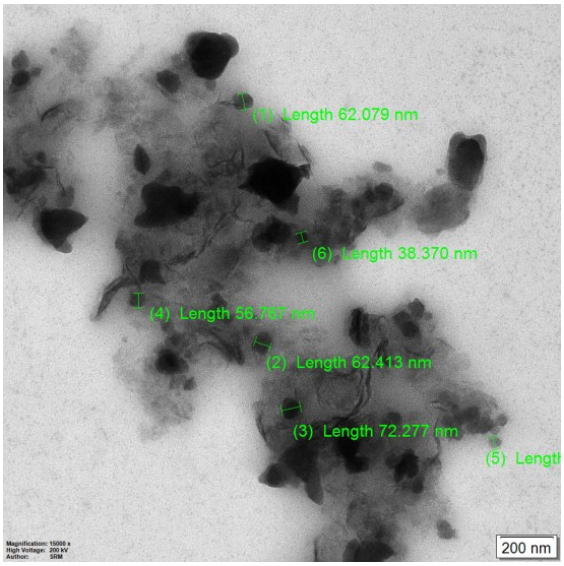


Fig. S2. The HR-TEM images of NiO/MoS_2 nanocomposite with measured particle sizes of NiO.

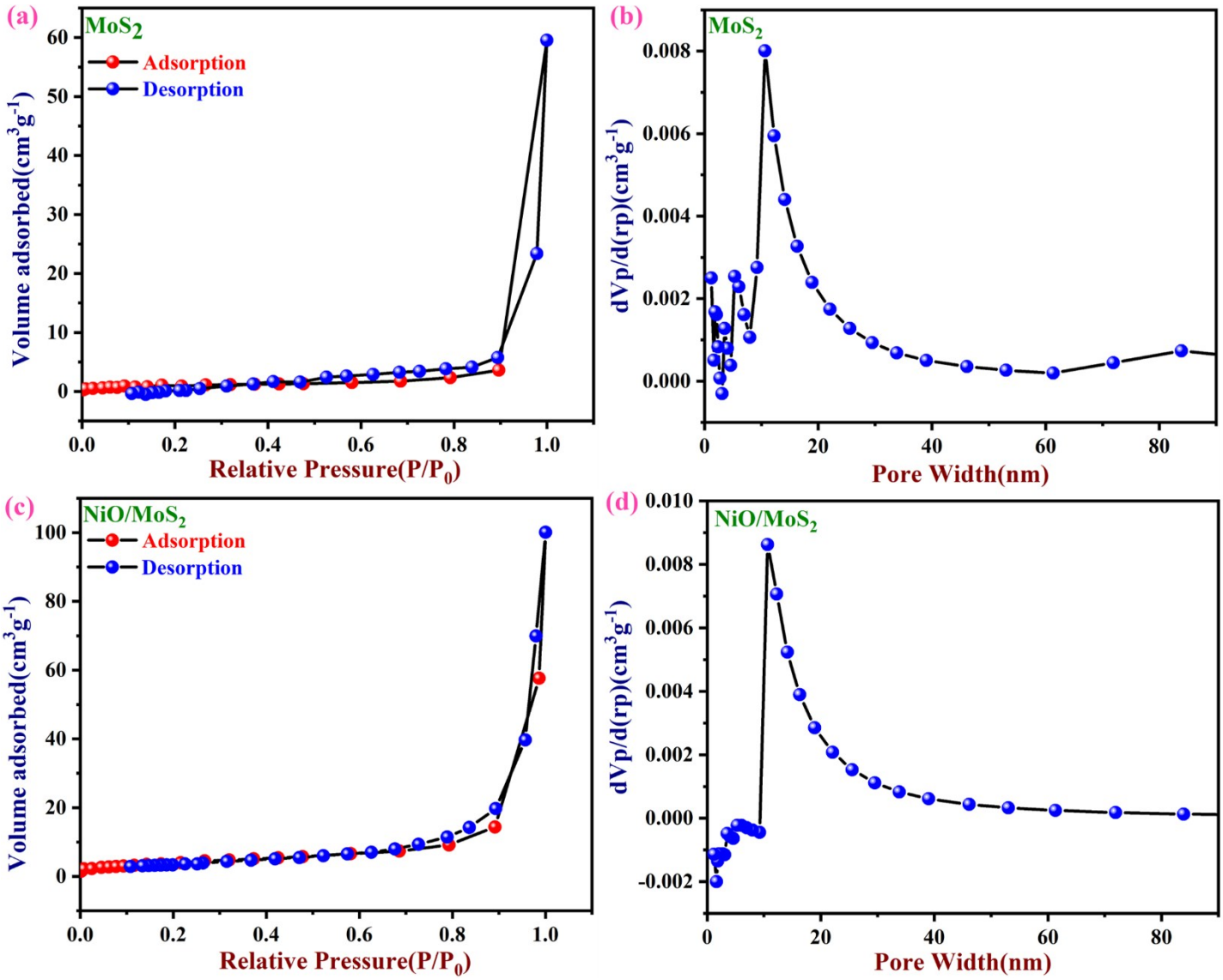


Fig. S3. Nitrogen adsorption/desorption isotherms and pore size distribution analysis of the MoS_2 (a, b) and NiO/MoS_2 nanocomposite (c, d).

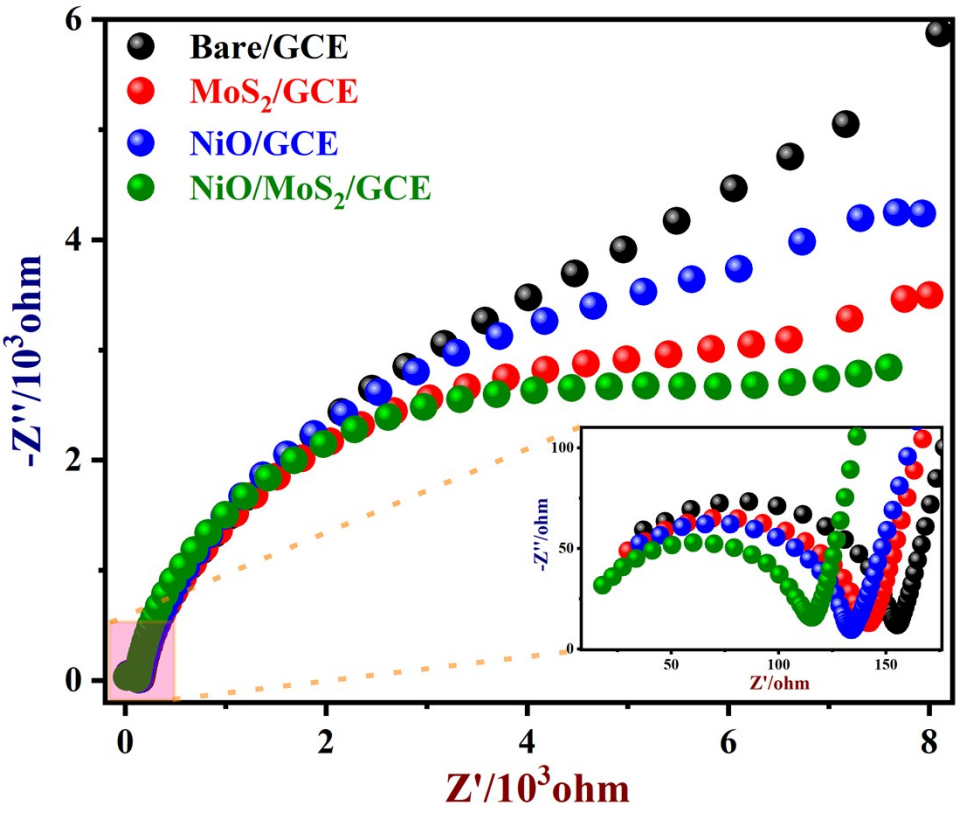


Fig. S4. Nyquist plot of NiO/MoS_2/GCE, NiO/GCE, MoS_2/GCE and bare/GCE in 0.1 M KCl containing 5 mM $[Fe(CN)_6]^{3-/4-}$ with frequency range from 0.1 Hz to 1000 kHz (inset: enlarged view of high frequency range).

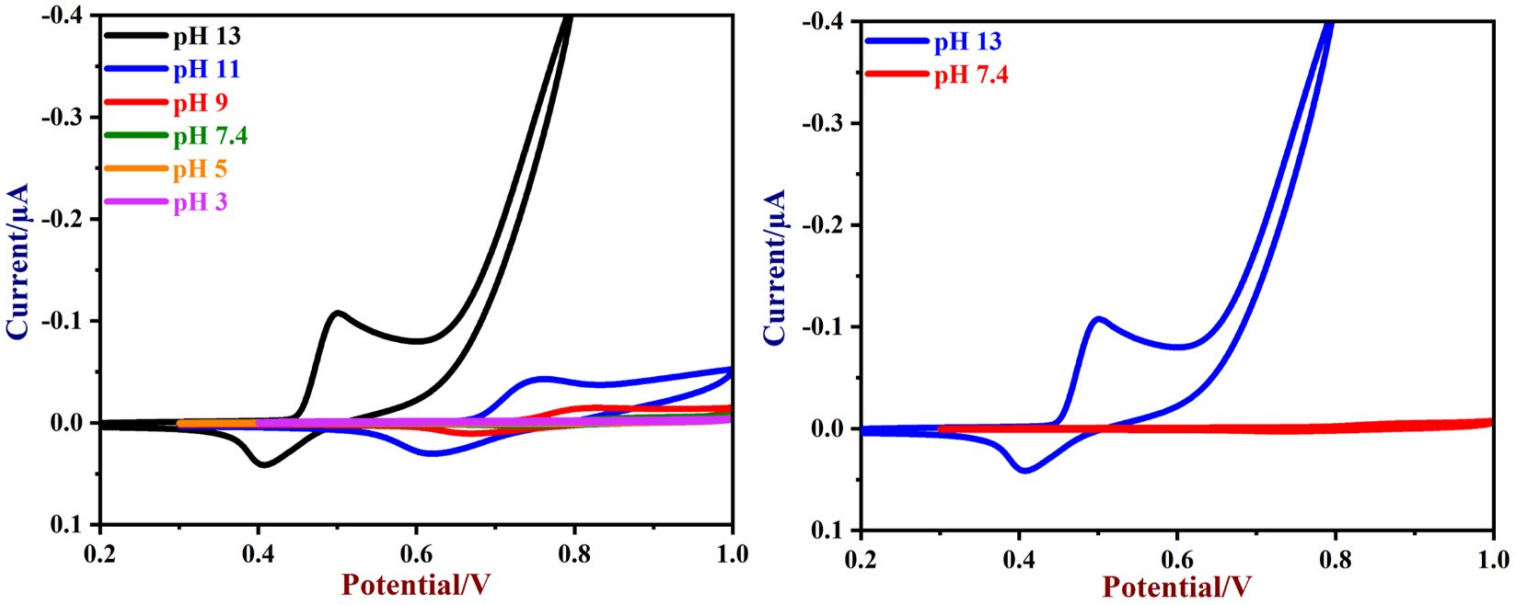


Fig. S5. (Left) The effect of pH on the electrochemical oxidation of glucose (50 µM) was carried out on NiO/MoS_2/GCE in 0.1 M NaOH from pH 13 to 3. (Right) Comparison CVs of pH 7.4 and 13 for glucose oxidation (50 µM).

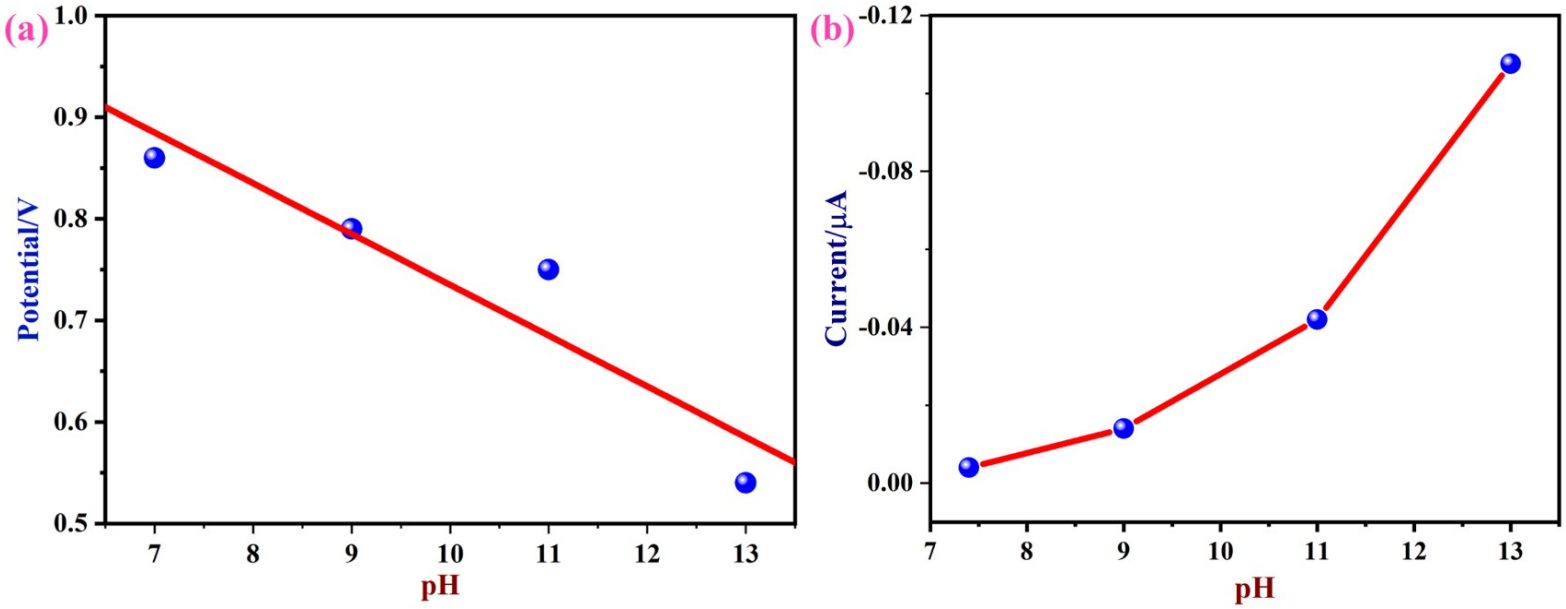


Fig. S6. (a) A linear curve shows the changes in oxidation potential of glucose *vs.* pH of electrolytes. (b) The measured current responses against pH of the solutions for glucose oxidation (50 μM).

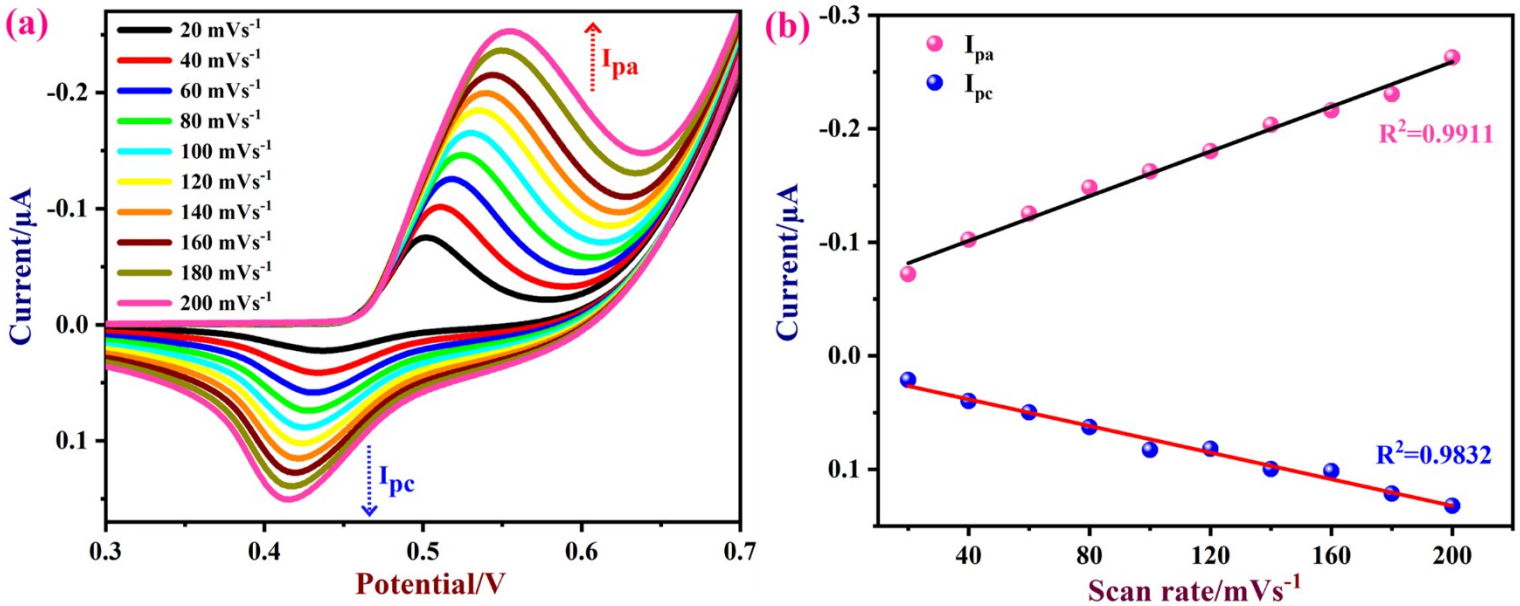


Fig. S7. CVs recorded by using **(a)** NiO/MoS_2/GCE in 0.1 M NaOH containing 50 µM glucose at various scan rates (from 20 to 200 mVs^{-1}). **(b)** The linear relationship between the scan rate *vs.* peak currents with a correlation coefficient values of ($I_{pa,}$ $R^2 = 0.9911$ and $I_{pc,}$ $R^2 = 0.9832$).

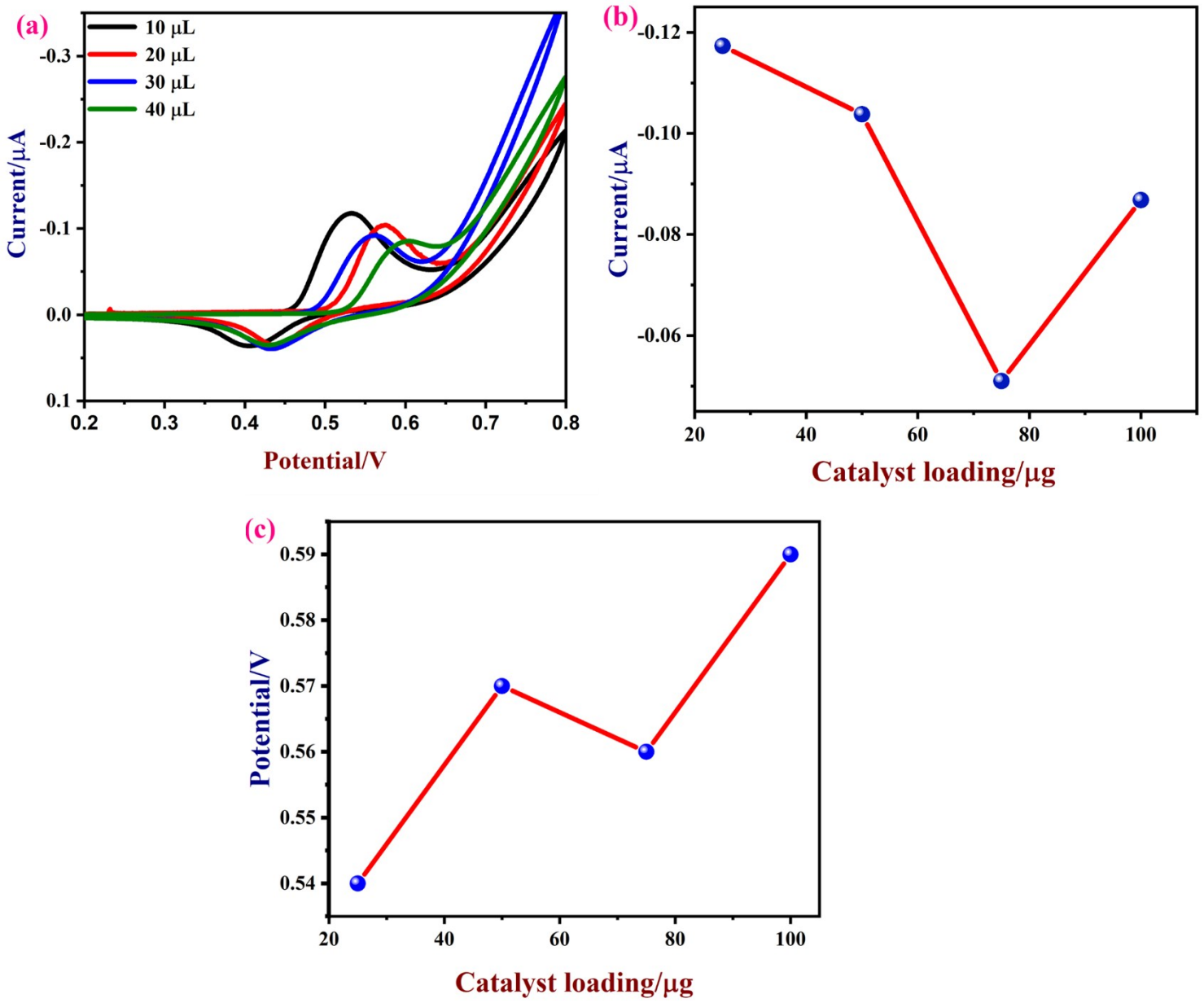


Fig. S8. (a) The effects of catalyst loading of NiO/MoS_2 (stock solution=2.5 mg/mL) on GCE surface as 25 (10 µL), 50 (20 µL), 75 (30 µL) and 100 µg (40 µL) on the oxidation of 50 µM glucose. (b) Anodic peak current (I_{pa}) of glucose *vs.* various amounts of catalyst loaded NiO/MoS_2/GCE. (c) The relationship between the E_{pa} of glucose oxidation *vs.* amount of catalysts on NiO/MoS_2 modified GCE.

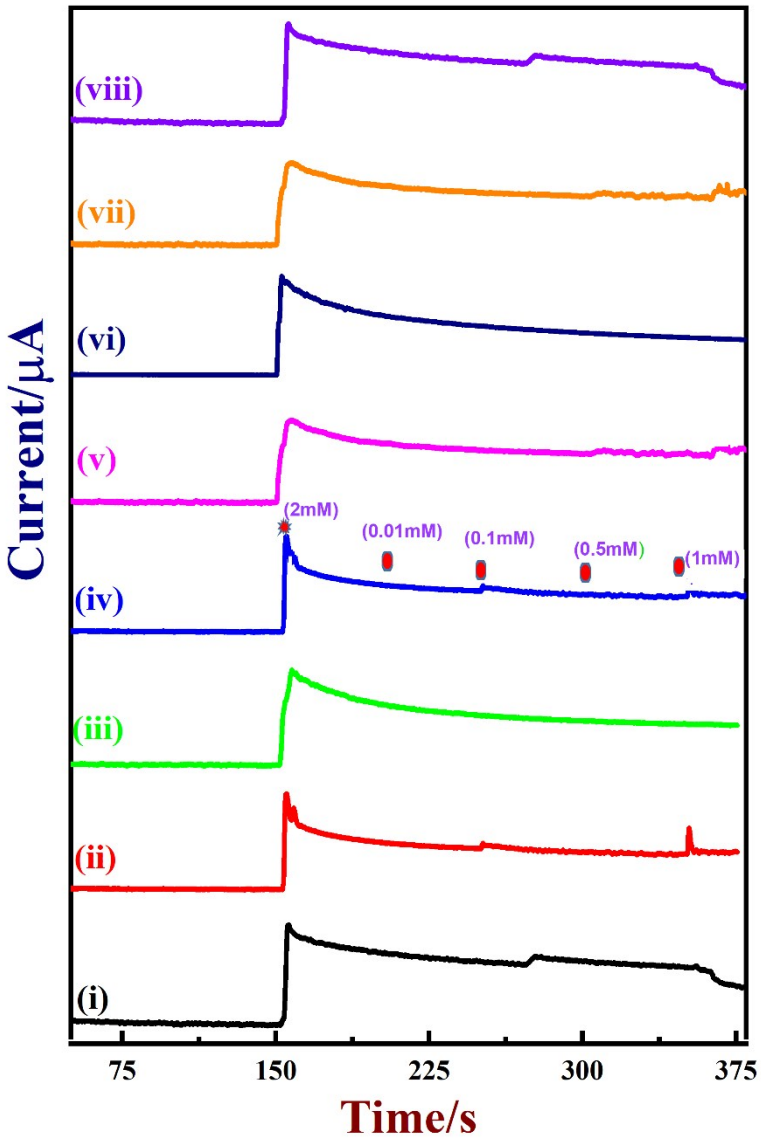


Fig. S9. Amperometric response of the NiO/MoS_2/GCE in 0.1 M NaOH in the presence of glucose (2 mM) and followed by successive additions of interferent compounds with various concentrations from 0.01 mM to 1 mM. (i) L-cysteine, (ii) alanine, (iii) hydrogen peroxide, (iv) fructose, (v) lactose, (vi) ascorbic acid, (vii) uric acid and (viii) dopamine.

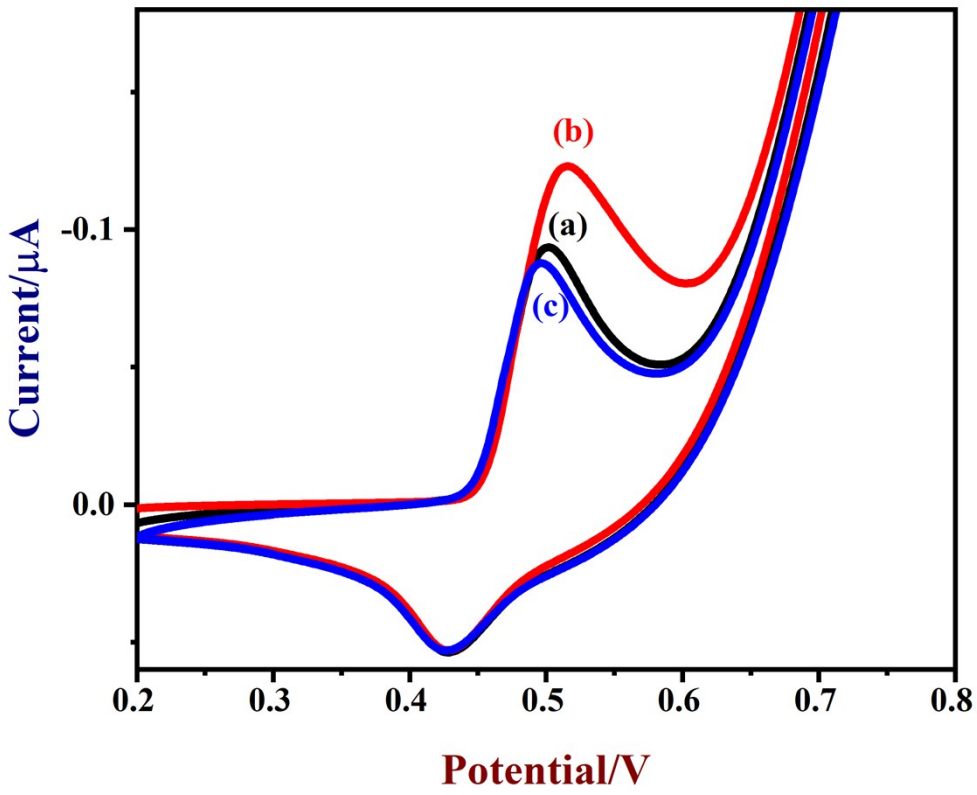


Fig. S10 CVs recorded using a NiO/MoS_2/GCE in the absence (curve a) and presence of 50 μM glucose (curve b) in 0.1 M NaOH. After glucose oxidation, the same NiO/MoS_2/GCE was reused to record CVs in a fresh 0.1 M NaOH (curve c). It was found that NiO oxidation current was decreased a little bit compared to the blank. Scan rate = 50 mV/s.