

**Potentiometric Performance of a Highly Flexible Fiber-Shaped Trifunctional
Sensor Based on ZnO/V₂O₅ Microrods**

Alfred Bekoe Appiagyei, Jeong In Han*

Department of Chemical and Biochemical Engineering, Dongguk University, 04620,
Seoul, South Korea

*Corresponding author: TEL: +82-2-2260-3364, Email: hanji@dongguk.edu

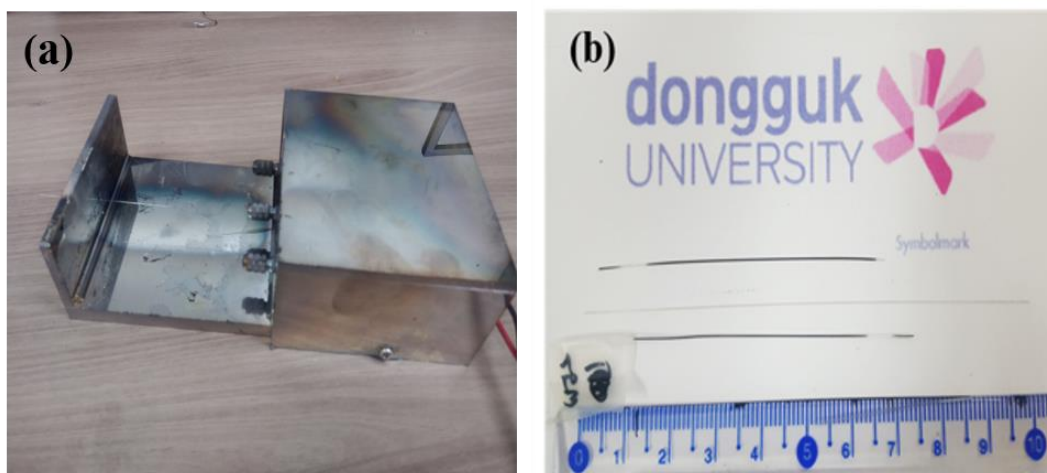


Figure S1: Photographical image of (a) Sputtering jig for rotating PET fibre (b) PET fiber and ZnO/V₂O₅ coated PET fiber

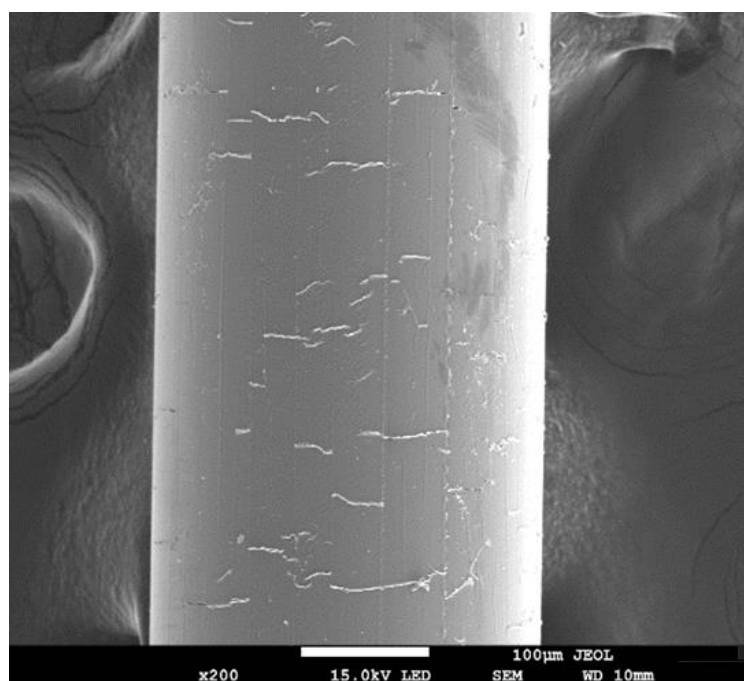


Figure S2 SEM image of PET fiber

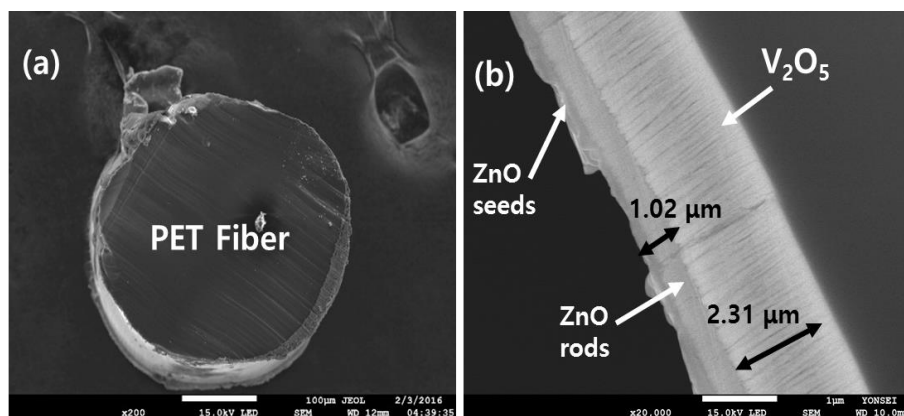


Figure S3: Cross-sectional SEM image of ZnO/V₂O₅ composite on ZnO seeds sputtered on PET fiber.

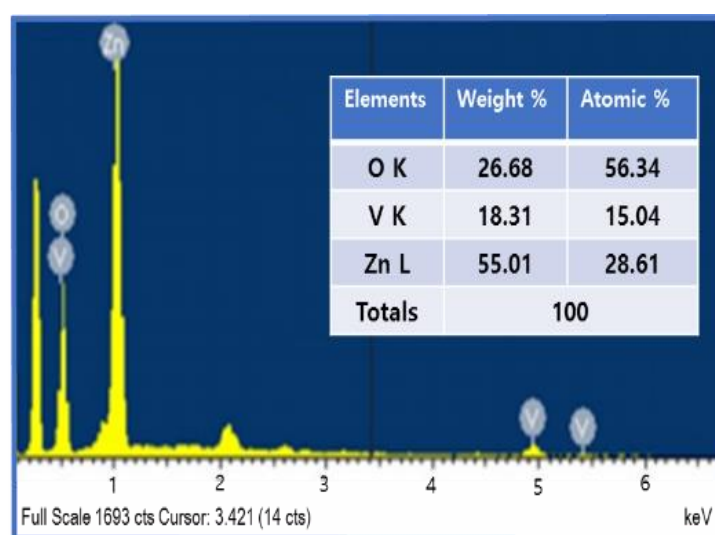


Figure S4: SEM-EDX pattern of ZnO/V₂O₅ showing the elemental composition.

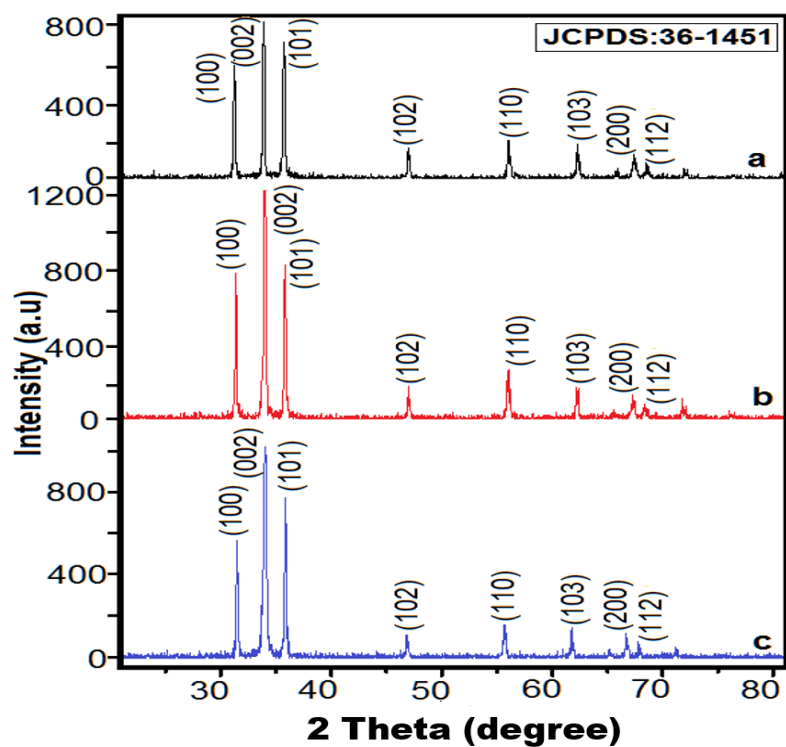
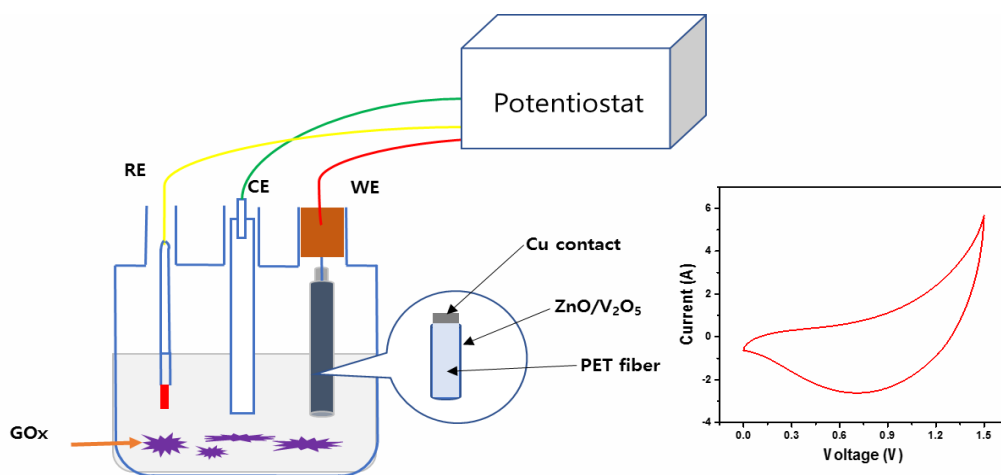


Figure S5. XRD patterns of ZnO microrods deposited with seed layer deposition time of (a) 10 min (b) and 20 min (c) 30 min.



Scheme 2: Schematic representation of the electrochemical sensor testing. RE, CE and WE represent reference electrode, counter electrode and working electrode respectively

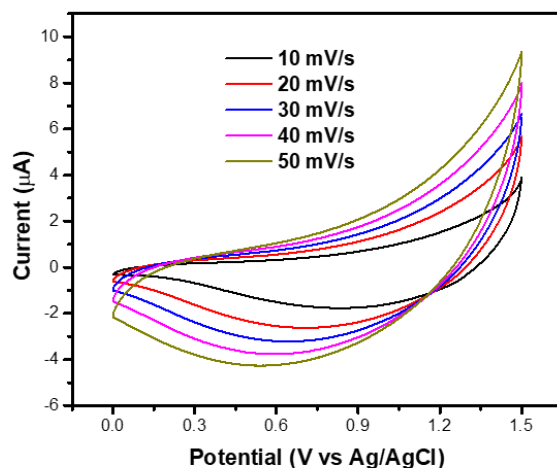


Figure S6. CV profiles for GOx in the absence of ZnO or ZnO/V₂O₅ (blank solution) at different scan rates.

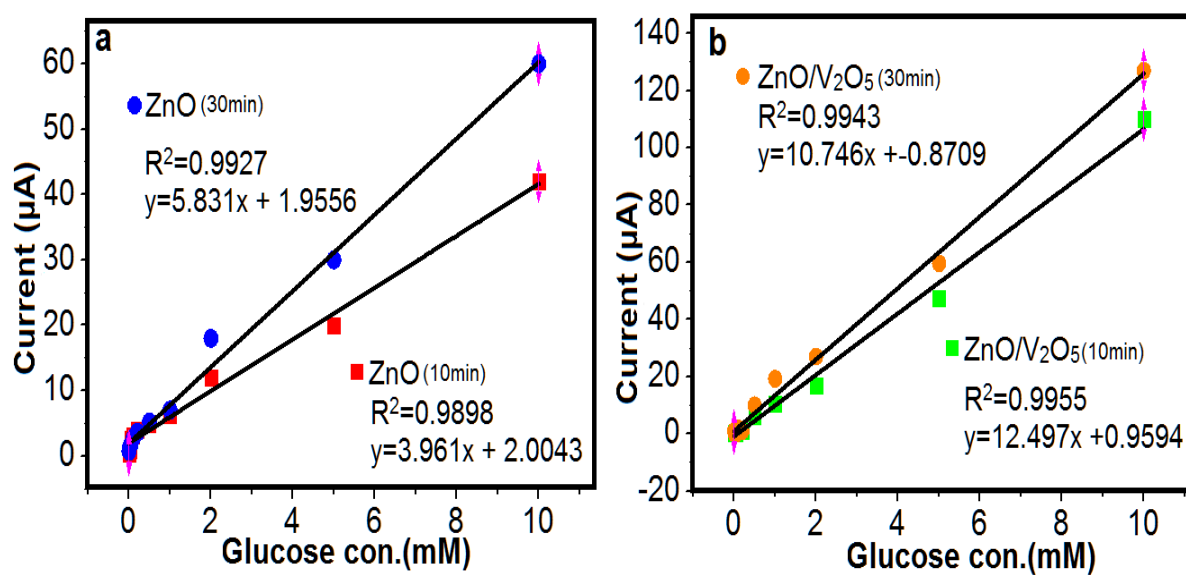


Figure S7. Calibration plot of ZnO and ZnO/V₂O₅ glucose sensors at +0.8 V with a straight line representing the linear fit for (a) 10 mins and (b) 30 mins ZnO seed layer deposition times on PET substrates

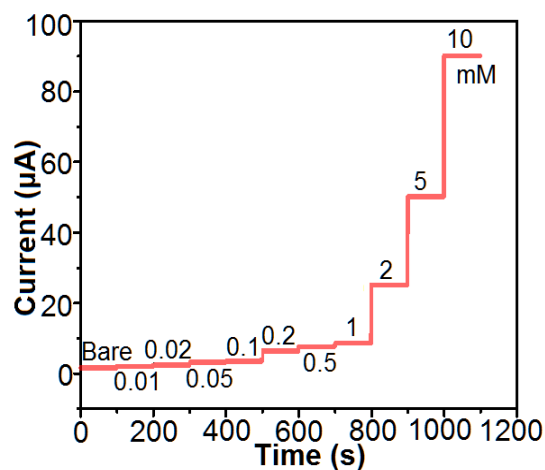


Figure S8. Current-time response monitoring according to increasing glucose concentration towards ZnO electrode

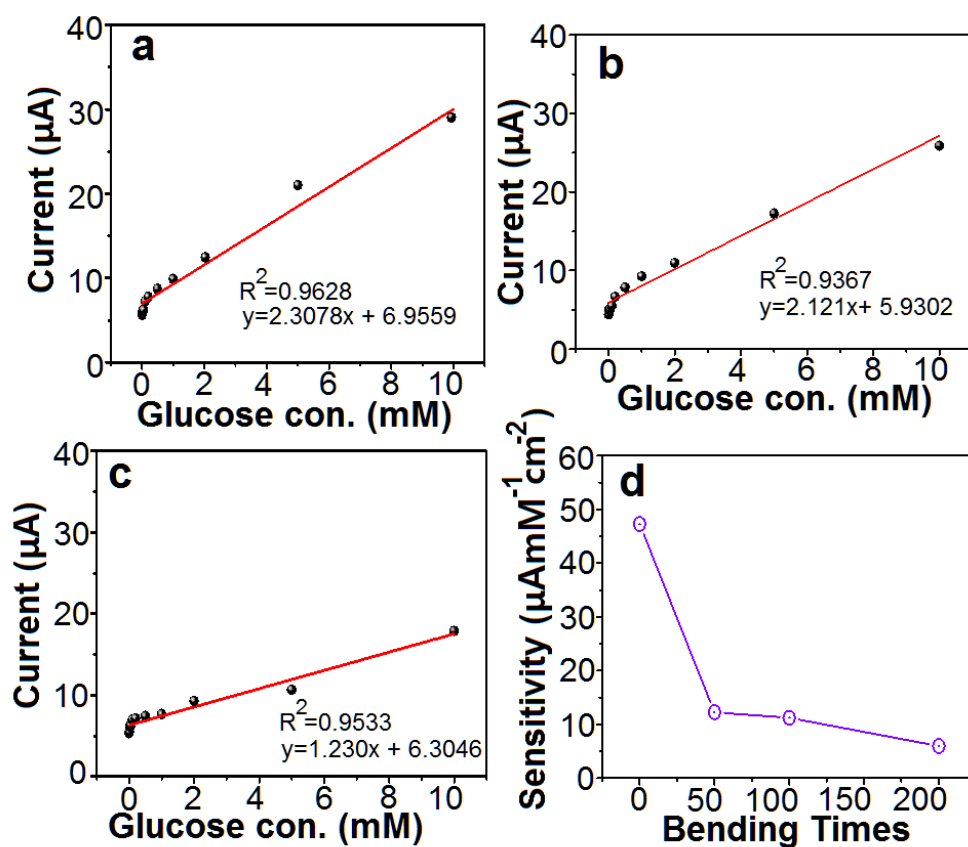


Figure S9. Calibration plot for ZnO/V₂O₅ glucose sensing at +1.0 V with a straight line representing the linear fit for ZnO seed layer deposited on PET for 20 min after (a) 50 cycles (b) 100 cycles (c) 200 cycles (d) Variation of calculated sensitivity after various bending cycles

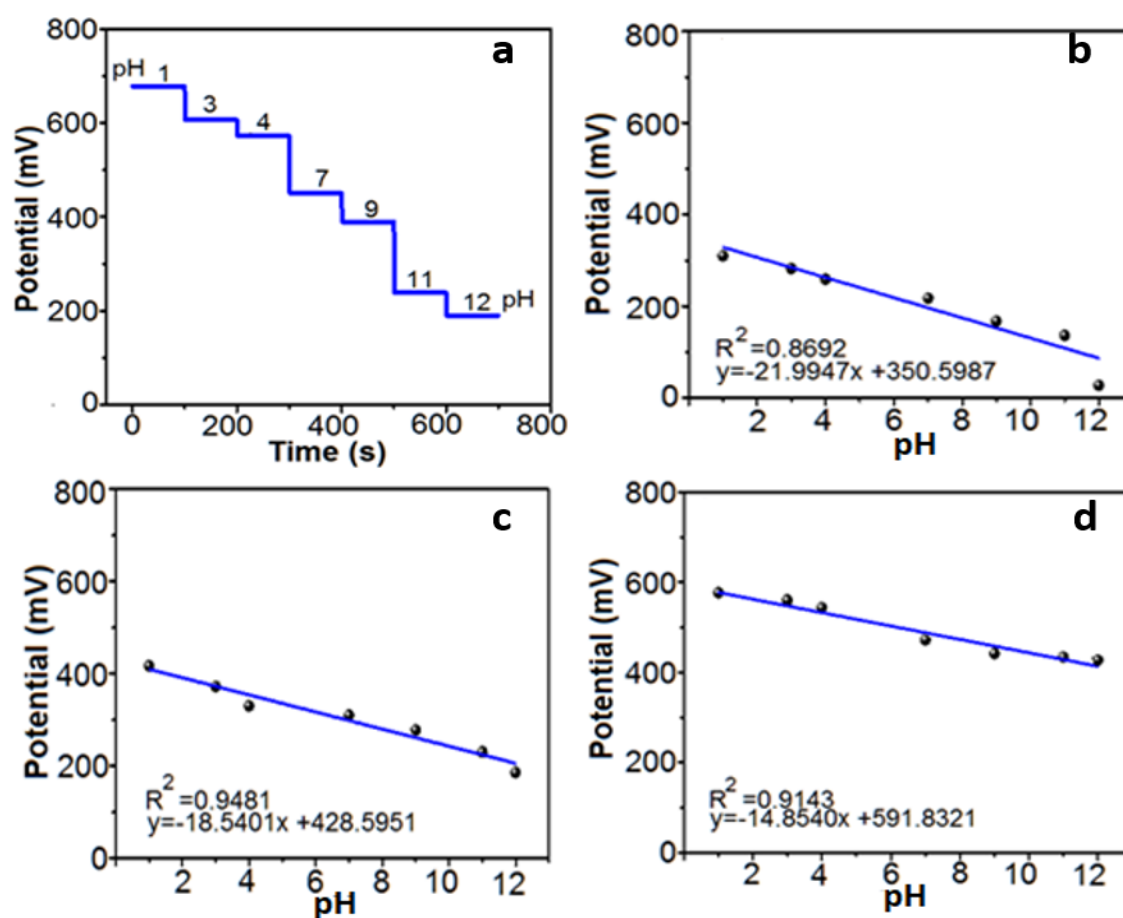


Figure S10. (a) Potential-time response obtained on increasing the pH of NaOH/HCl electrolyte for ZnO electrode. Calibration plot for ZnO/V₂O₅ pH sensors with a straight line representing the linear fit after (a) 50 cycles (b) 100 cycles (c) 200 cycles of repetitive bending.

Table S1. Sensitivity, limit of detection (LOD), and Limit of quantification (LOQ) of ZnO and ZnO/V₂O₅ glucose sensor on ZnO seed layer at different deposition times.

| Electrodes | Deposition time, min | Sensitivity, $\mu\text{AmM}^{-1}\text{cm}^{-2}$ | LOD, μM | LOQ, μM |
|-----------------------------------|----------------------|---|--------------------|--------------------|
| ZnO | 10 | 21.06 | 598 | 1990 |
| | 20 | 46.98 | 268 | 892 |
| | 30 | 30.67 | 392 | 1304 |
| ZnO/V ₂ O ₅ | 10 | 66.15 | 192 | 624 |
| | 20 | 72.06 | 174 | 582 |
| | 30 | 56.31 | 229 | 793 |