Supplementary materials

A Portable and Ecologic Paper-Based Device for Glucose Monitoring in Peripheral Blood Mononuclear Cell Lysates

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Potential identification of paper substrate for chronoamperometry experiments

To optimize the parameters for chronoamperometry experiments, we conducted a comparative study using Whatman filter paper and benchtop filter paper (Figure S1). The results demonstrated that Whatman filter paper outperformed benchtop filter paper, providing higher sensitivity and a lower limit of detection (LOD).

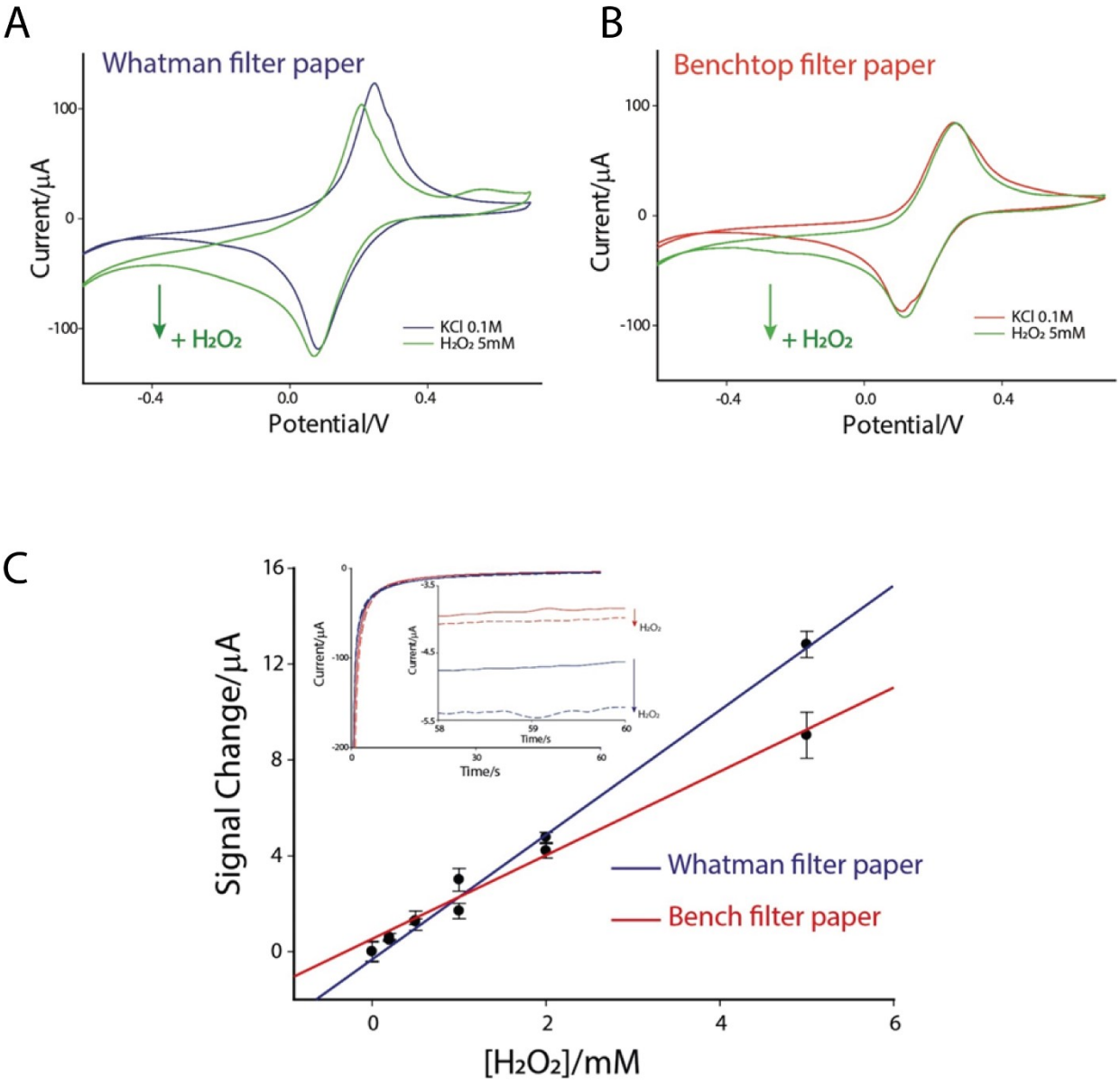

Figure S1: Optimization of paper substrate **(A)** Whatman filter paper; **(B)** bench-top filter paper; **Experimental parameters**: Starting potential: -0.7 V; First vertex potential (E_{V1}): -0.7 V; Second vertex potential (E_{V2}): 0.7 V; Potential step (E_{step}): 0.01 V; Scan rate: 0.1 V/s; Number of scans: 2; **(C)** calibration curves comparing Whatman filter paper (blue) and bench-top filter paper (red) for hydrogen peroxide detection using chronoamperometric technique. **Experimental parameters**: E_{dc}: -0.1 V; $T_{interval}$: 0.1 seconds; and a T_{run}: 60 s.

Using the chronoamperometry technique, we further compared Whatman filter paper with standard bench top filter paper for detecting H_2O_2 under optimized conditions, applying a potential of -0.1 V and testing H_2O_2 solutions in 0.1 M potassium chloride at various concentrations (Figure S1 C). The calibration curves showed that Whatman filter paper had

the steepest slope among the three indicating that it was the most sensitive. In particular, Whatman filter paper gave the linear equation of y = 2.57x – 0.21 with the coefficient of determination (R^2) of 0.99 which indicates very high degree of linearity. The limit of detection (LOD) was calculated at 0.46 mM, and the limit of quantification (LOQ) at 1.40 mM. Additionally, the relative standard deviation (RSD%) was 4.5%, indicating good precision across repeated measurements. On the other hand, benchtop filter paper gave a calibration equation of y = 1.74x + 0.53 with an R^2 of 0.96. Still, the LOD was 0.74 mM while the LOQ was 2.23 mM indicating that sensitivity had been reduced. The RSD% was 7. 2 %, which indicated that the measurements were not as precise as those made in the previous experiment. Therefore, Whatman filter paper was chosen for subsequent analyses as it had the best sensitivity, precision and performance.

SEM images of paper-based substrates

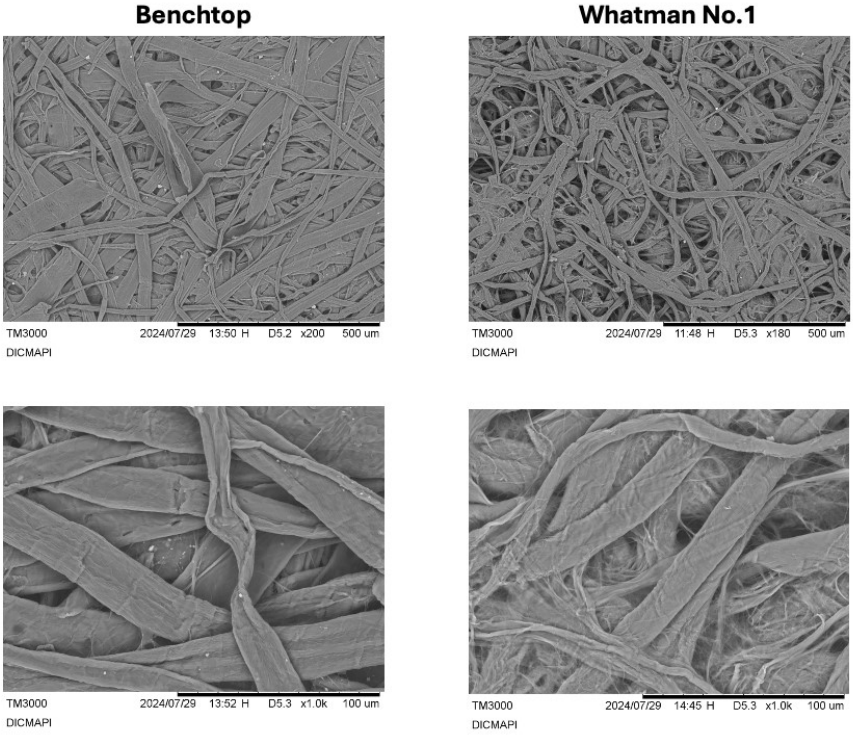

Figure S2: SEM images of the Benchtop (left) and Whatman No.1 (right) papers.