Supplementary Material

Methylene blue-Modified Biochar from Sugarcane for the Simultaneous Electrochemical Detection of Four DNA Bases

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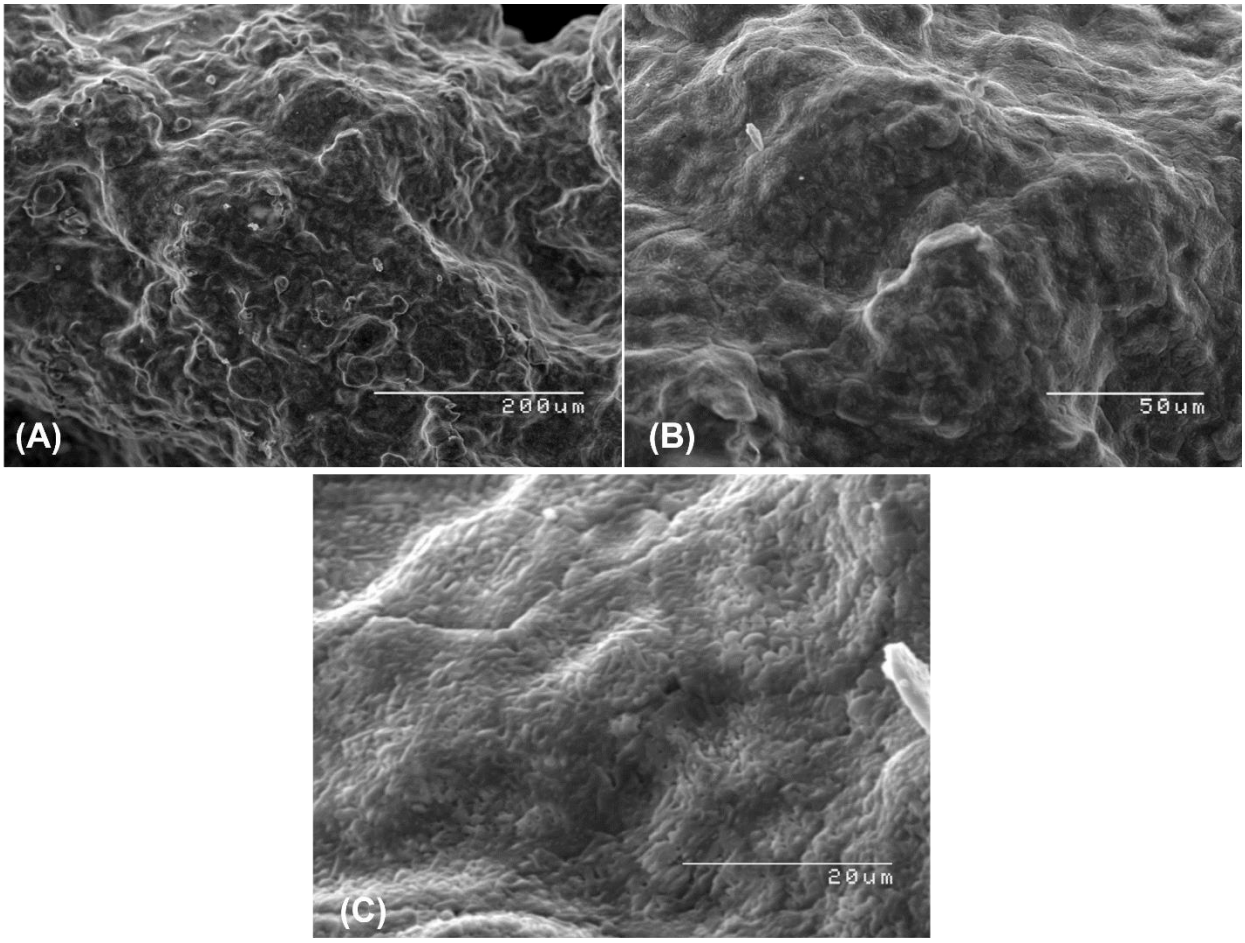

Figure S1: (A-C) SEM images of the SC-MB hybrid nanocomposite after grinding the intact bagasse fibres that were treated with a saturated MB solution. The scale bars in images A, B, and C are 200 μm, 50 μm, and 20 μm, respectively.

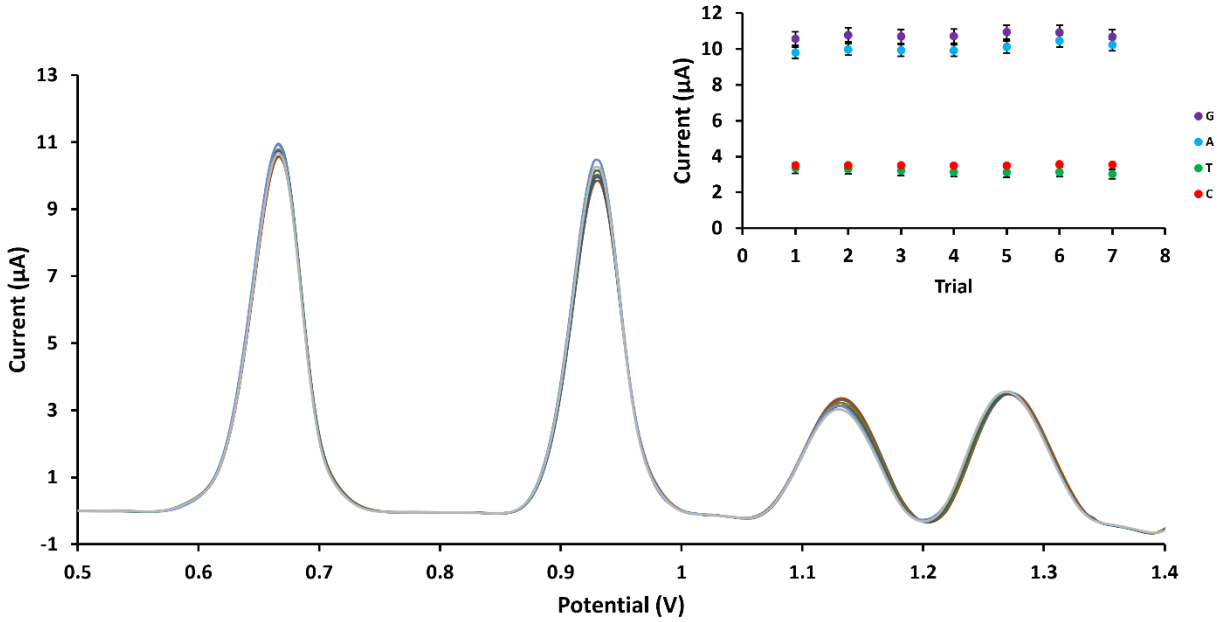

Figure S2: Reproducibility study with seven successive DPV measurements (n=7) were performed while keeping the concentration of G, A, T, and C constant at 33.3, 33.3, 333.3, and 333.3 µM, respectively. The RSD (%) calculated for G, A, T, and C were 1.3, 2.2, 3.5 and 0.7%, respectively. The inset is a plot of the peak current for each nucleotide with respect to the trial.

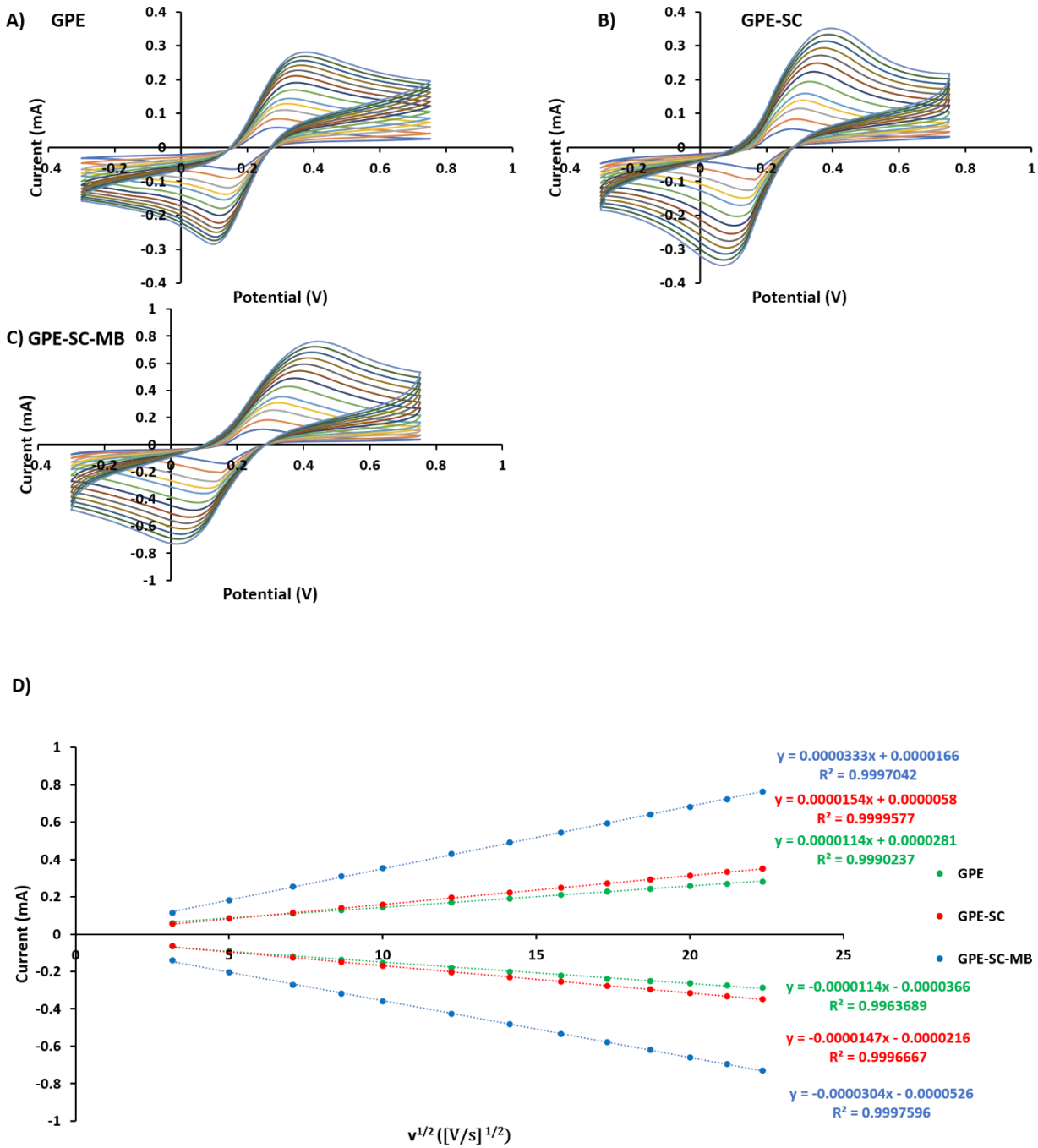

Figure S3: Cyclic voltammograms of (A) GPE, (B) GPE-SC, and (C) GPE-SC-MB at varying scan rates between 10 mV/s and 500 mV/s. (B) Plot of the anodic and cathodic peak current values with respect to the square root of the scan rate for the GPE (green), GPE-SC (red), and GPE-SC-MB (blue). All CVs were performed in a solution of 5 mM $K_3Fe(CN)_6$ and 5 mM $K_4Fe(CN)_6$ with 0.1 M KCl.

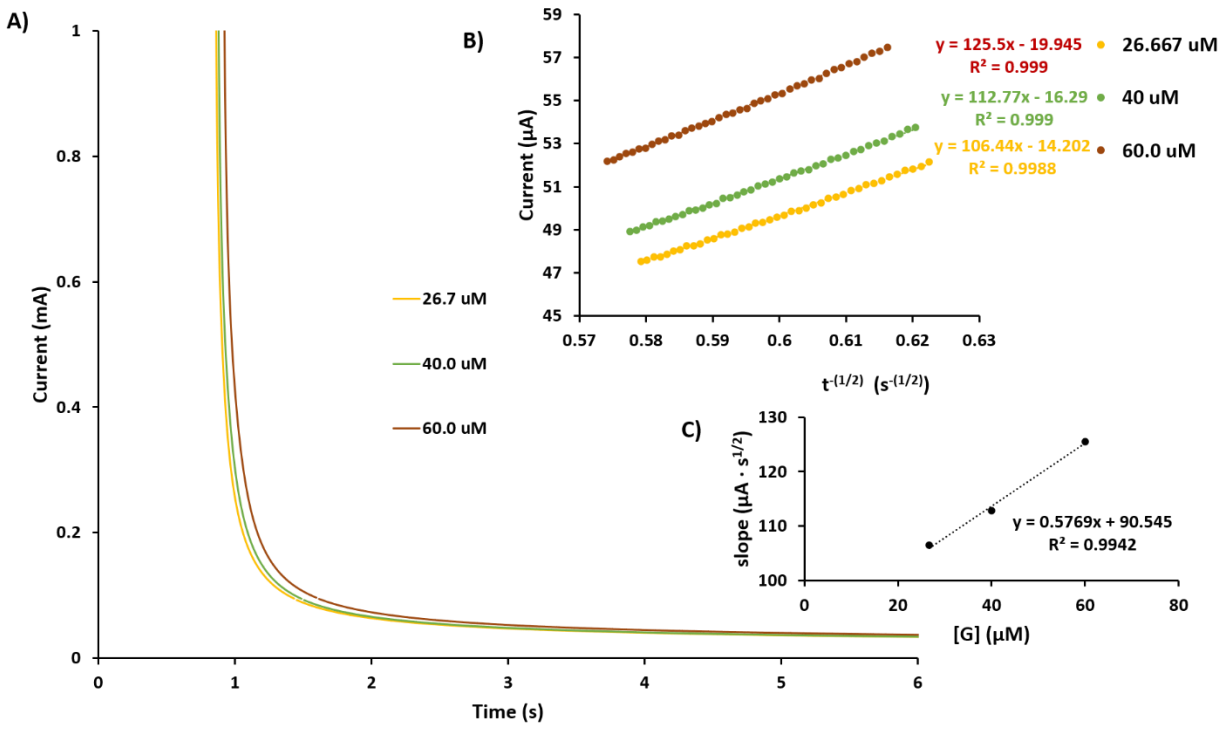

Figure S4: (A) Chronoamperograms of the GC-SC-MB in the presence of varying concentrations of G (26.7 µM, 40.0 µM, and 60.0 µM). (B) A plot of the current obtained from the chronoamperograms with respect to the inverse square root of time (1/√s). (C) A plot of the slope from plot (B) with respect to the concentration of G.

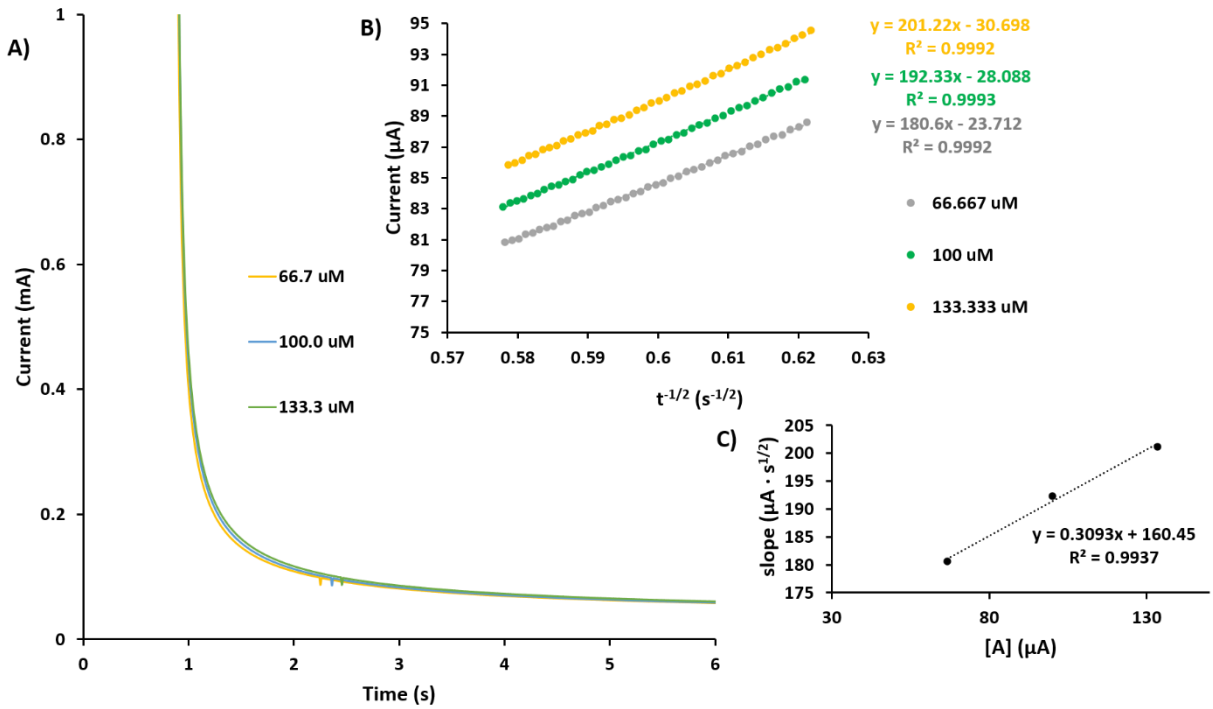

Figure S5: (A) Chronoamperograms of the GC-SC-MB in the presence of varying concentrations of A (66.7 µM, 100 µM, and 133.3 µM). (B) A plot of the current obtained from the chronoamperogram with respect to the inverse square root of time (1/√s). (C) A plot of the slope from plot (B) with respect to the concentration of A.

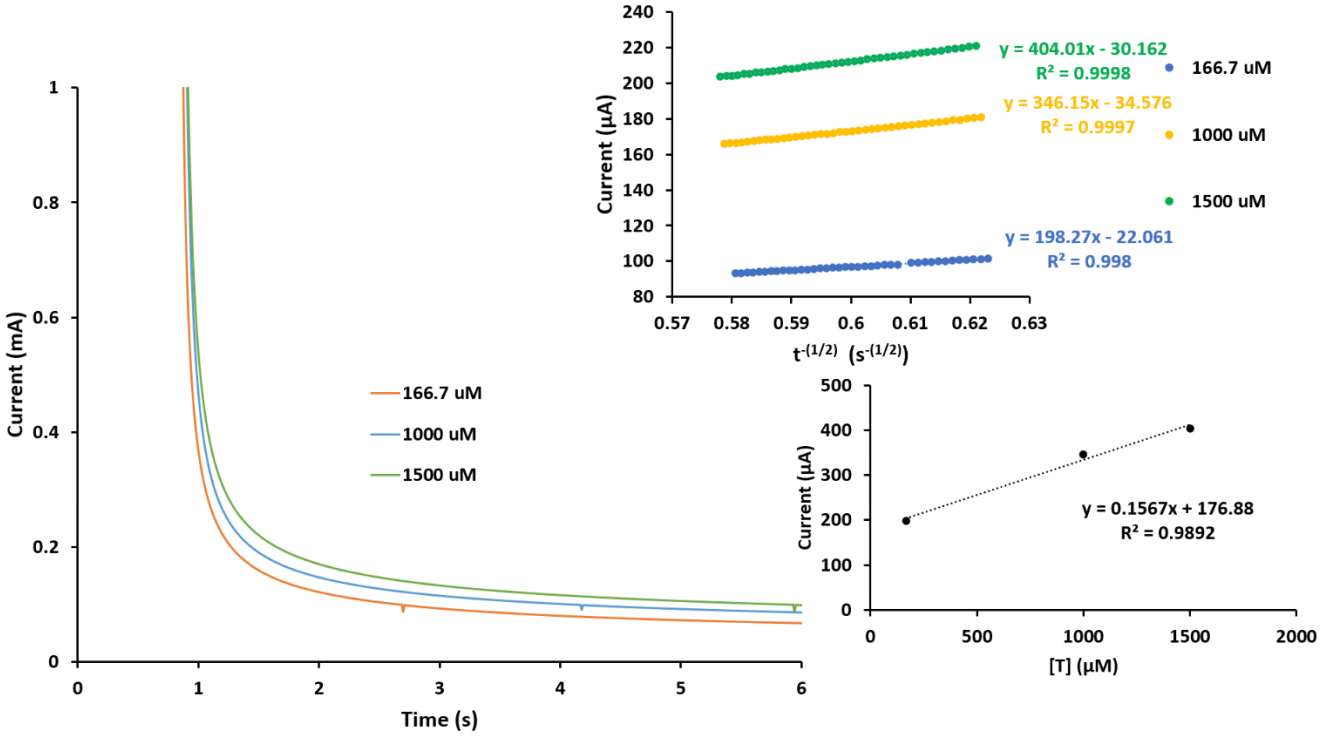

Figure S6: (A) Chronoamperograms of the GC-SC-MB in the presence of varying concentrations of T (166.7 µM, 1000 µM, and 1500 µM). (B) A plot of the current obtained from the chronoamperogram with respect to the inverse square root of time (1/√s). (C) A plot of the slope from plot (B) with respect to the concentration of T.

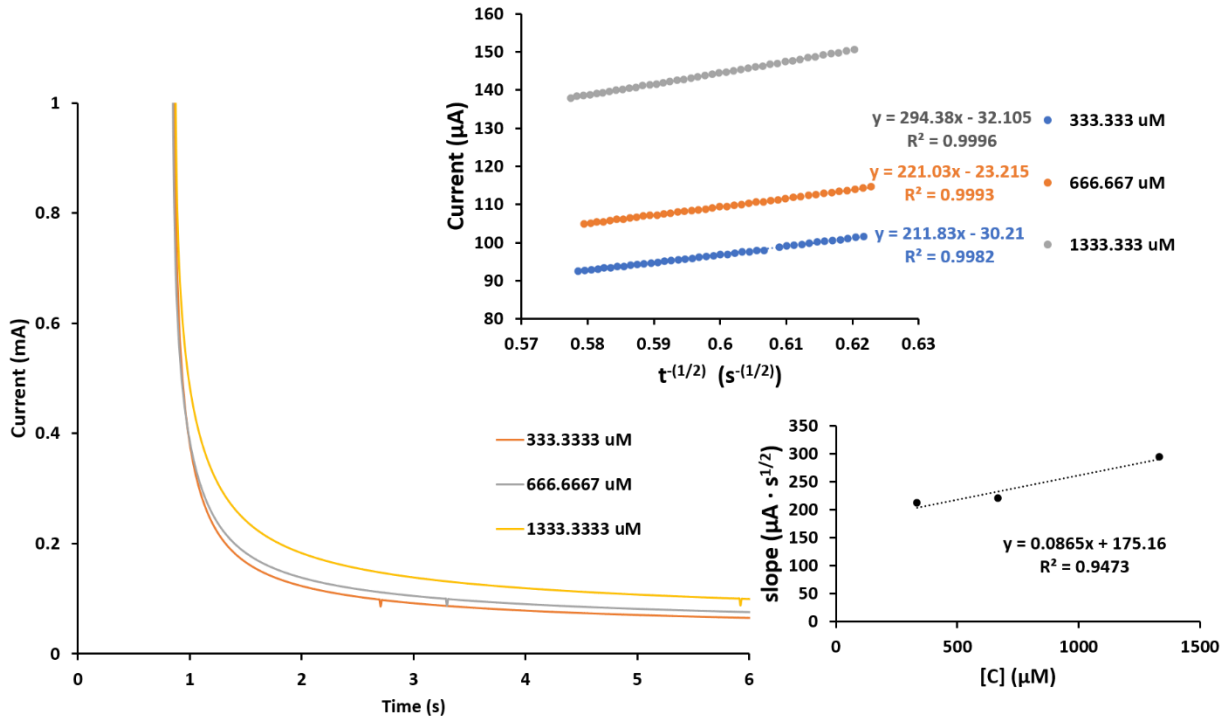

Figure S7: (A) Chronoamperograms of the GC-SC-MB in the presence of varying concentrations of C (333.3 µM, 666.7 µM, and 1333.3 µM). (B) A plot of the current obtained from the chronoamperogram with respect to the inverse square root of time (1/√s). (C) A plot of the slope from plot (B) with respect to the concentration of T.

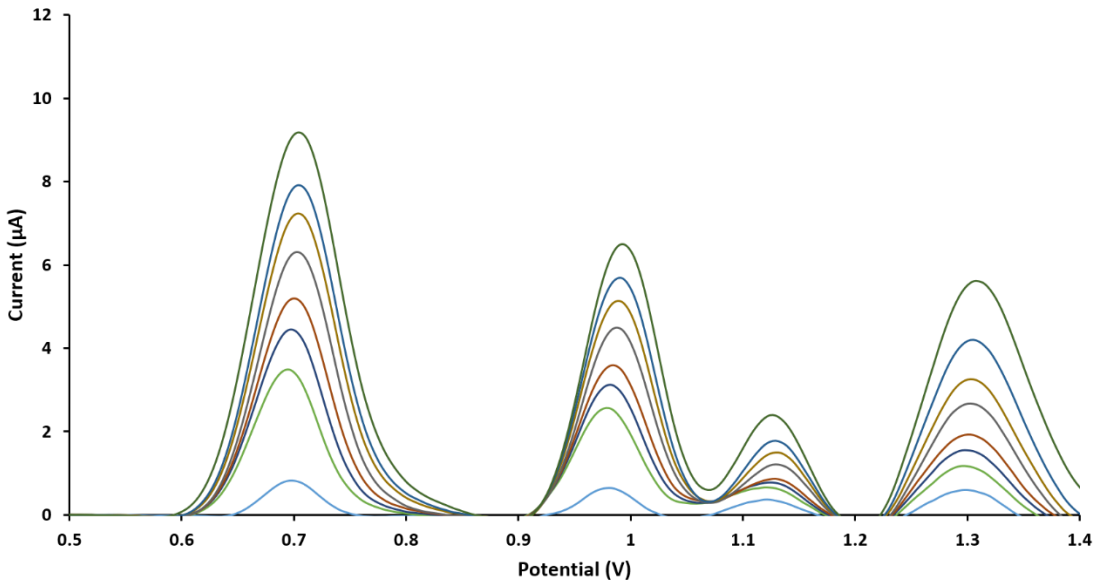

Figure S8: Differential pulse voltammograms showing the standard addition study of the four DNA bases in a human saliva sample (saliva was diluted 5-fold using 0.2 M PBS, pH 7.0). The concentrations ranged from 1.33 to 14.67 µM for G and A, and from 20 to 200 µM for T and C.