

Supplementary material

Rapid electrodeposition of Cu nanoparticles film on Ni foam as the integrated 3D free-standing electrode for noninvasive and nonenzymatic creatinine sensing

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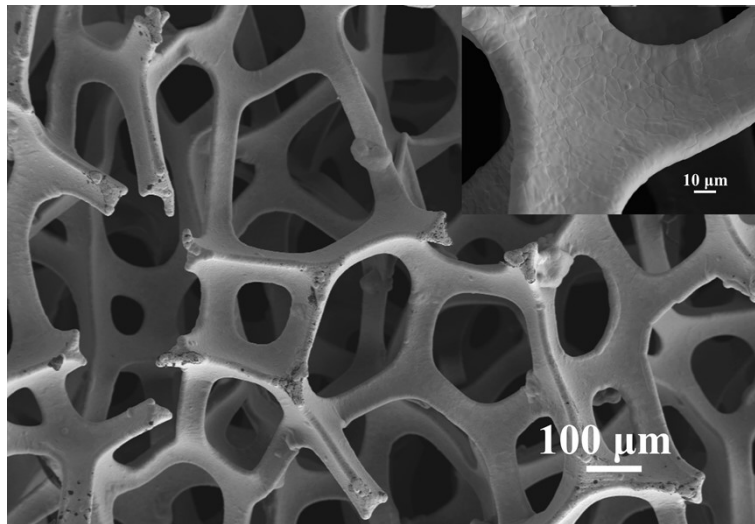


Figure S1. SEM image of bare NF.

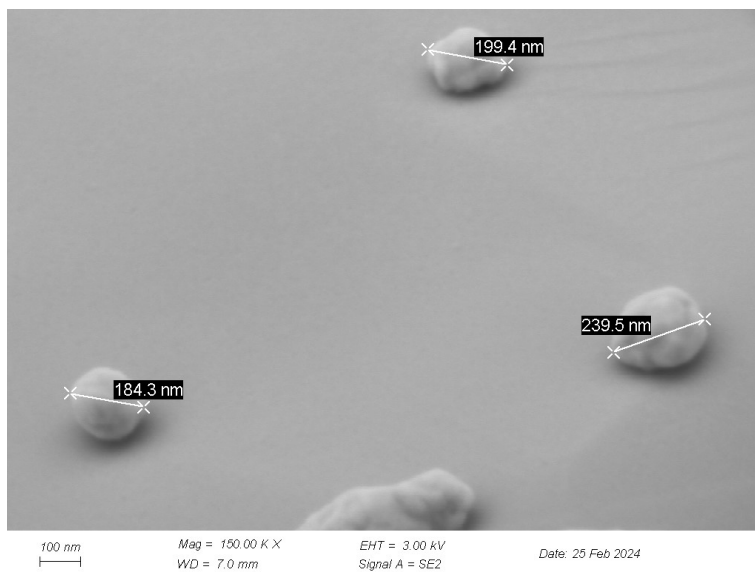


Figure S2. High-resolution SEM images of Cu nanoparticles electrodeposited on nickel foam for 10 s.

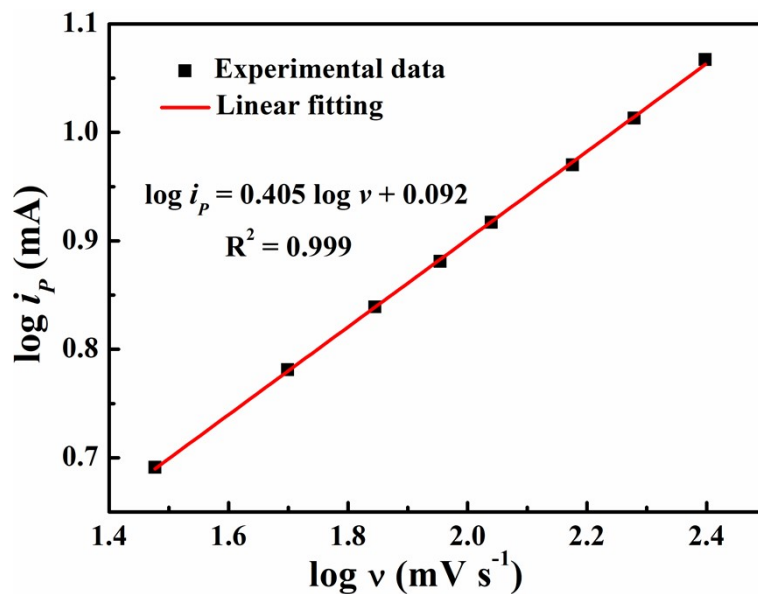


Figure S3. Dependence of logarithm of peak current on the logarithm of scan rate for 1.25 mM creatinine in 0.1 M PBS (pH 7.0) at Cu NPs film/NF electrode.

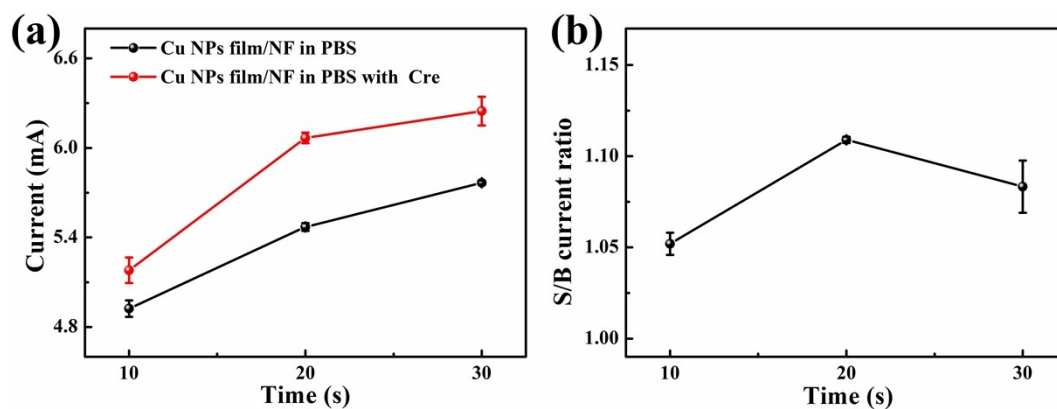


Figure S4. S/B current ratios were obtained from cyclic voltammograms of Cu NPs film/NF sensing electrodes prepared at different electrodeposition times (10s, 20s, and 30s) in 0.1 M PBS for 1.25 mM creatinine detection.

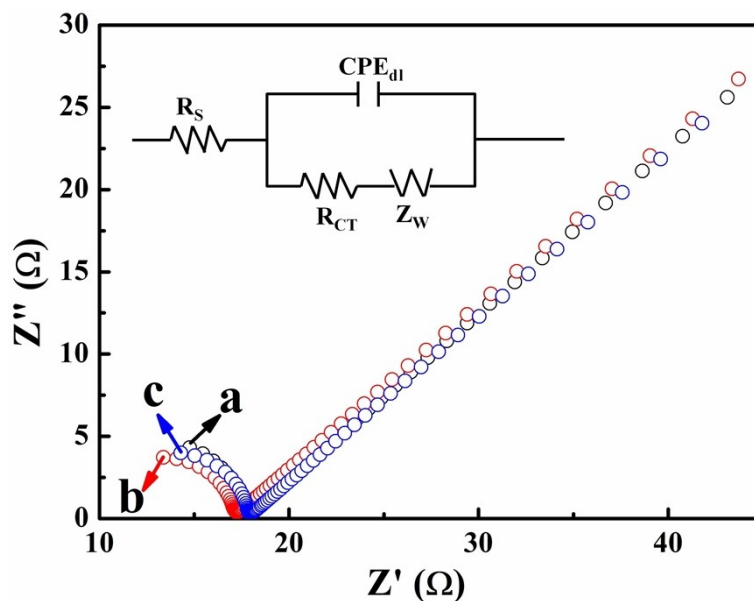


Figure. S5 EIS of Cu NPs film/NF electrodes prepared by electrodeposition for 10 s (a), 20 s (b), and 30 s (c) were carried out in an electrolyte solution containing 5 mM $[\text{Fe}(\text{CN})_6]^{3-/4-}$ and 0.1 M KCl. (Inset:Equivalent circuit model used for EIS fitting, which includes the ohmic resistance of the electrolyte (R_s), the double-layer capacitance (CPE_{dl}), the charge-transfer resistance (R_{ct}), and the Warburg impedance (Z_w). The diameters of the semicircular arcs in the high-frequency region denote the charge-transfer impedance, while the straight lines in the low-frequency region denote the substance-transfer impedance.)

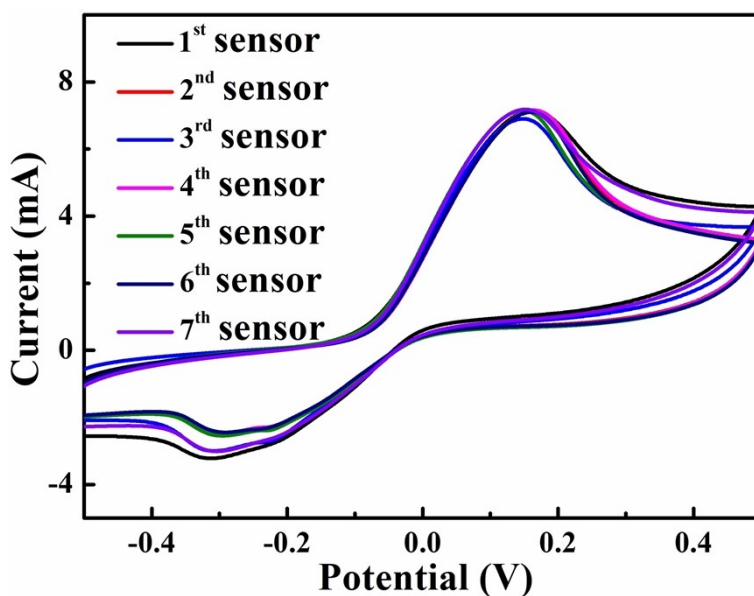


Figure S6. CV curves of seven sensors were prepared under the same growth parameters for the detection of 5 mM creatinine.

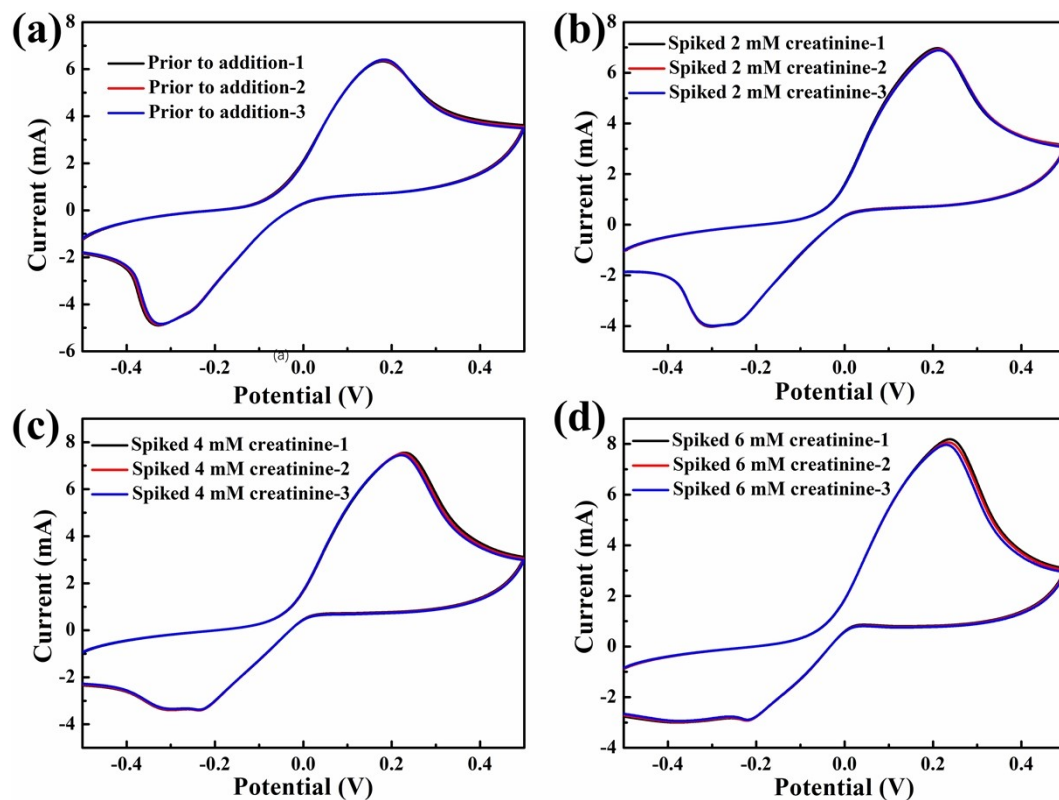


Figure S7. CV curves of diluted urine without standard addition (a), with the addition of 2 mM creatinine (b), with the addition of 4 mM creatinine (c), and with the addition of 6 mM creatinine (d) were measured using Cu NPs film/NF electrode.