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Supplementary Material to

Facile one-pot synthesis of CuO nanospheres: Sensitive electrochemical determination of hydrazine in water effluents

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Experimental

Chemicals

All chemicals were of analytical grade and used without any further purification. Copper sulfate pentahydrate ($CuSO_4·5H_2O$), ammonium hydroxide (NH_4OH, 25 %) ethanol (75 %), hydrazine, glucose, para-aminophenol, para-nitrophenol, catechol, disodium sulfide, hydrogen peroxide, nitrate, dibasic sodium phosphate ($Na_2HPO_4·2H_2O$), and monobasic sodium phosphate (NaH_2PO_4), were received from Sigma-Aldrich. Supporting electrolyte (phosphate buffer (PB) solution 0.1 M, pH 7.0) was prepared using the mixture of $Na_2HPO_4·2H_2O$ and NaH_2PO_4 in doubly distilled water (DDW).

Instrumentation

Ultraviolet–visible light (UV–vis) absorption spectra were measured with a spectrophotometer in the range of 200–1100 nm (Model V-560 JASCO, Japan). FT-IR analysis was carried out by spectrophotometer in the range of 400–4000 cm^{-1} (Model 460 Plus, JASCO, Japan). XRD experiment was performed by X-ray diffraction unit, Cu Kα radiation (λ = 1.5418° A) on X- ray diffractometer (Model JDX-8030, JEOL, Japan). Morphology and particle size of CuO NS were determined by FESEM and TEM (T20 G2, FEI TECNAI, USA). Electrochemical measurements were performed in a conventional two-compartment, three-electrode cell with glassy carbon electrode (GCE) as a working electrode, platinum (Pt) wire as a counter electrode and KCl saturated Ag/AgCl as a reference electrode. The electrochemical measurements were carried out with CHI electrochemical workstation (Model 660E, Austin, TX, USA). For differential pulse voltammetry (DPV) measurements, pulse width of 0.06 s, amplitude of 0.05 V, sample period of 0.02 s and pulse period of 0.2 s were used. Electrochemical impedance analyses were carried out at CHI-660E instrument at the applied potential of 0.22 V. The voltage perturbation was 5 mV rms over a frequency range of 100 kHz to 0.1 Hz. All electrochemical experiments were carried out under nitrogen atmosphere at room temperature.

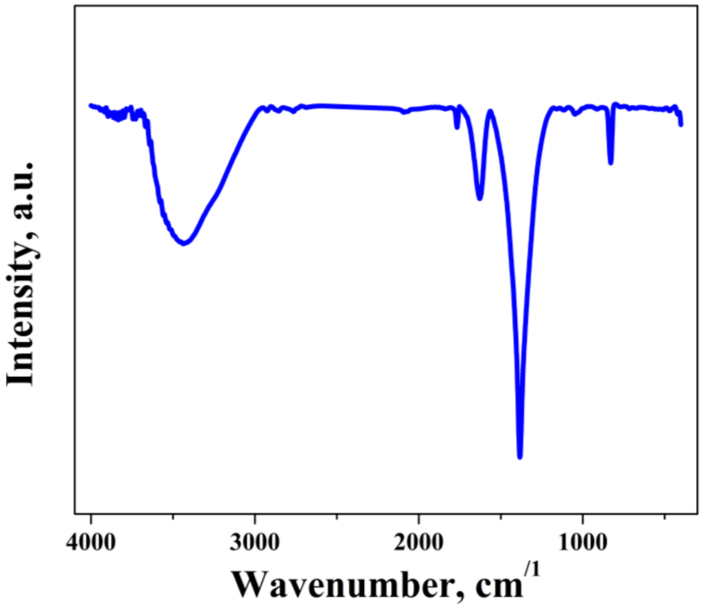

Figure S-1. *FT-IR spectrum of CuO NS*

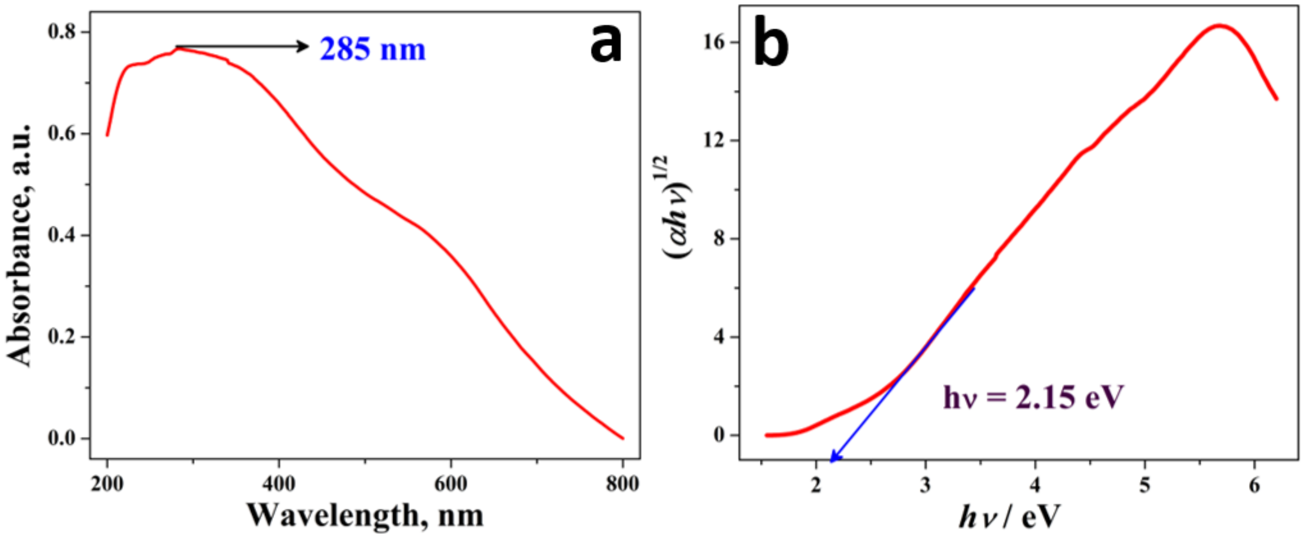

Figure S 2. *(a) UV-visible spectrum and (b) Tauc plot of CuO-NS*

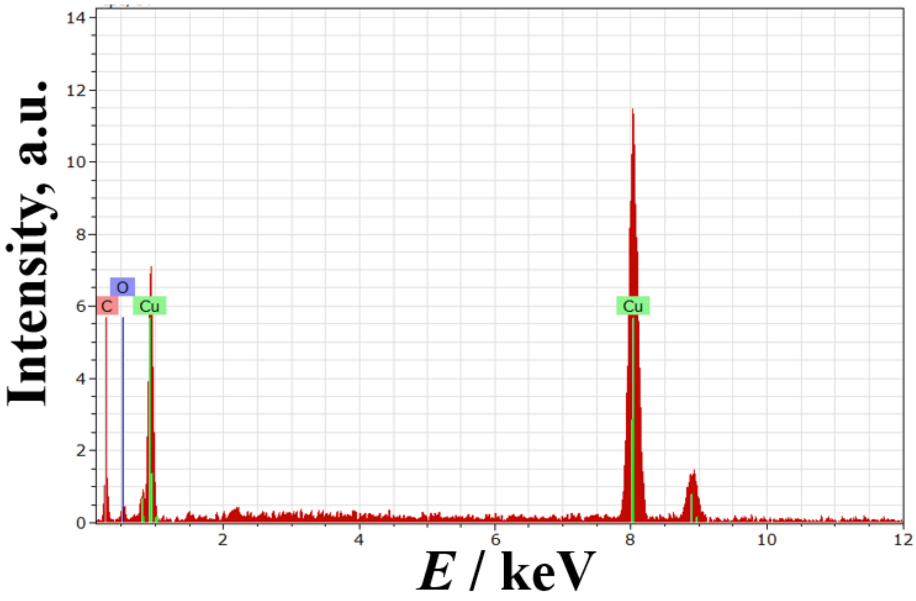

Figure S-3. *EDX elemental profile of CuO-NS*

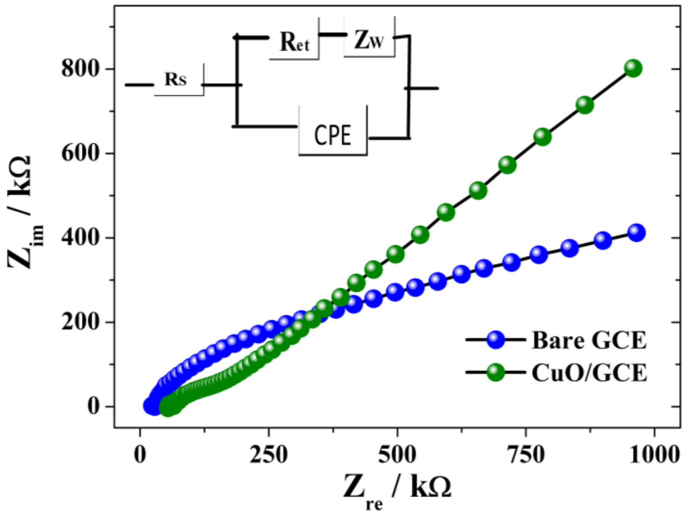

Figure S-4. *Nyquist plots of bare GCE and CuO-NS/GCE in the mixture of 5 mM [Fe(CN)$_6$]$^{3-/4-}$ and 0.1 M KCl measured at 0.22 V with ± 5 mV ac signal amplitude at frequencies from 100 kHz to 0.01 Hz; (inset: Randles equivalent circuit model)*

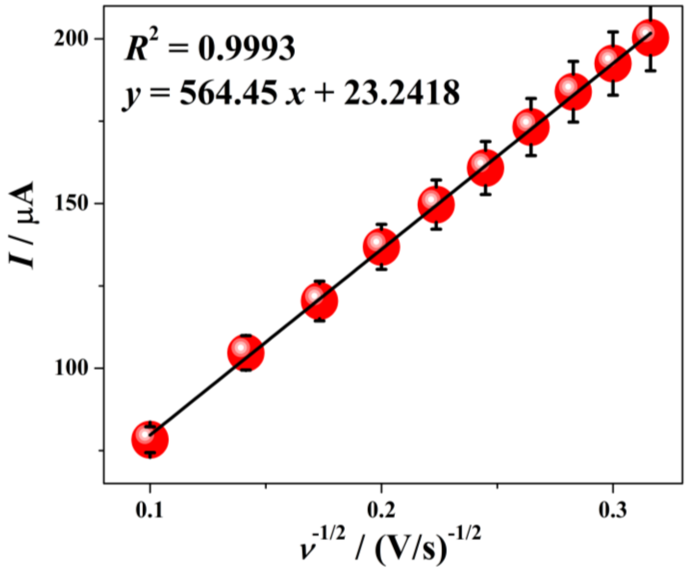

Figure S-5*. Plot of HZ oxidation peak current vs. square root of scan rate*

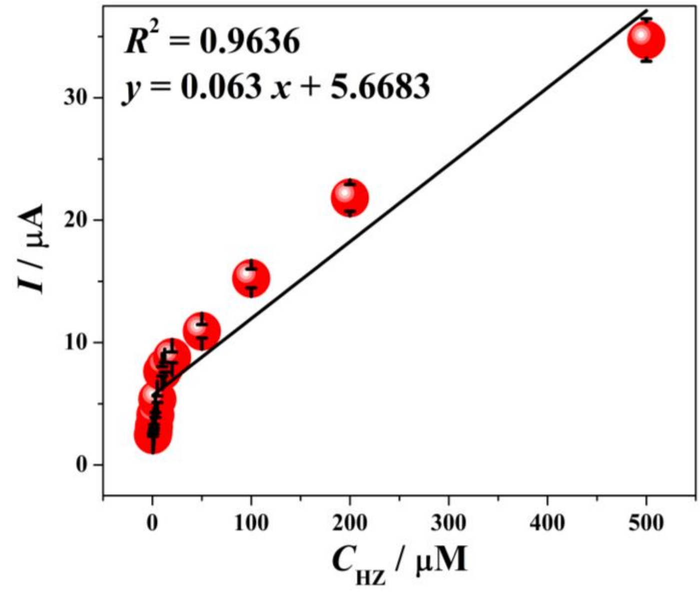

Figure S-6. *Calibration plot for oxidation peak current vs. HZ concentration.*