# Electronic Supplementary Information

# Biomimetic CuO/ZTF-8 nanozyme based neoteric sensor towards selective detection of superoxide anion

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## Materials and methods

Zinc oxide powder (ZnO, 99.9%) was obtained from Sigma-Aldrich Pvt., Ltd. 5-methyl tetrazole (mtz, $C_2H_4N_4$, 98.0%), copper acetate monohydrate ($Cu(CO_2CH_3)_2 \cdot H_2O$, 98.0%) was purchased from Tokyo Chemical Industry Co., Ltd. Methanol ($CH_3OH$) was purchased from Central Drug House Pvt., Ltd. Potassium dioxide ($KO_2$) and dopamine hydrochloride (DA) were procured from Sigma-Aldrich. Uric acid (UA), tryptophan (L-Tryp), cholesterol (Chol), glucose (Glu), ammonia solution, N, N-Dimethyl Formamide (DMF) and sodium hydroxide pellets (NaOH) were purchased from SRL chemicals, India. Hydrogen peroxide ($H_2O_2$) and ascorbic acid (AA) was obtained from Merck, India. Potassium perchlorate ($KClO_3$) was obtained from Alfa Aesar, India and potassium nitrite ($KNO_2$) was bought from Avra Chemicals, India. All the chemicals and solvents were used without further purification.

## Instrumentation

Powder X-ray diffraction was recorded from Bruker DS advance instrument using iron-filtered Cu Kα radiation (λ=1.5406 Å). Field Emission Scanning Electron Microscopic (FE-SEM) was performed using Thermo-Fisher FEI QUANTA 250 FEG under high vacuum conditions at an operating voltage range of 5 kV – 30 kV. High resolution transmission electron microscopic studies were carried out in JEOL JEM 2100 with LaB6 as electron source. X-ray photoelectron spectroscopic studies were recorded using PHI5000 Version Probe III. Electron spin resonance studies were done using JEOL JES FA200 with X-band frequency of 8.75 - 9.65 GHz. All electrochemical studies were carried out using CHI-760E electrochemical workstation. A conventional three-electrode system with glassy carbon electrode as the working electrode, Ag/AgCl as the reference electrode and platinum coil as the counter electrode were employed to conduct all the electrochemical studies.

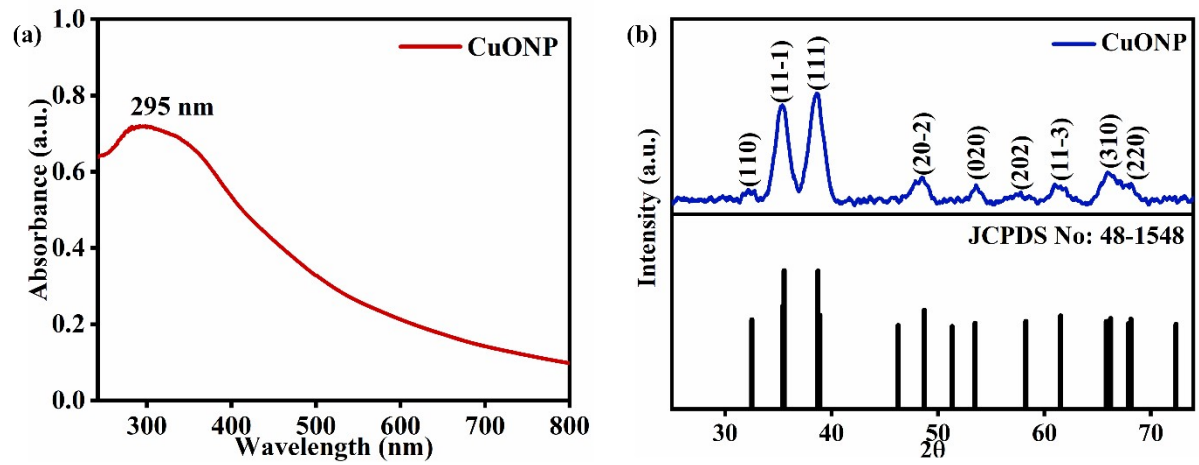


**Fig. S1 (a)** UV-vis spectrum and **(b)** PXRD pattern of CuONP.

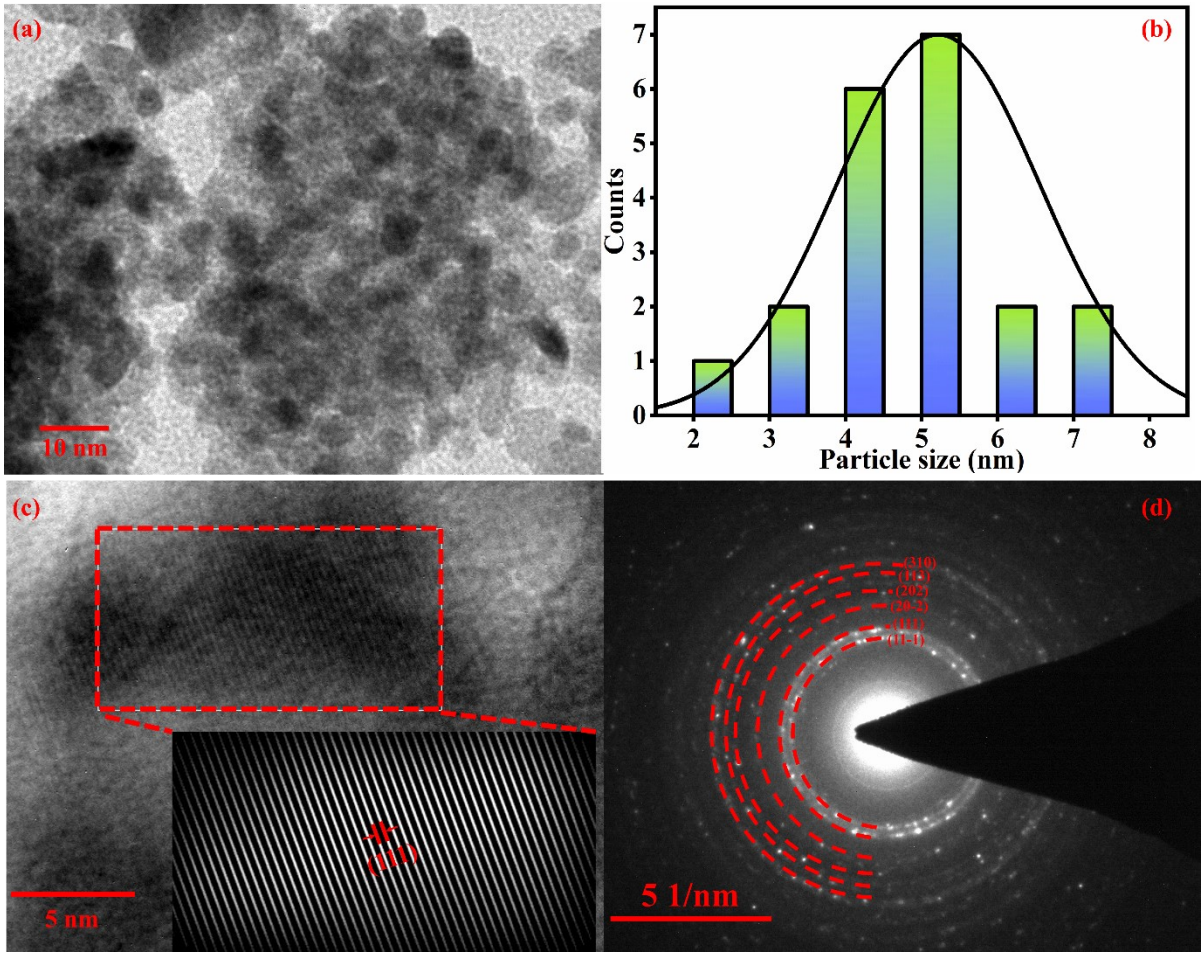


**Fig. S2 (a and c)** HRTEM images **(b)** size distribution curve and **(d)** SAED pattern of CuONP.

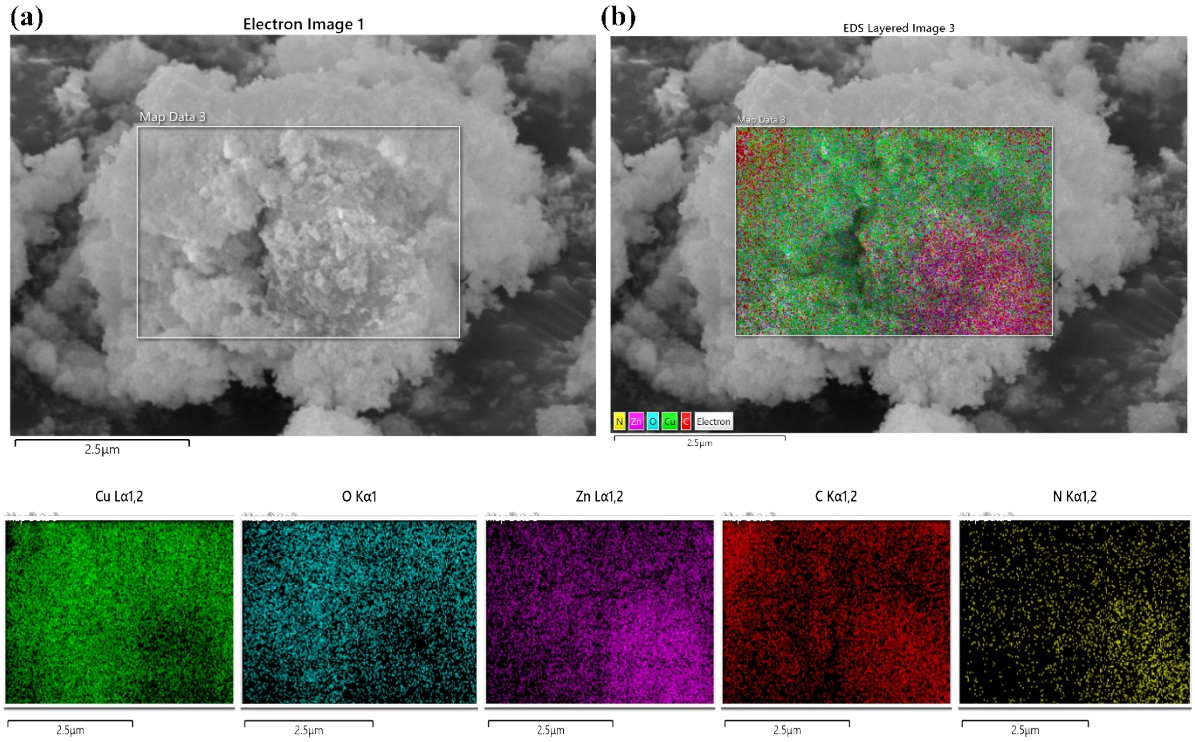


**Fig. S3** FESEM and elemental analysis of CuO/ZTF-8 nanocomposite.

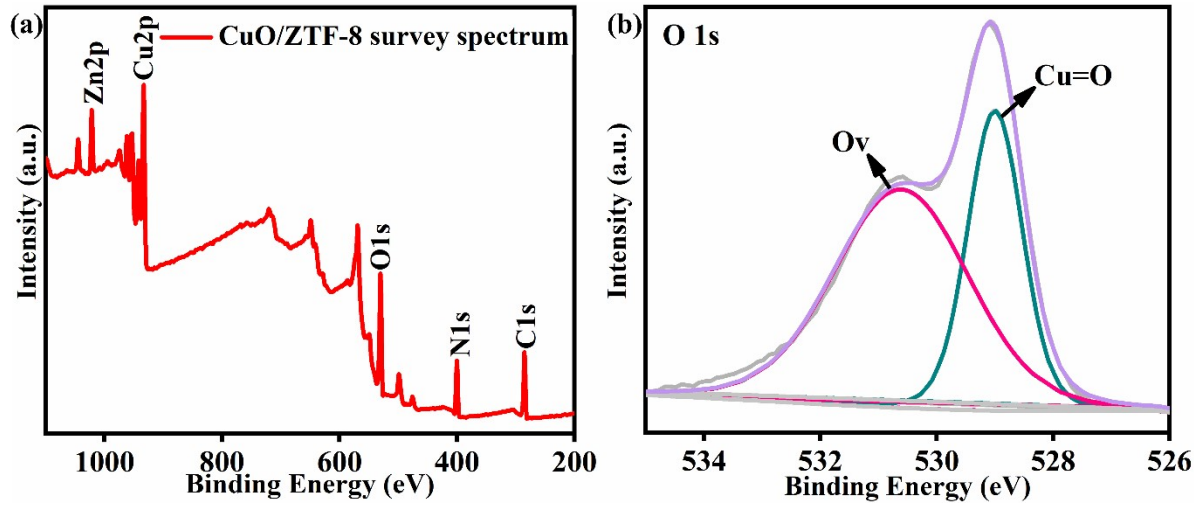


**Fig. S4** XPS **(a)** survey spectrum and **(b)** O 1s spectrum of CuO/ZTF-8 nanocomposite.

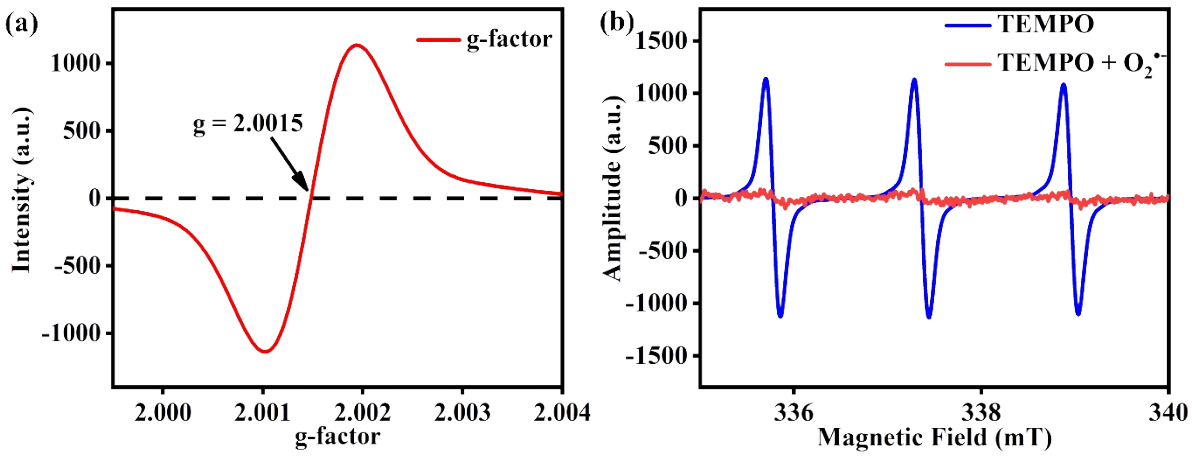


**Fig. S5 (a)** g-factor plot of TEMPO. **(b)** ESR spectrum of TEMPO in the presence and absence of $O_2^{\bullet-}$.

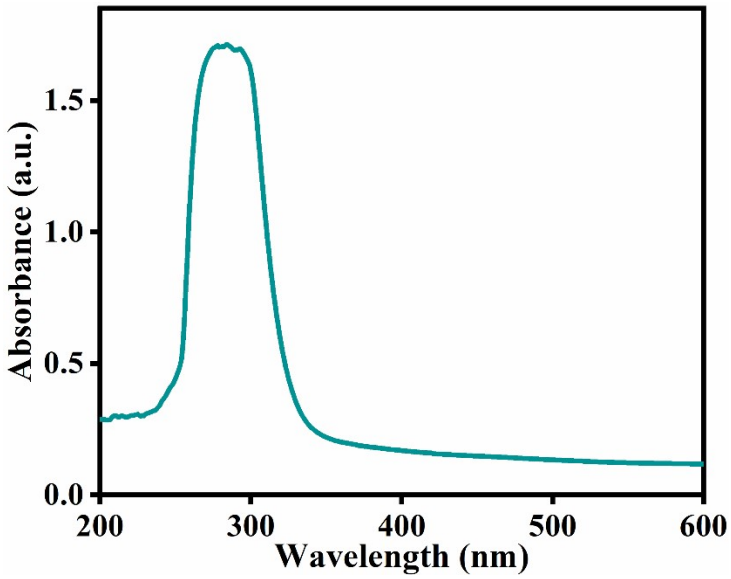


**Fig. S6** Absorbance spectra of 7.1 mg of $KO_2$ in DMSO in the presence of 18-crown-6.

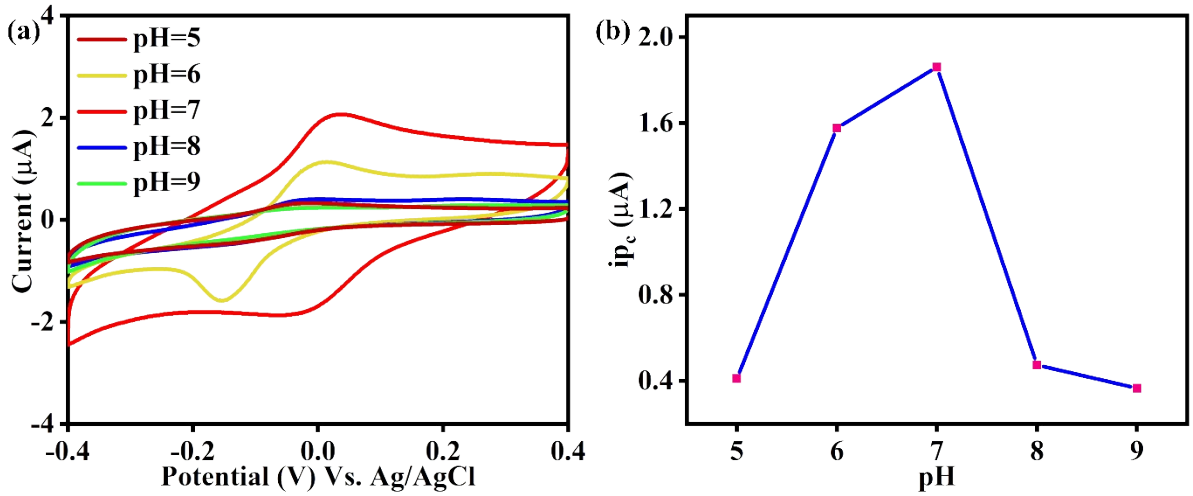


**Fig. S7 (a)** CVs of CuO/ZTF-8/GCE in 0.1 M PBS at different pH values (pH: 5.0, 6.0, 7.0, 8.0, and 9.0) at a scan rate of 50 mV $s^{-1}$. **(b)** Effect of pH on the cathodic peak current of CuO/ZTF-8/GCE.

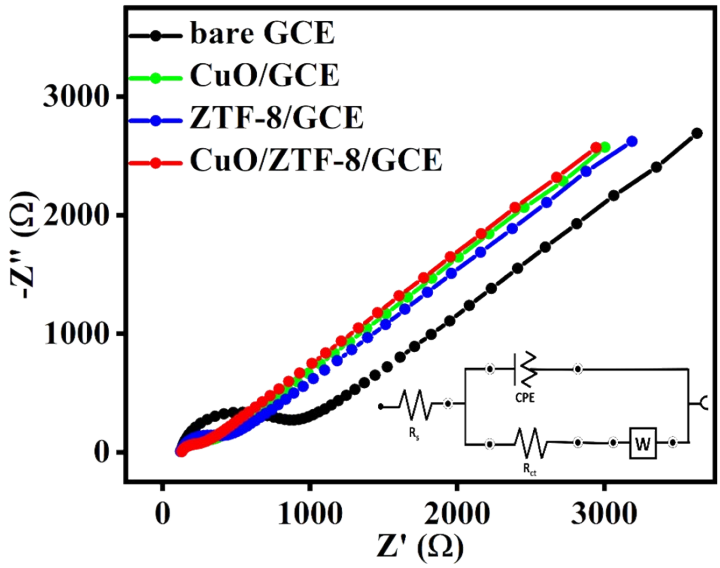


**Fig. S8** Electrochemical impedance spectra of bare GCE, CuO/GCE, ZTF-8/GCE and CuO/ZTF-8/GCE recorded in the presence of 2.5 mM $[Fe(CN)_6]^{3-}$ in 0.1 M KCl.

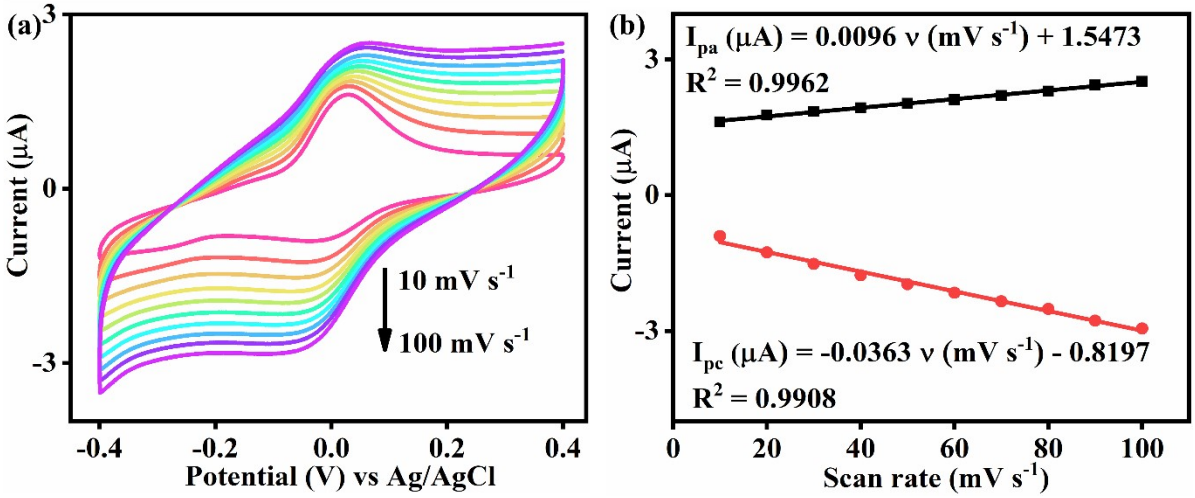


**Fig. S9 (a)** Effect of scan rate of CuO/ZTF-8/GCE at different scan rates from 10 mV $s^{-1}$ to 100 mV $s^{-1}$. **(b)** Plot of peak currents vs scan rate.

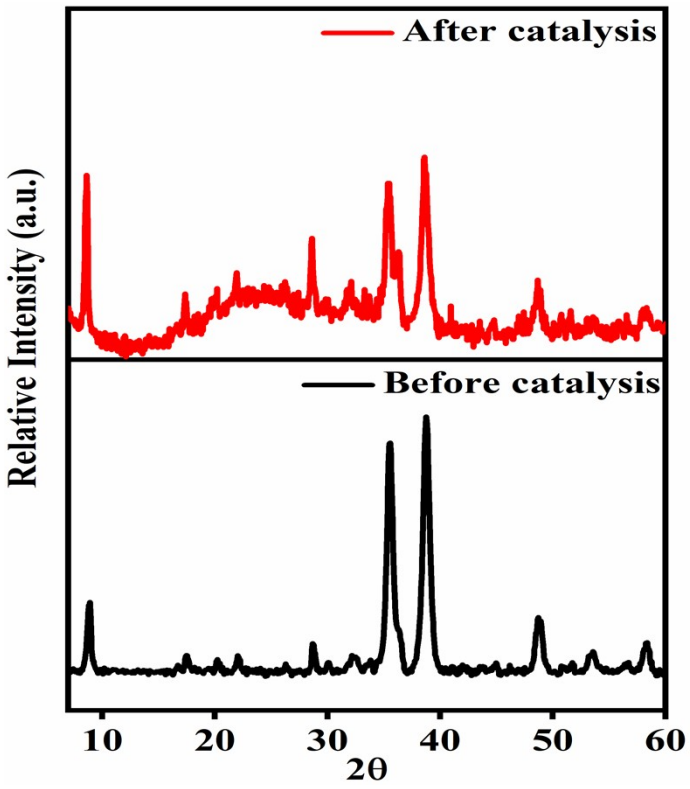


**Fig. S10** PXRD pattern of CuO/ZTF-8 nanocomposite before and after catalysis.

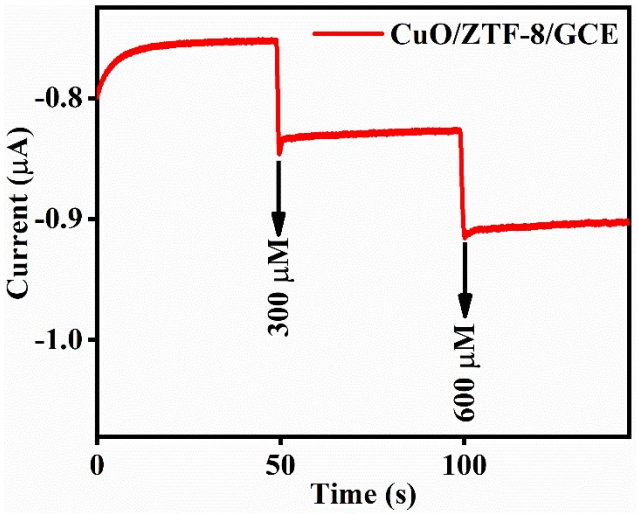


**Fig. S11** Amperometric response of CuO/ZTF-8/GCE at -0.2 V for successive addition of $O_2^{\bullet-}$ to serum sample in 0.1 M PBS (pH = 7; $N_2$ saturated).