

## **Copper enhanced fluorescence: A novel platform for sensing of hydrogen peroxide**

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### **Materials and instruments**

Without further purification, all of the chemicals employed in the studies were of analytical grade. Triple-distilled water was employed during the entire project. All glassware was cleaned using freshly made aqua regia, followed by soapy water and lots of distilled water. Before usage, the glassware had been thoroughly dried. All of the metal salts including copper sulphate were purchased from Sigma Aldrich. NaOH and Hydrogen per Oxide were purchased from Fisher Scientific and Qualigens, respectively. Fisher Scientific provided buffer tablets for the pH metre calibration. The purchase of salicylaldehyde (SL) was done from Loba Chemicals.

Using a digital spectrophotometer called the Shimadzu UV-2600, all UV/Vis absorption spectra were captured. A Horiba FluoroMax-4 spectrometer was used to analyse the fluorescence at room temperature. The JEOL Make JSM-7610FPlus FESEM at SAIF, a high resolution (1 KV 1.0nm, 15 Kv 0.8nm) with wide range of probe scanning electron microscope, was used to analyse particle morphology. Prior to performing the FESEM experiment, samples were vacuum dried for 24 hours. For microscopic examination, the water suspension was dried on carbon tape. Atomic absorption shimadzu AA-7000F was also used to assess the amount of iron in natural water (double beam optics with high sensitivity and flexibility). With the help of a Systronics Digital pH metre 335, pH solutions were created.

## Synthesis of CEF

NaOH (0.15 g) was dissolved in 500 mL of distilled water, and copper sulphate solution (0.159 gm) was dissolved in 100 ml of distilled water. 2.5 mL of SL and 0.15 g of NaOH were mixed in 500 mL of water to create a pale yellow SL solution. SL, NaOH and CuSO<sub>4</sub> solution (5:4:4) were mixed thoroughly and aged for 8 h to obtain solution (CEF).

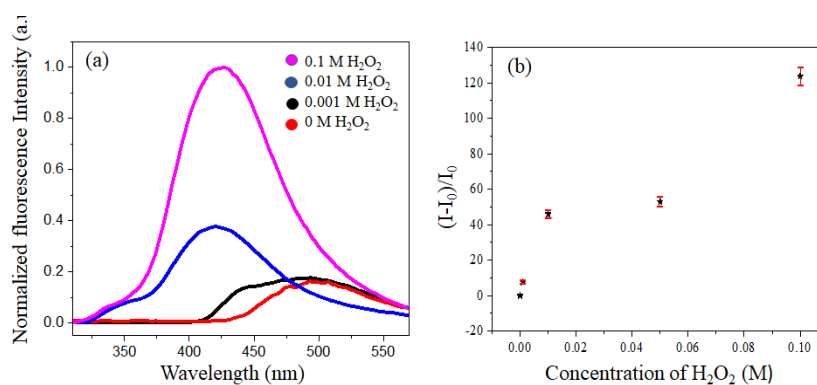


Fig. S1: (a) Fluorescence spectra of SL with various concentration of H<sub>2</sub>O<sub>2</sub>; (b) Relative enhancement at various concentrations of H<sub>2</sub>O<sub>2</sub>.

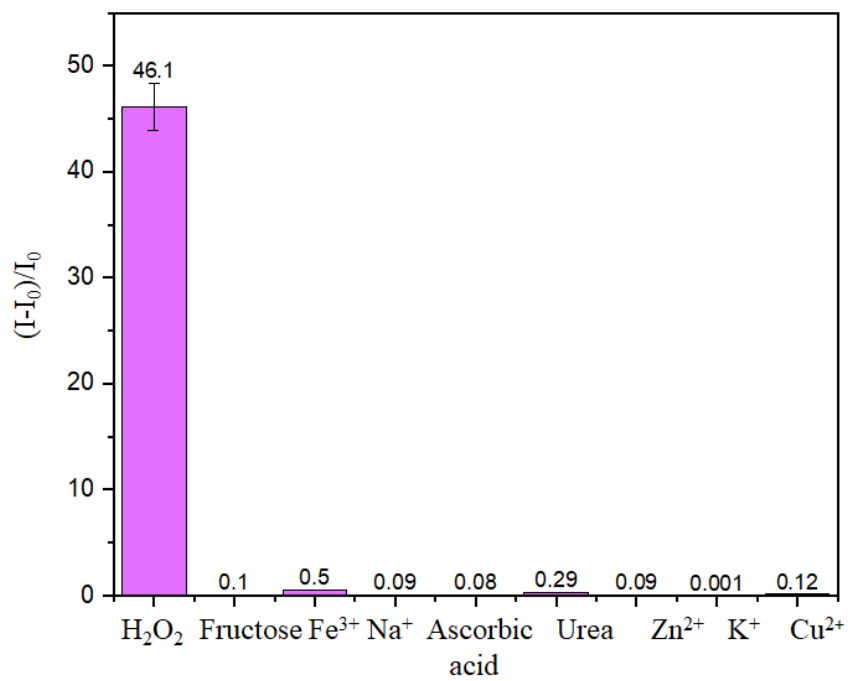


Fig. S2: Bar diagram indicating the fluorescence alteration of alkaline SL at different competitive molecules.

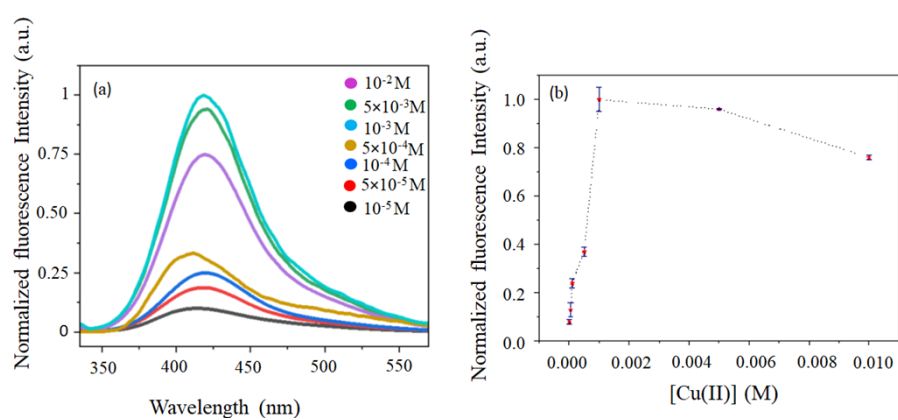


Fig. S3: (a) Fluorescence spectra of CEF solution at different [Cu(II)]; (b) Fluorescence intensity of CEF solution at different [Cu(II)].

Condition: [SL] =  $10^{-2}$  M ;  $\lambda_{\text{ex}}$  = 290 nm

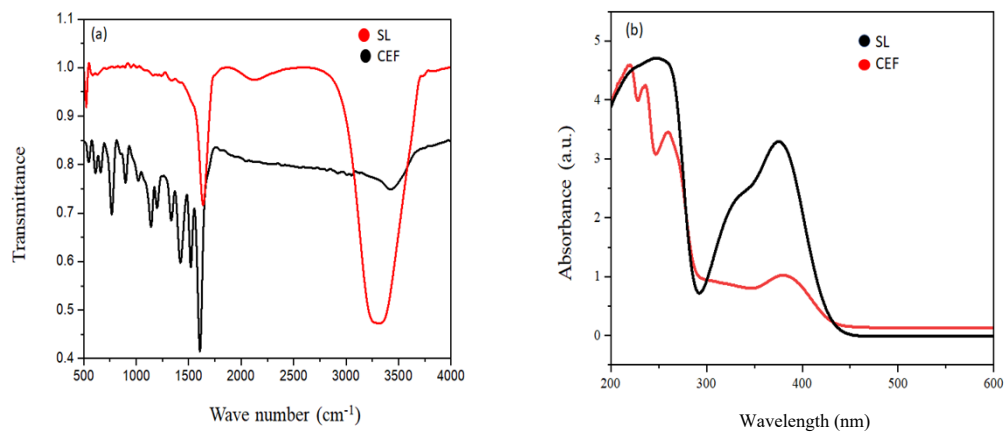


Fig. S4: (a) Fourier Transmission Infrared (FTIR) spectra of SL and CEF; (b) UV-Vis spectra of SL and CEF.

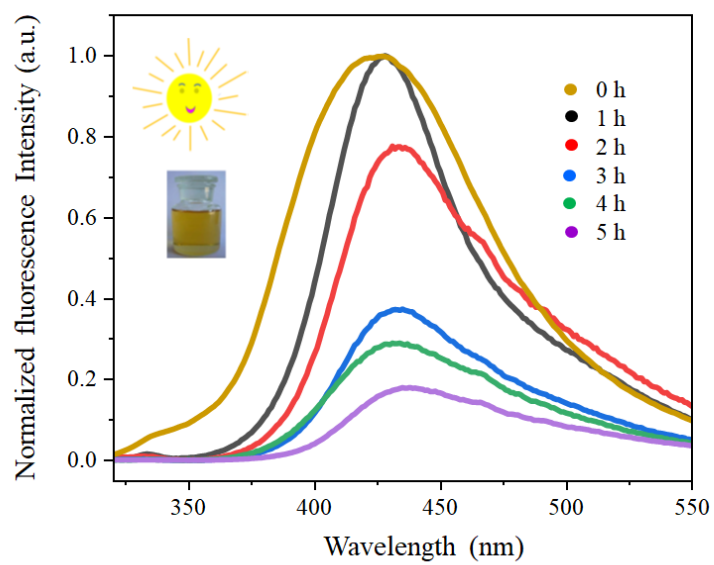


Fig S5: Fluorescence spectra of CEF solution under the exposure of sun light at different intervals.

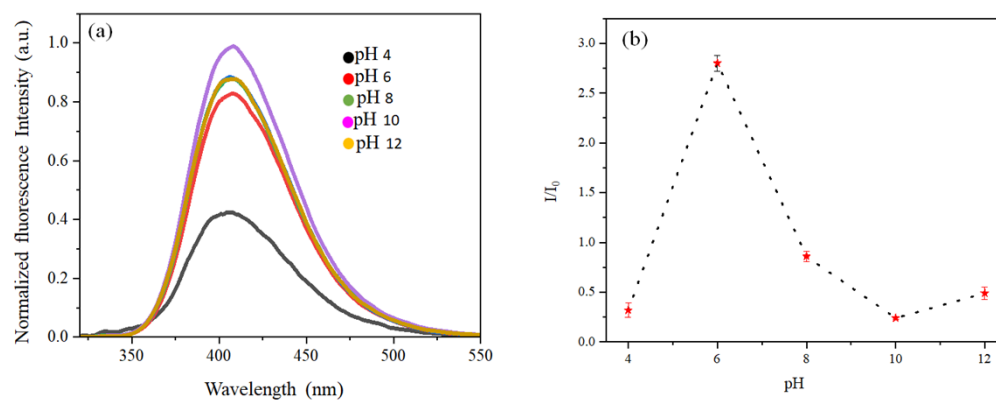


Fig S6: (a) Fluorescence spectra of CEF at different pHs; (b) Change of fluorescence intensity of CEF at different pHs with  $5 \times 10^{-4}$  M  $H_2O_2$  and  $\lambda_{ex}$  290 nm.

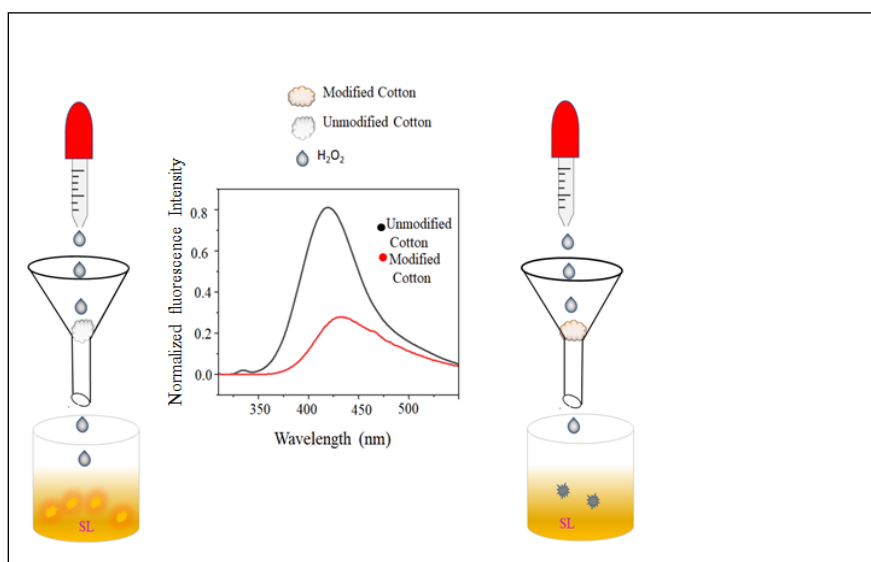


Fig. S7: Cotton wool and CEF modified cotton wool for the removal of  $H_2O_2$ .



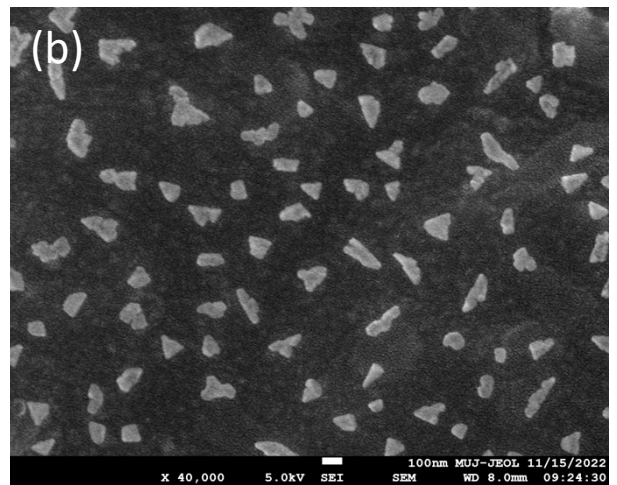
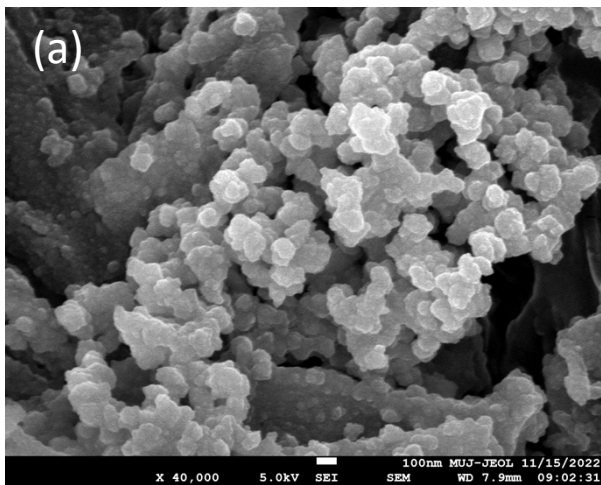


Fig. S8: FESEM image of (a) CEF and (b) CEF + H<sub>2</sub>O<sub>2</sub>

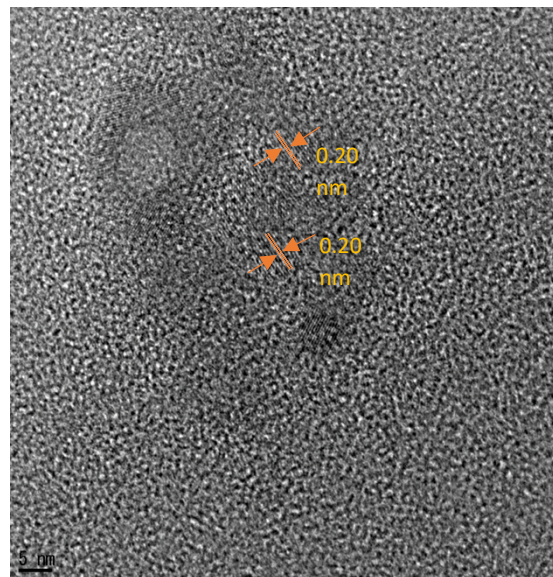
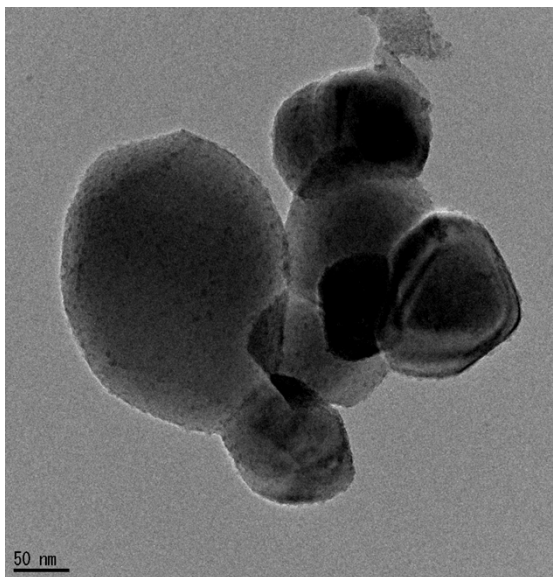


Fig. S9: TEM and HRTEM image of CEF