

Supplementary Material

Copper-based metal-organic xerogels on paper for chemiluminescence detection of dopamine

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Results and discussion

Optimization of experimental conditions

In order to optimize the experimental result, the next conditions should be considered in the luminol-H₂O₂ system on the paper-based chip: (A) The type of the copper salts; (B) luminol concentration; (C) H₂O₂ concentration; (D) pH value.

Firstly, the cationic source of copper salts was explored, including CuCl₂, CuSO₄, Cu(Ac)₂ and Cu(NO₃)₂. The CL intensity of Cu-MOXs with equal amounts of Cu²⁺ was recorded in Fig. 2A. When CuCl₂ was used as the anion source, the results showed that the peroxidase mimic activity of Cu-MOXs was the best. **Then CuCl₂ was chosen as the best cationic source in this work.** As the concentration of luminol can greatly affect the CL intensity, the effect of the concentration of luminol was studied over the range of 0.8 mM to 4.0 mM (Fig. S2B). With the increase of concentration of luminol, CL intensity (ΔI) increased gradually. When luminol concentration is greater than 4 mM, CL intensity had no obvious changes in the subsequent experiment. So, in this work, 4 mM of luminol was chosen for later use.

Next, the concentration of hydrogen peroxide was selected. The effect of the concentration at 0.1mM-3.0 mM was investigated and the results were shown in Fig S2C. **From the results, we can see that the CL signal increased with the concentration of H₂O₂. The signal decreased after the concentration was higher than 2.0 mM. The reason for this is that H₂O₂ decomposes fast at higher concentration. So, the proper concentration for H₂O₂ was 2.0 mM.**

As we all know, the CL signal of luminol can be produced in the basic solution. Then the pH value was selected from 10.0 to 12.5 (Fig. S2D). It was found that the CL intensity increased with the pH value from 10.0 to 12.0. After the pH value was higher than 12.0, CL intensity declined a little. **The signal/noice ratio was the best with pH of 12.0.** So, 12.0 was selected as the optimal pH value in the later work.

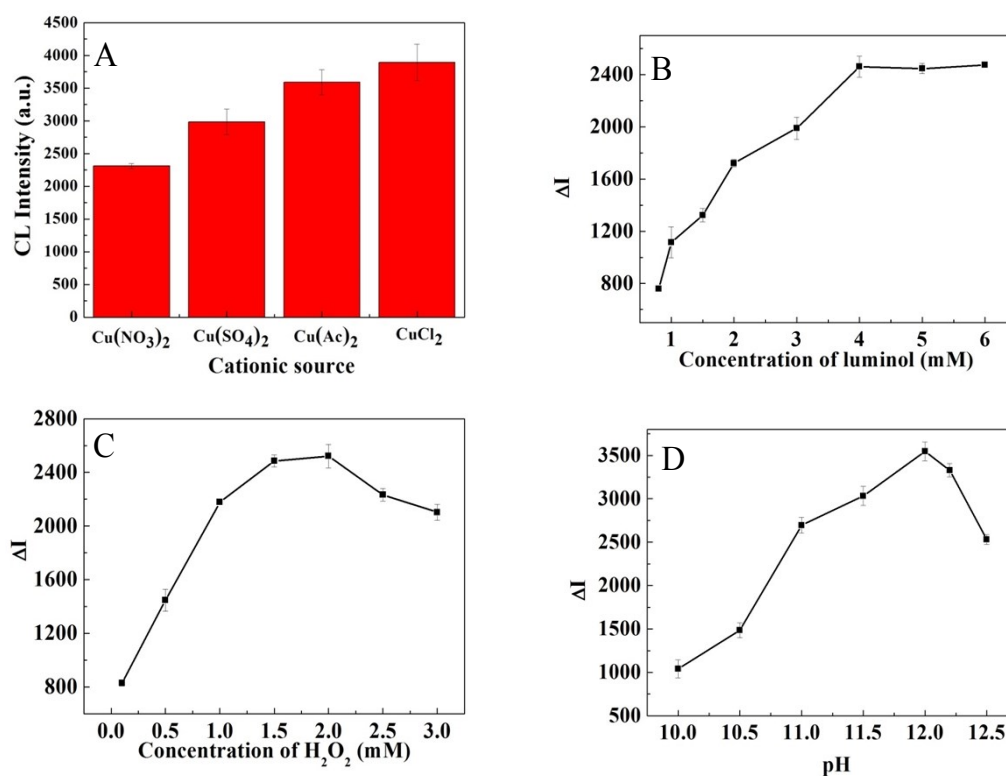


Fig. S1 Effect of the reaction conditions on luminol-H₂O₂ CL system in the presence of Cu-MOXs. (A) Effect of CL intensity from different anion; (B) Effect of luminol concentration. pH: 12.0; H₂O₂: 2.0 mM; (B) Effect of H₂O₂ concentration. luminol: 4.0 mM; pH: 12.0; (C) Effect of pH. luminol: 4.0 mM; H₂O₂: 2.0 mM. (Error bar represents the standard deviation for three measurements).