

Electronic Supplementary Information

Thiourea dioxide as unique eco-friendly coreactant of luminol chemiluminescence for sensitive detection of luminol, thiourea dioxide, and cobalt ions

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Experimental Section

Chemicals and materials. Luminol and hydrogen peroxide were obtained from Beijing Chemical Reagent Company. Thiourea dioxide was purchased from Aladdin. $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ was obtained from Sinopharm Chemical Reagent Co. Ltd. (Beijing, China). Luminol stock solution (10 mM) was prepared by dissolving 0.1772 g luminol in 0.1M NaOH and then dilute with water to 100 mL. Luminol working solutions with different pH values were prepared by diluting the luminol stock solution with carbonate buffer or sodium hydroxide. TD solution was prepared by directly dissolving TD in water. Other chemicals were analytical-reagent grade and used as received. Doubly distilled water was used throughout all experiments.

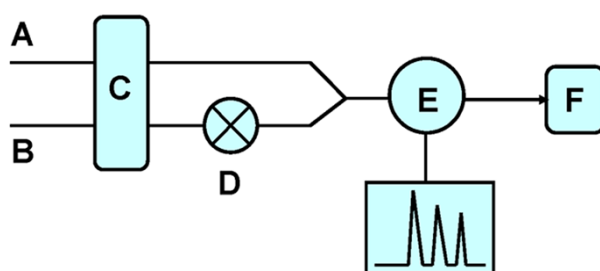
Apparatus. The CL was measured by a flow injection CL system consisting of a IFIS-C mode intelligent flow injection sampler (ReMax Inc., Xi'an, China), a BPCL

ultra-weak luminescence analyzer (the Institute of Biophysics, Chinese Academic of Sciences), and a home-made flow cell. The flow cell was put in a light-tight box of the luminescent analyzer. The loop injector was equipped with an injection loop of 50 μL .

Procedure of TD detection. Scheme S1 shows the schematic diagram of the flow system for TD detection. 10 μM luminol in 0.1 M carbonate buffer solution (pH 11.9) and water were respectively pumped into the flow cell through channels A and B at a flow rate of 1.25 mL/min. Different concentrations of TD in water were injected through the loop injector.

Procedure of luminol detection. 40 mM TD in water and 0.1 M carbonate buffer solution (pH 11.9) were respectively pumped into the flow cell through channels A and B at a flow rate of 1.25 mL/min. Different concentrations of luminol in 0.1 M carbonate buffer solution (pH 11.9) were injected through the loop injector.

Procedure of Co^{2+} detection. 10 μM Luminol in carbonate buffer solution (pH 11.9) and water were respectively pumped into the flow cell through channels A and B at a flow rate of 1.25 mL/min. Different concentrations of Co^{2+} were mixed with 1 mM TD first, and then the mixture were injected through the loop injector.



Scheme S1 A schematic diagram of the flow system for this new luminol CL system. A and B: flow channels; C: IFIS-C mode intelligent flow injection sampler; D: loop injector; E: CL detector; F: waste cup.

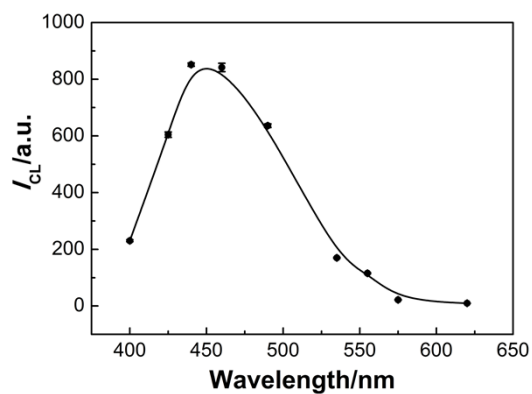


Fig. S1 CL spectrum of luminol/TD system. $c(\text{luminol})$: 0.1 mM; $c(\text{TD})$: 1 mM; Photomultiplier tube voltage: 700 V.

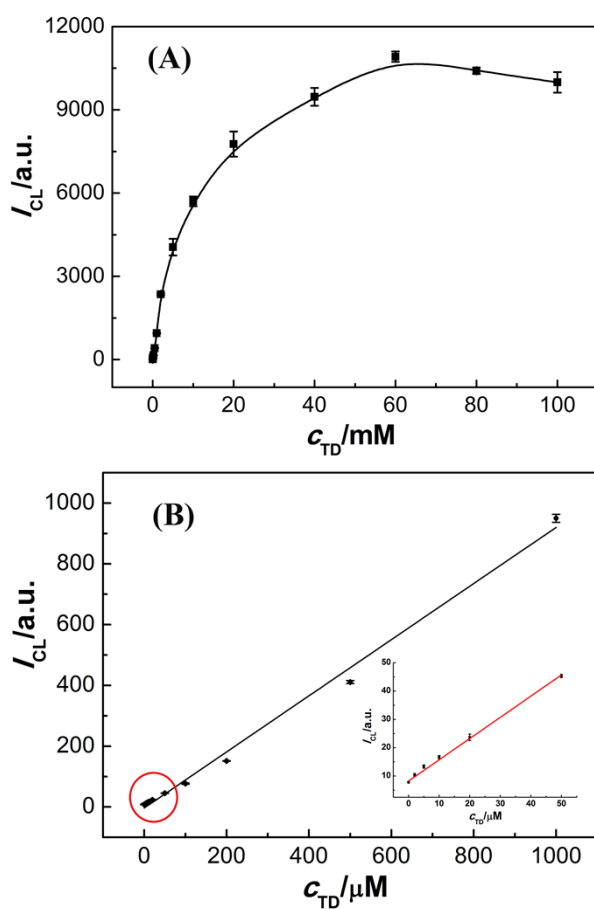


Fig. S2 (A) Dependence of CL intensities on the concentrations of TD from 0 to 100 mM; (B) Linear relationship between CL intensity and the concentration of TD from 0 to 1000 μM . Insert: enlargement of the red circle. $c(\text{luminol})$: 10 μM ; photomultiplier tube voltage: 1000 V.

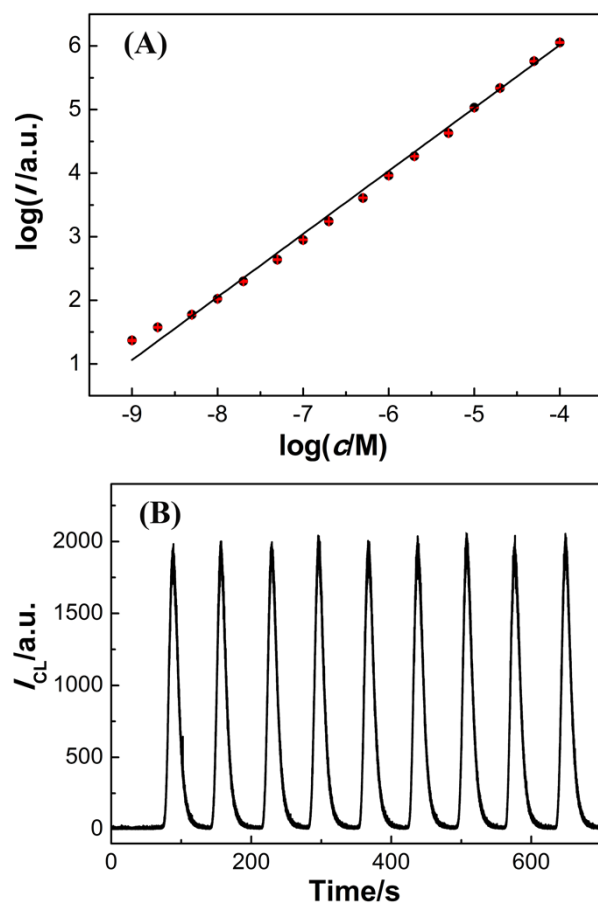


Fig. S3 (A) Linear calibration curve of luminol. (B) The CL intensity-time curves at the luminol concentration of 500 nM. $c(TD)$: 40 mM; photomultiplier tube voltage: 1200 V.