

Supporting Information

Graphene quantum dots-assisted morin-KMnO₄ chemiluminescence system for precise recognition of cypermethrin

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Table S1. Tolerable concentration ratios with respect to 8.0 mg L⁻¹ of CYPM.

Species	Tolerable concentration ratio (10³) [C_{interferent} (μg/L)/C_{CY} (mg/L)]
Na ⁺ , Cl ⁻ , K ⁺ , SO ₄ ²⁻ , CH ₃ COO ⁻	800
Br ⁻ , CO ₃ ²⁻ , PO ₄ ³⁻ , Mg ²⁺ , Ca ²⁺ , Tartaric acid, Lactose, Valine	600
Methanol	640
Ethanol	600
Ni ²⁺ , Pb ²⁺ , Al ³⁺ , Zn ²⁺	220
Fe ²⁺ , Co ²⁺	140
Cu ²⁺	20

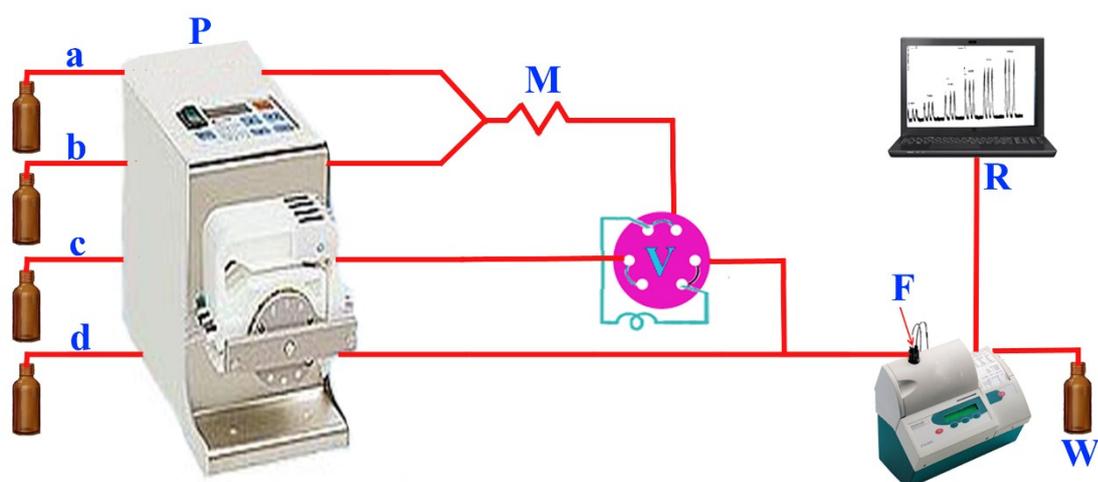
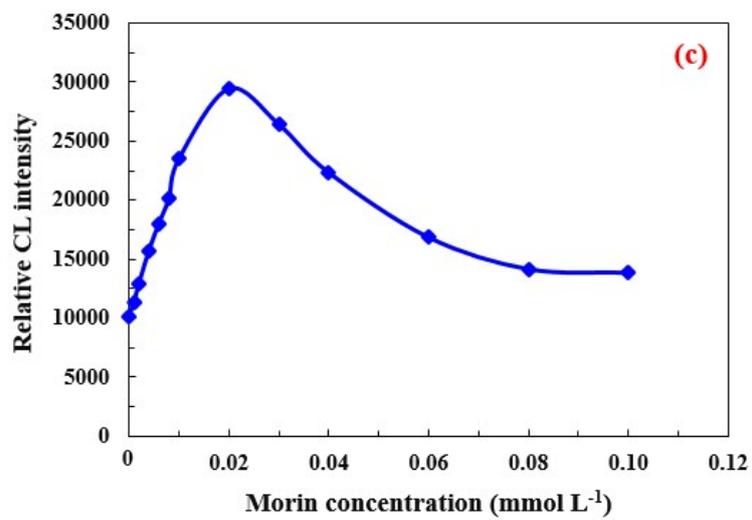
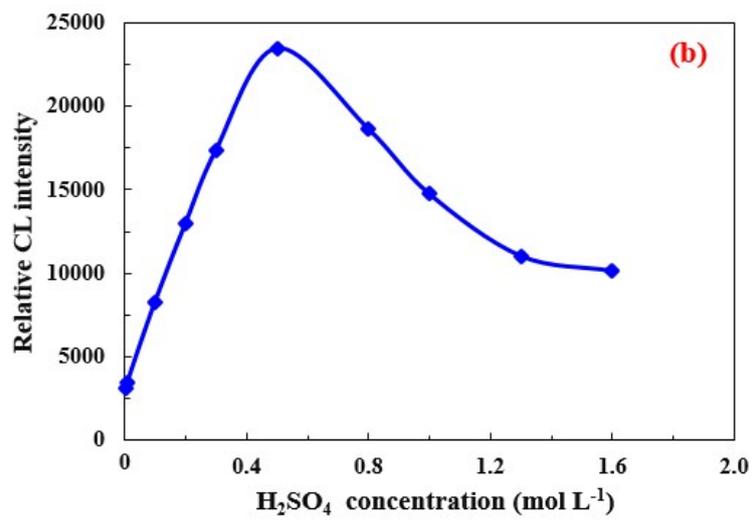
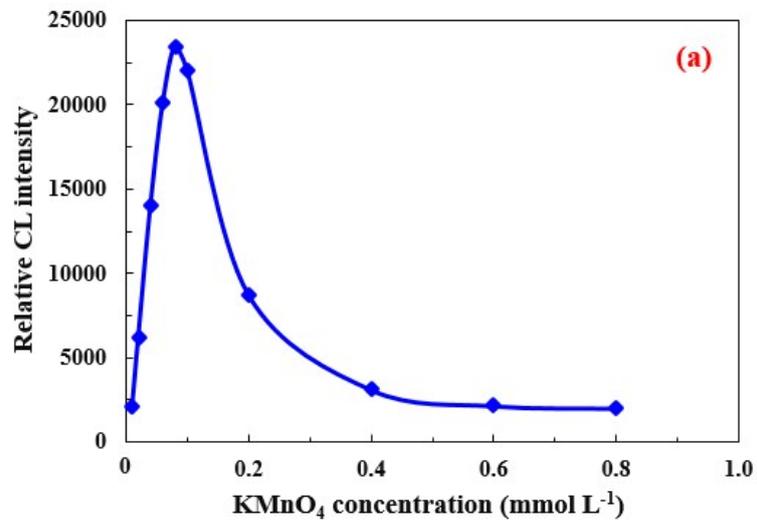


Figure S1. Schematic diagram of flow-injection CL system; (a): H_2SO_4 solution; (b): sample or standard solution of mixture of morin, GQDs, CTAB and cypermethrin; (c): H_2O as the carrier; (d): KMnO_4 solution; P: peristaltic pump; M: mixing tube; V: injection valve; F: flow cell; W: waste; D: detector (luminometer); R: recorder (personal computer).



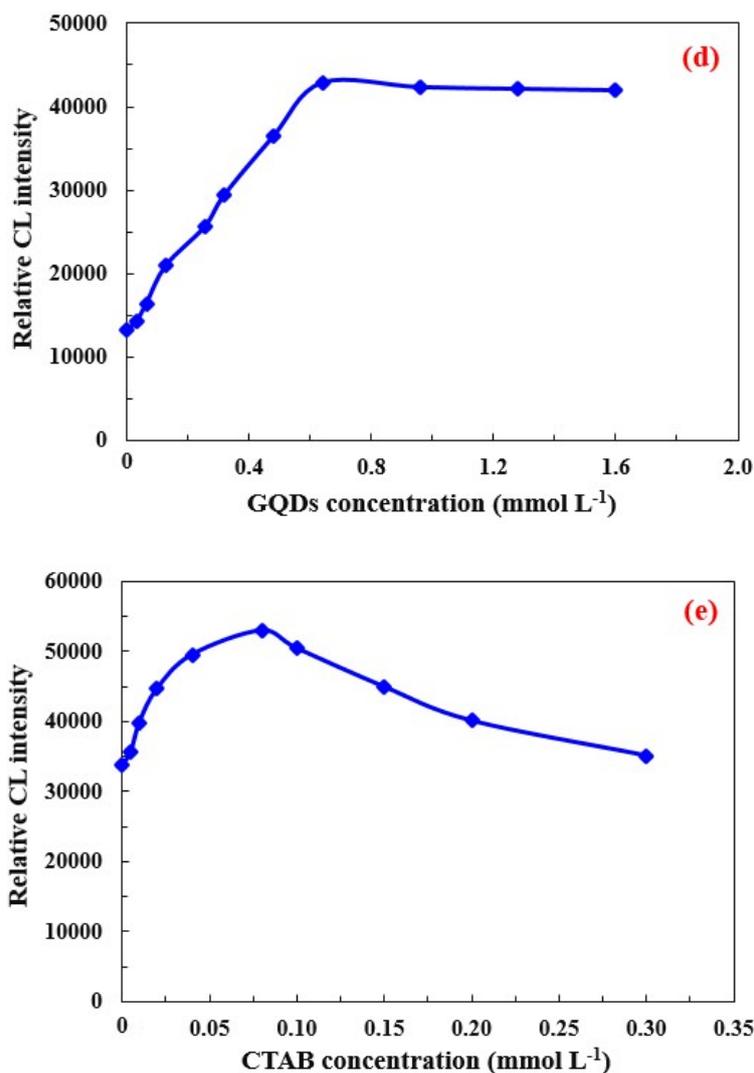


Figure S2. Optimization of the CL reaction conditions: (a) effect of KMnO_4 concentration. Conditions: the concentrations of H_2SO_4 , GQDs, CTAB, and morin were 0.5 mol L^{-1} , 0.32 mmol L^{-1} , 0.02 mmol L^{-1} and 0.01 mmol L^{-1} , respectively; (b) effect of H_2SO_4 concentration. Conditions: the concentrations of KMnO_4 was 0.08 mmol L^{-1} , other conditions were as in (a), (c) effect of morin concentration. Conditions: the concentrations of H_2SO_4 was 0.5 mol L^{-1} , other conditions were as in (b), (d) effect of GQDs concentration. Conditions: the concentrations of morin was 0.02 mmol L^{-1} , other conditions were as in (c), and (e) effect of CTAB concentration. Conditions: the concentrations of GQDs was 0.64 mmol L^{-1} , other conditions were as in (d).

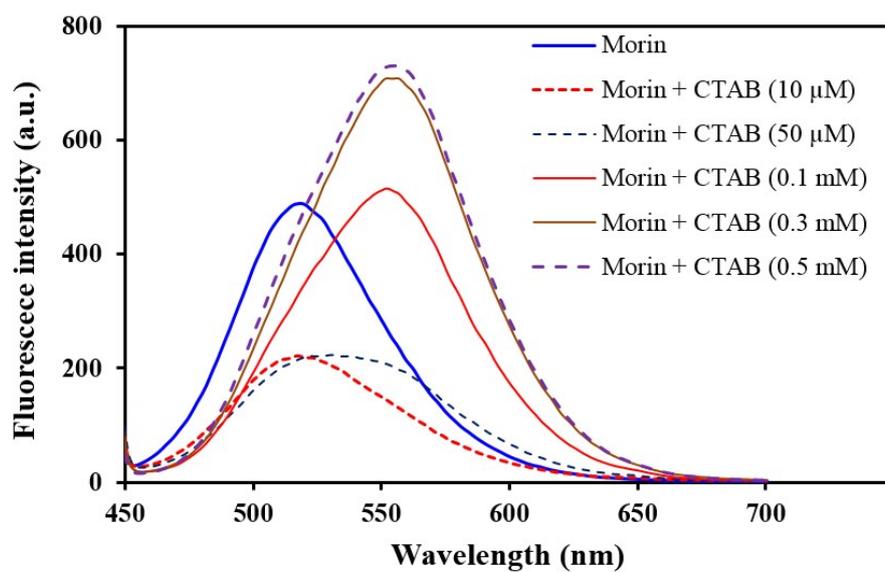


Figure S3. Fluorescence emission spectra for 0.1 mmol L⁻¹ morin in the presence of different amounts of CTAB.

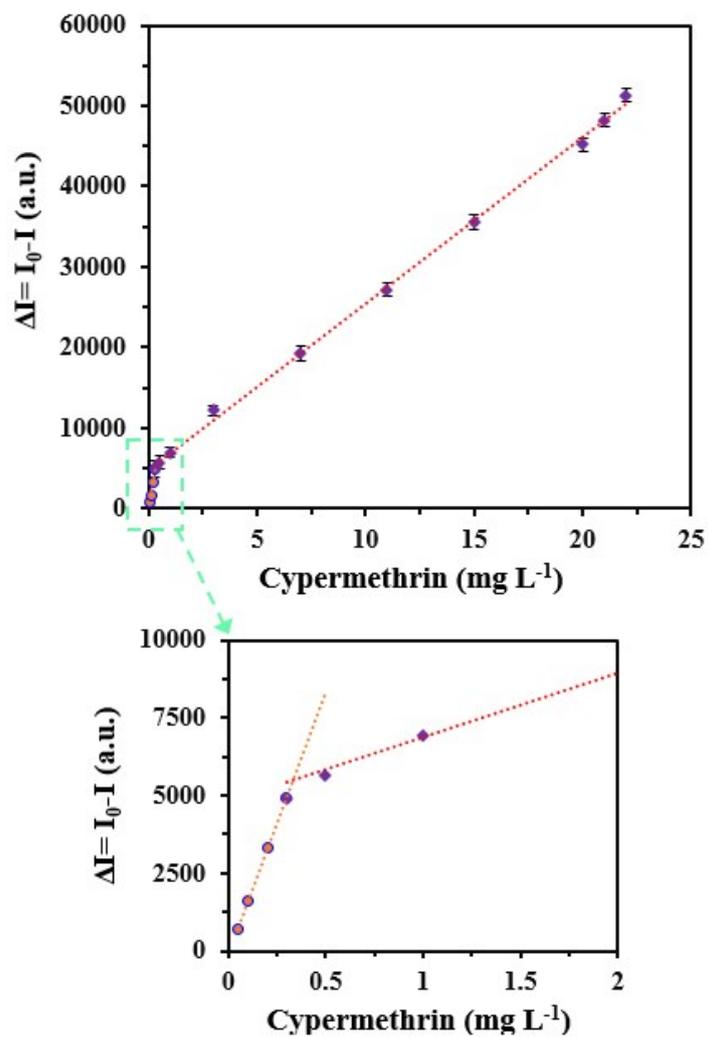


Figure S4. Calibration graph with two linear dynamic range for the determination of CYPM by morin-GQDs-CTAB-KMnO₄ CL (First linear range: 0.05-0.3 mg L⁻¹ and second linear range: 0.3-22 mg L⁻¹).