

Supporting information for

Trace Copper Ion Detection by Photocatalytic Degradation of Chromotrope 2R

Lili Fu, Yuan Xiong, Shu Chen, Yunfei Long*

Key Laboratory of Theoretical Chemistry and Molecular Simulation of Ministry of
Education of China, School of Chemistry and Chemical Engineering, Hunan
University of Science and Technology, Xiangtan, 411201, PR China

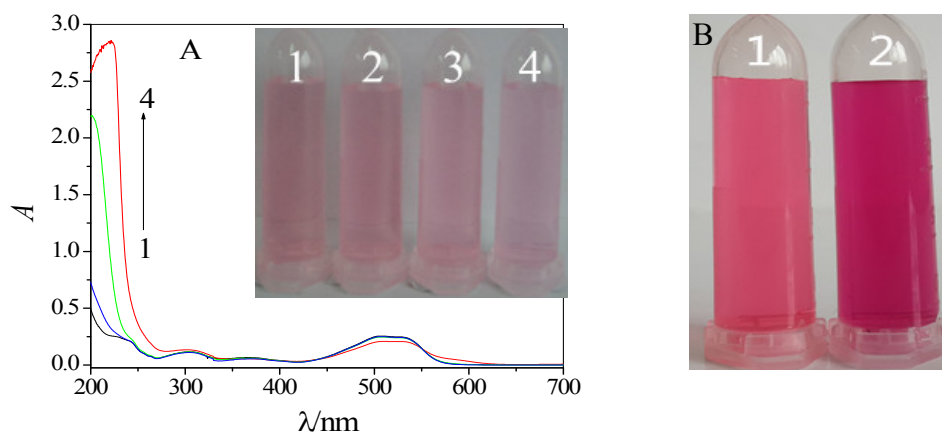


Fig. S1. A. The UV-visible absorption spectra of CR added with different concentrations of Cu^{2+} 0, 1.0×10^{-5} , 1.0×10^{-4} , 1.0×10^{-3} mol L^{-1} (line 1–4) without UVC light irradiation and partly amplified in the insert. The solutions were controlled at pH 4.78, c_{CR} (1.0×10^{-5} mol L^{-1}).

Fig.S1.B. The two pictures are CR (1) and CR- Cu^{2+} (2) without UVC light irradiation, respectively. The solutions were controlled at pH 4.78, c_{CR} (1.0×10^{-4} mol L^{-1}), $c_{\text{Cu}^{2+}}$ (1.0×10^{-3} mol L^{-1}).

* Corresponding author. E-mail: l_yunfei927@163.com, Tel.: +86 731 58388503.

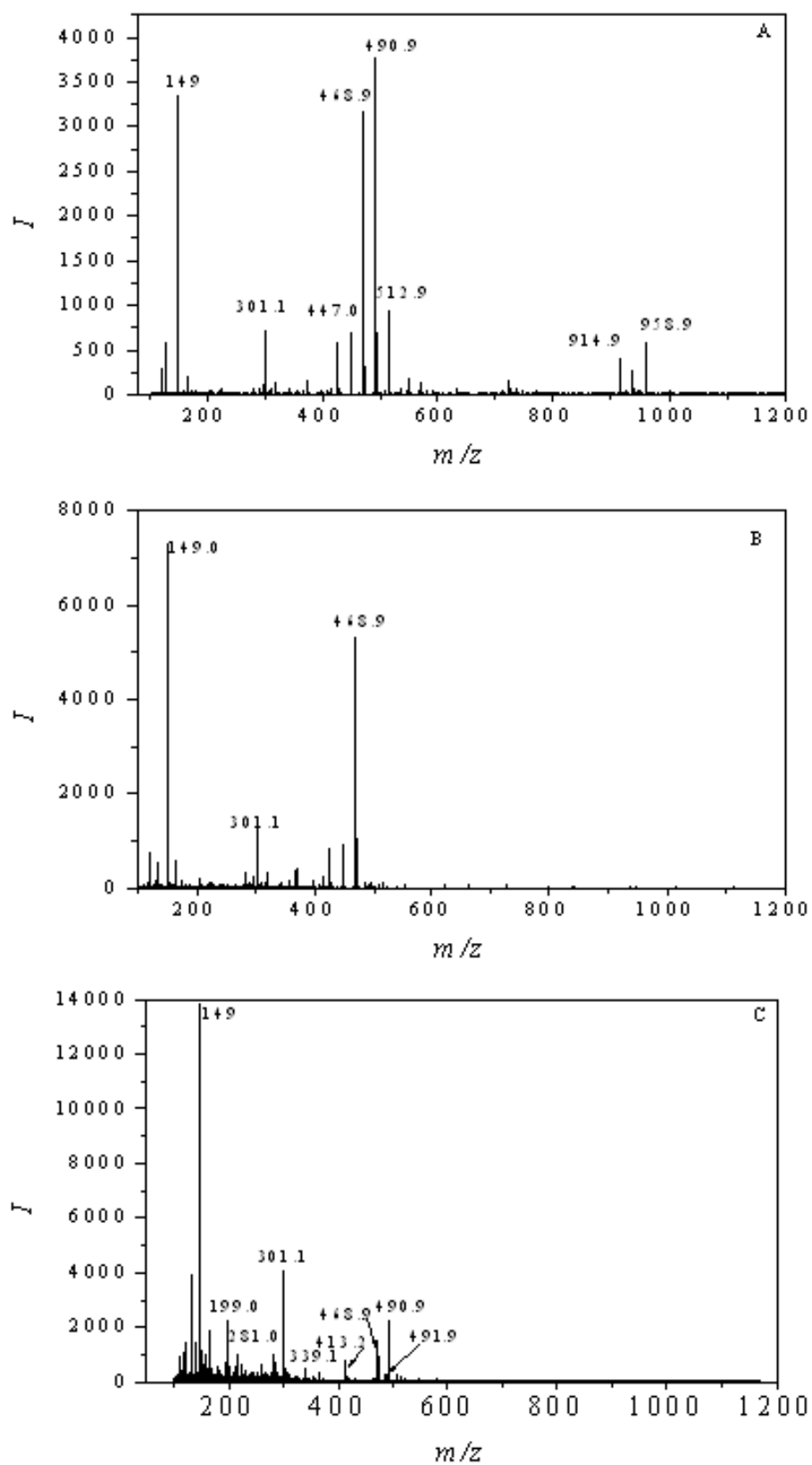


Fig. S2. The Mass spectrogram of CR in the presence of Cu^{2+} ($1 \times 10^{-6} \text{ mol L}^{-1}$) without UVC irradiation (A), CR without UVC irradiation (B), CR under UVC irradiation (C). $c_{\text{CR}} = 1 \times 10^{-5} \text{ mol L}^{-1}$.

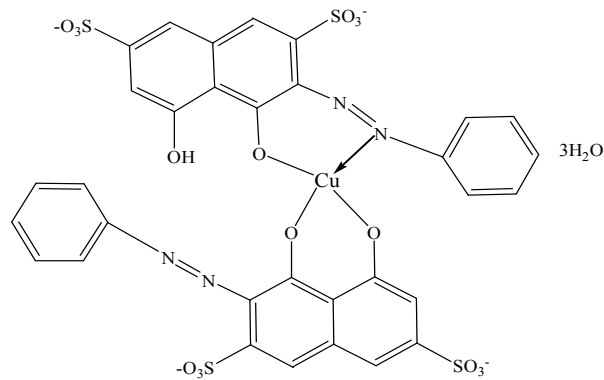


Fig. S3. The possible structure of the complexes formed from CR and Cu^{2+} .

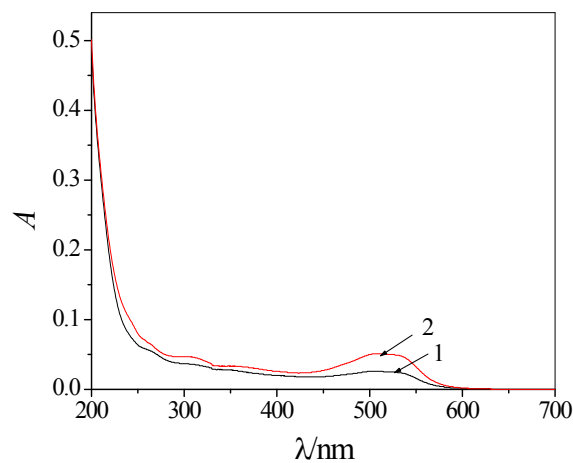
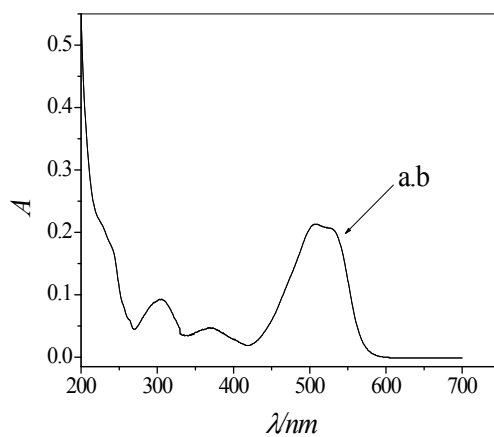


Fig. S4. The UV-visible absorption spectra of CR- Cu^{2+} deoxygenate (curve 2) and without deoxygenate (curve 1) under the UV light irradiation for 50 min. The solutions were controlled at pH 4.78, $c_{\text{CR}} (1.0 \times 10^{-5} \text{ mol L}^{-1})$. $c_{\text{Cu}^{2+}} (1.0 \times 10^{-6} \text{ mol L}^{-1})$

Fig. S5. UV-visible absorption spectra of $1 \times 10^{-5} \text{ M}$ CR solution in the presence of BR



pH=4.78 and absence of Cu^{2+} ions under the natural light irradiation for 50min (spectrum a) and shielding from light for 50 min (spectrum b).

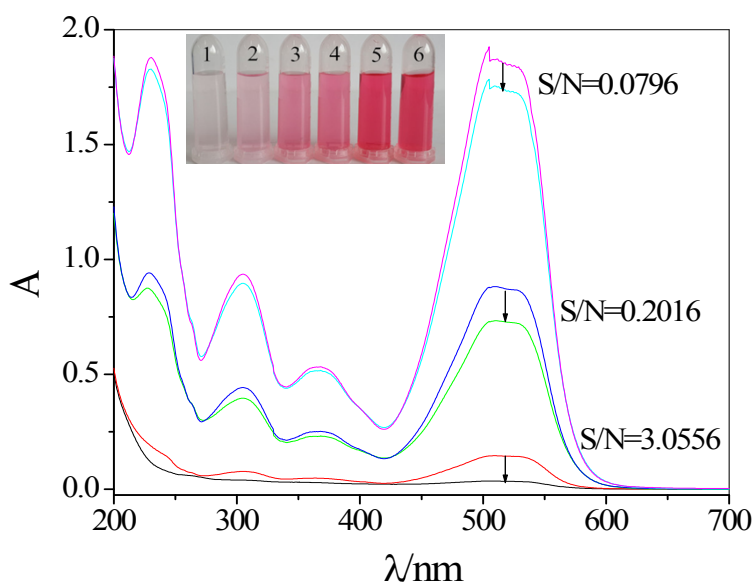


Fig. S6. UV-visible absorption spectra of three different concentrations of CR solutions $1.0 \times 10^{-5} \text{M}$ (1, 2), $5.0 \times 10^{-5} \text{M}$ (3, 4) and $1.0 \times 10^{-4} \text{M}$ (5, 6) in the absence (1, 3, 5) and presence (2, 4, 6) of $1.0 \times 10^{-6} \text{M}$ copper ions under UV irradiation. The inserted picture shows that the color distinction of CR solutions ($1.0 \times 10^{-5} \text{M}$) in the absence (1) and presence (2) of Cu^{2+} ($1.0 \times 10^{-6} \text{M}$) is the most obvious of three different concentrations of CR solutions.

Table S1 Comparison of the sensitivity for copper ion detection in recent spectral methods.

Method	probe	Linear range(μM)	Detection limit(μM)	Ref.
Fluorescence/ colorimetry	a new spirobenzopyra n derivative	0.513-381	0.106	[1]
Fluorescence	Carbon Quantum Dots	0.01-1.1	0.006	[2]
Fluorescence	Copper/Silver Nanoclusters	0.005-0.2	0.0027	[3]
Absorption/colorimetry	The conversion of spiropyran to merocyanine	Not given	1.0	[4]
Absorption	dual-DNAzyme probe	1.0-10000	1.0	[5]
Absorption	Chromotrope 2R complex	0.005-1.0	0.0034	This work

Table S2. The determination results of a real sample

Sample	Detection value ($\mu\text{g g}^{-1}$)	Average ($\mu\text{g g}^{-1}$)	RSD
Human hair	3.565, 3.798, 3.798	3.72	3.62%

Reference:

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