


Figure S1. Citrate sodium aqueous solution by itself has weak fluorescence, Figure 1, and this weak fluorescence was not affected by the presence of EDTA. Experimental conditions, 50 mM citrate at pH5, pH7, and pH8, plus 5 mM pH matched EDTA. This spectrophotometry was performed in the same batch run with that of Figure 1. For free citrate (50 mM), it was shown in Figure 1a,c.

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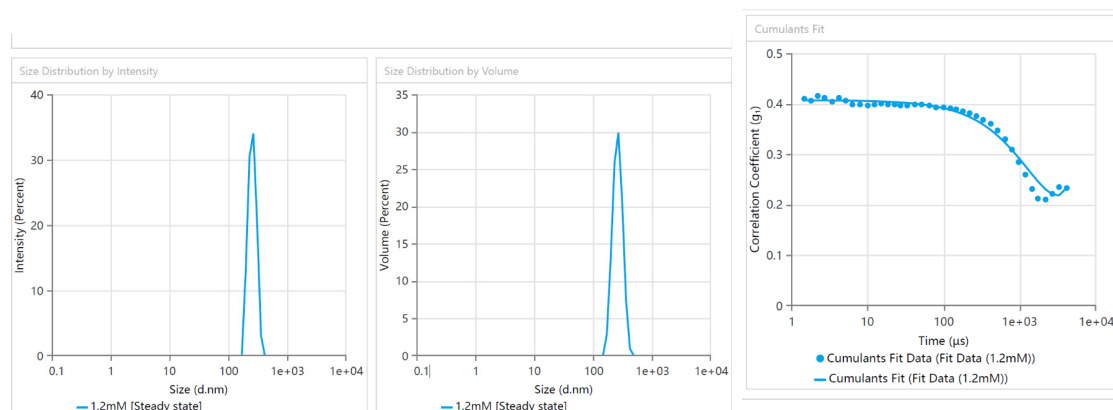


Figure S2. Dynamic light scattering result of the citrate- Cu^{2+} complex, the regression analysis and curve fitting showed good fit between the simulated curve and experimental data, which suggested homogeneous composition in the examined sample.

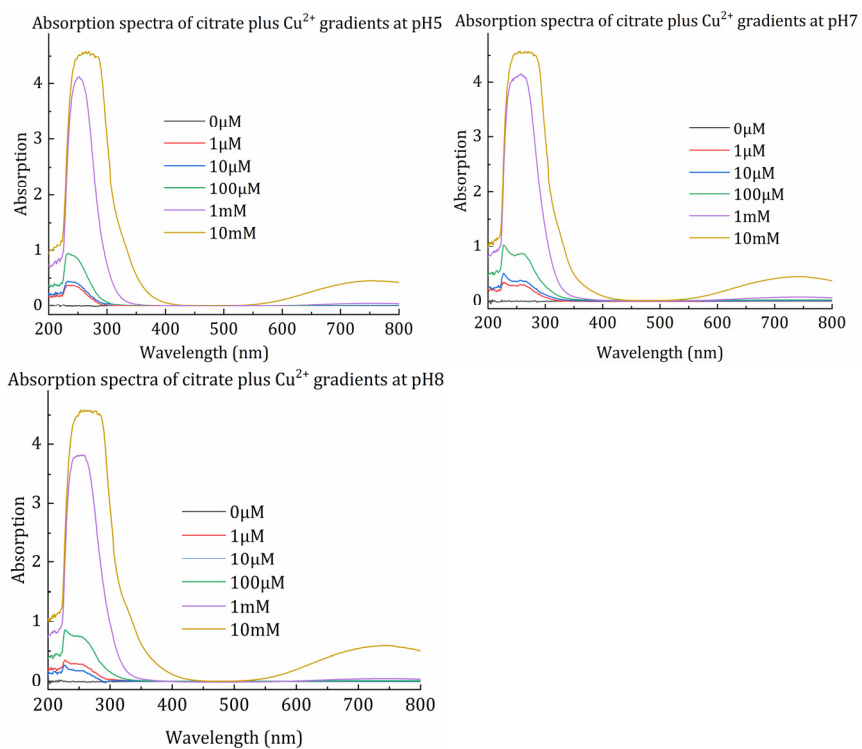


Figure S3. Absorption spectra of citrate- Cu^{2+} complexes in aqueous solution at pH5, pH7, and pH8.

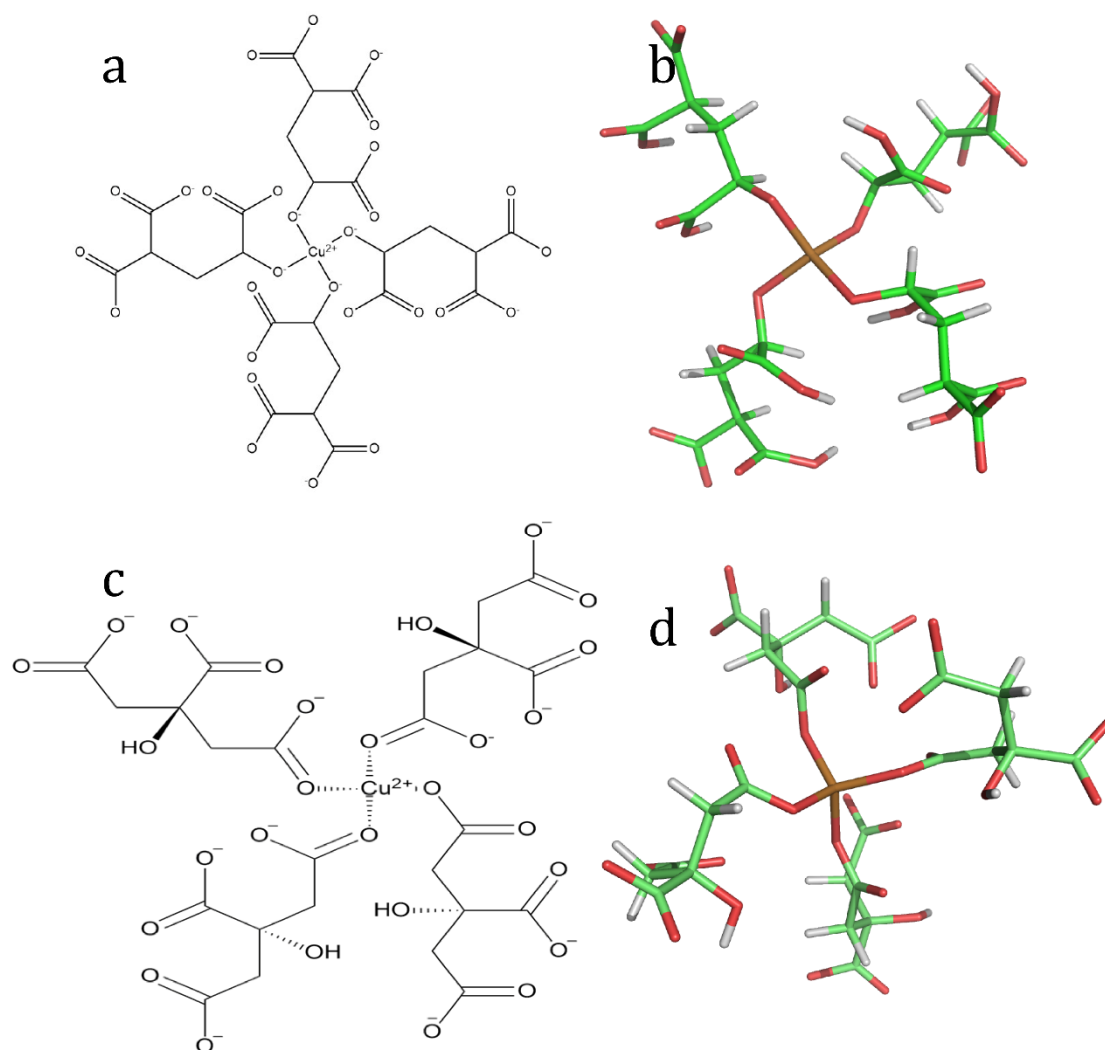


Figure S4. The proposed core of the citrate-Cu²⁺ particle in aqueous solution. Citrate may coordinate with copper ion through its hydroxyl group (a,b) or carboxylate group (c,d). There are multiple possibilities of the chelation here, for instance, some via the hydroxyl group while some through carboxylate group. The fluorescent core of citrate-Cu²⁺ complex particle was very likely to have at least two carboxylate groups involved in Cu²⁺ chelation. ac. Chemical structures of citrate-Cu²⁺ complex; and stick models of the complex structures (bd, carbon colored green, and oxygen colored red).

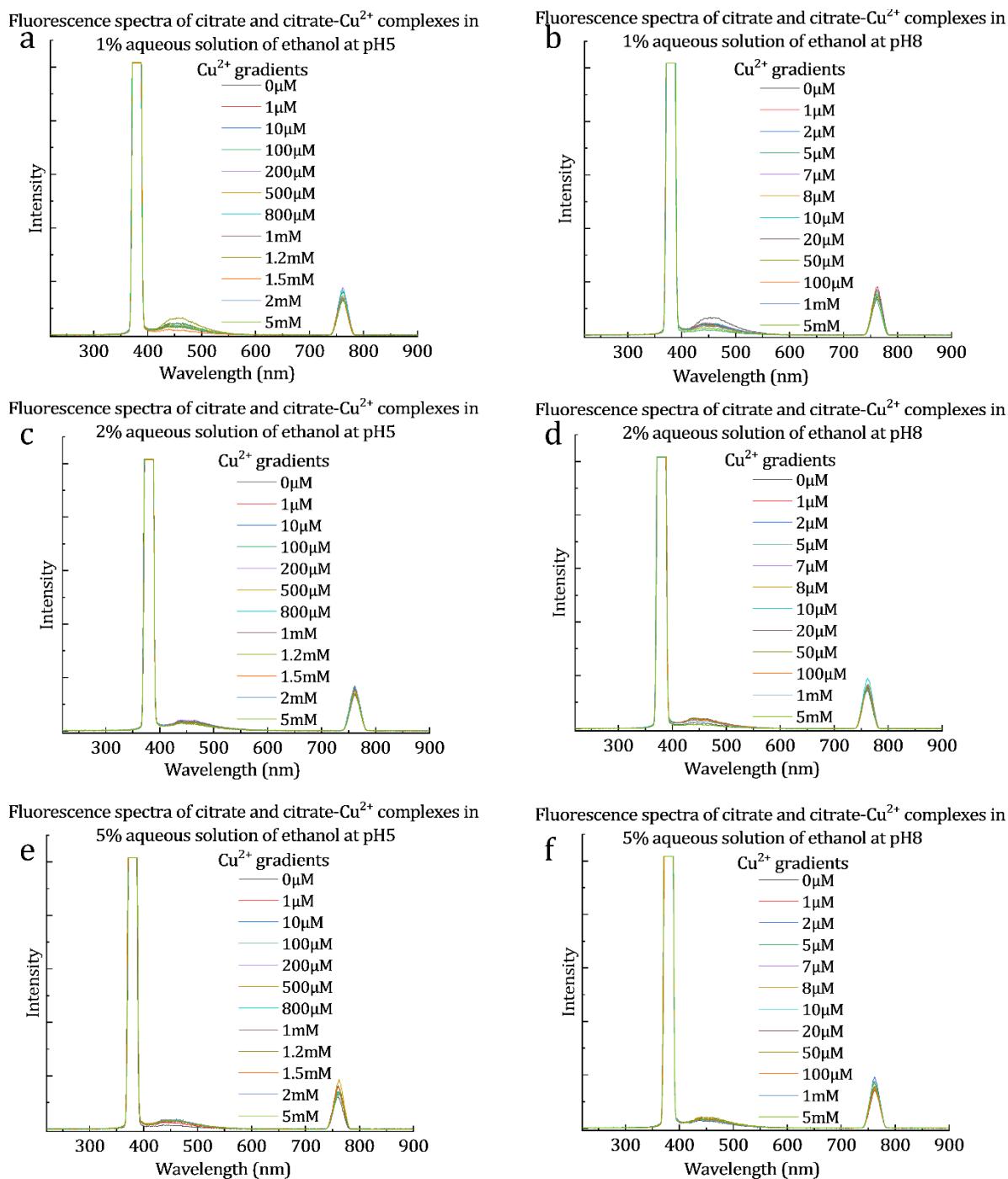


Figure S5. The fluorescence spectra of citrate aqueous solutions in the presence of ethanol at various concentrations of Cu²⁺ ions, at pH5 (**a,c,e**), and at pH8 (**b,d,f**). ab. Fluorescence spectra of citrate in 1% ethanol aqueous solutions at various concentrations of Cu²⁺ ions. cd. Fluorescence spectra of citrate in 2% ethanol aqueous solutions at various concentrations of Cu²⁺ ions. ef. Fluorescence spectra of citrate in 5% ethanol aqueous solutions at various concentrations of Cu²⁺ ions.

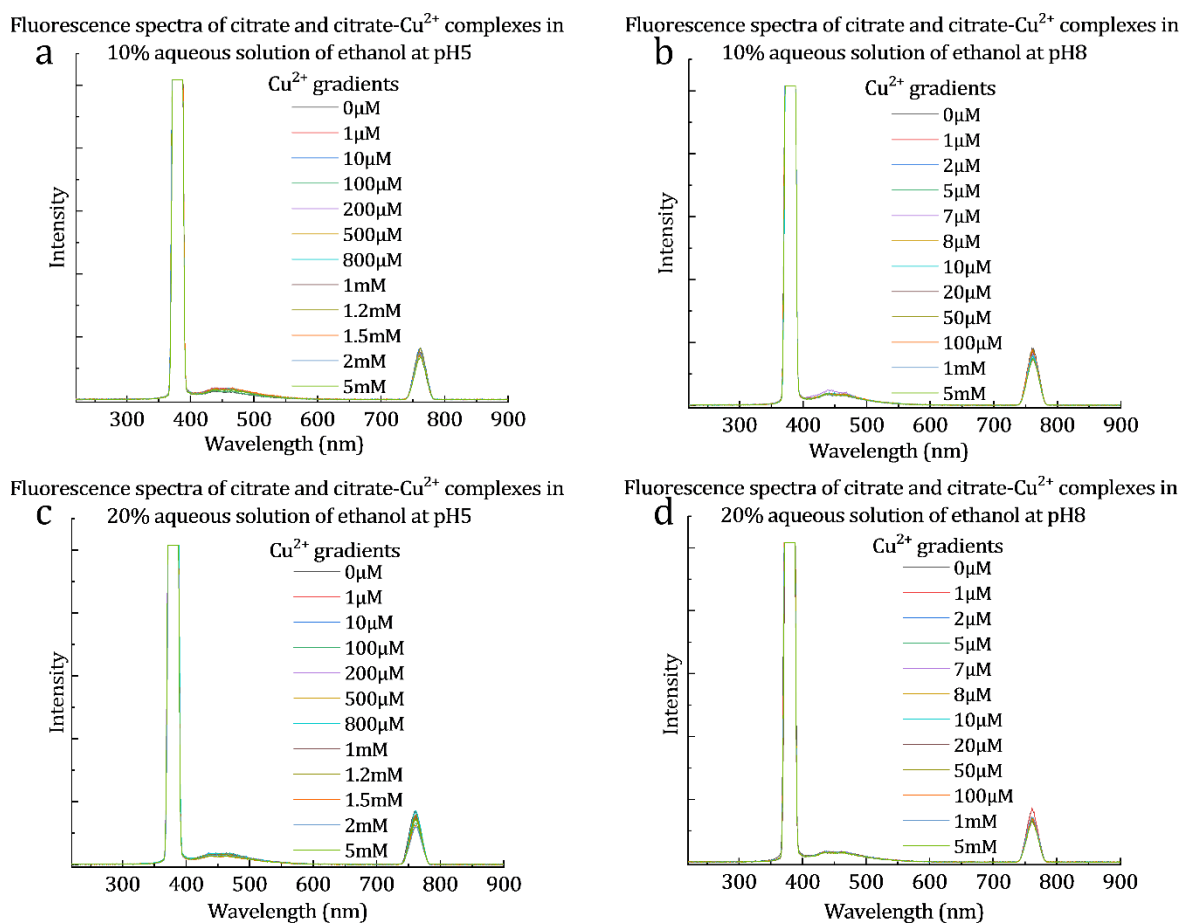


Figure S6. The fluorescence spectra of citrate aqueous solutions in the presence of ethanol at various concentrations of Cu²⁺ ions, at pH5 (**a,c**), and at pH8 (**b,d**). **ab.** Fluorescence spectra of citrate in 10% ethanol aqueous solutions at various concentrations of Cu²⁺ ions. **cd.** Fluorescence spectra of citrate in 20% ethanol aqueous solutions at various concentrations of Cu²⁺ ions.

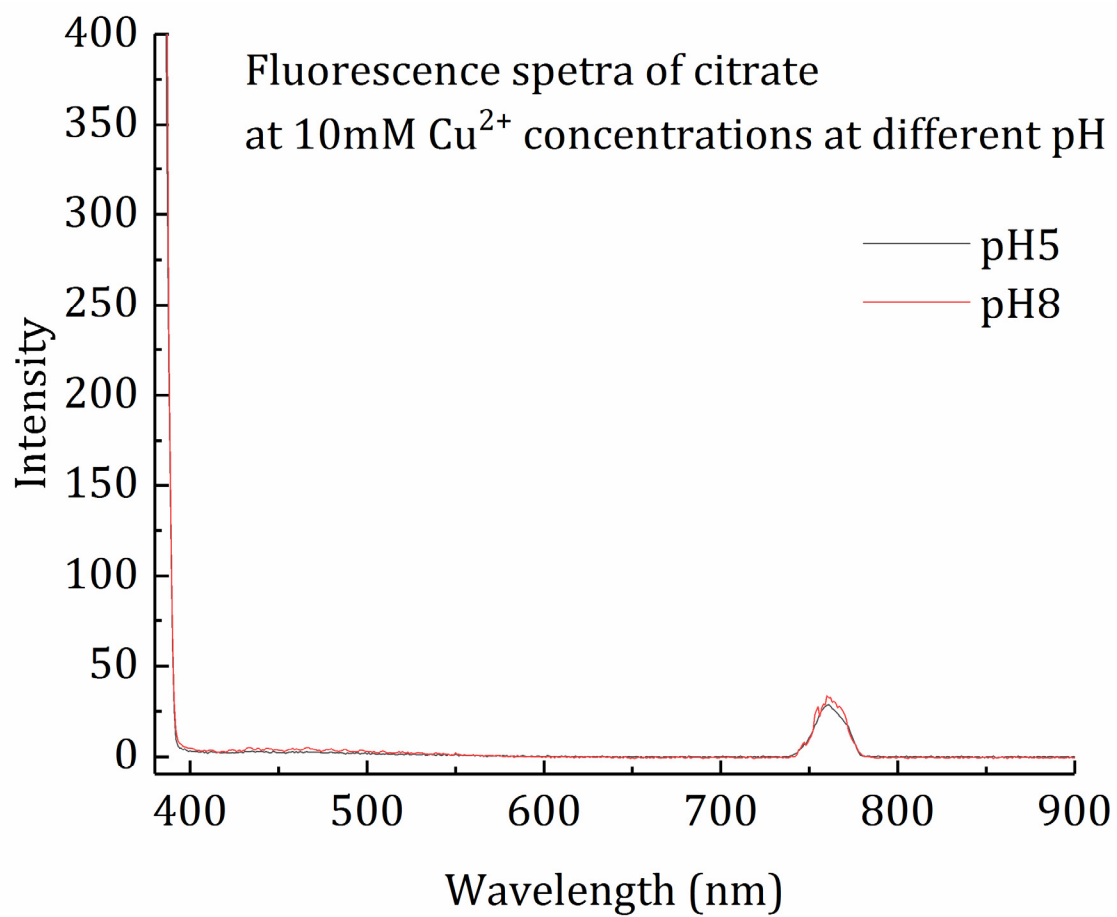


Figure S7. The fluorescence spectra of citrate aqueous solutions in the presence of 10 mM Cu^{2+} ions.