supplementary material

Figure 1S Choice of pH-range for the Measurement

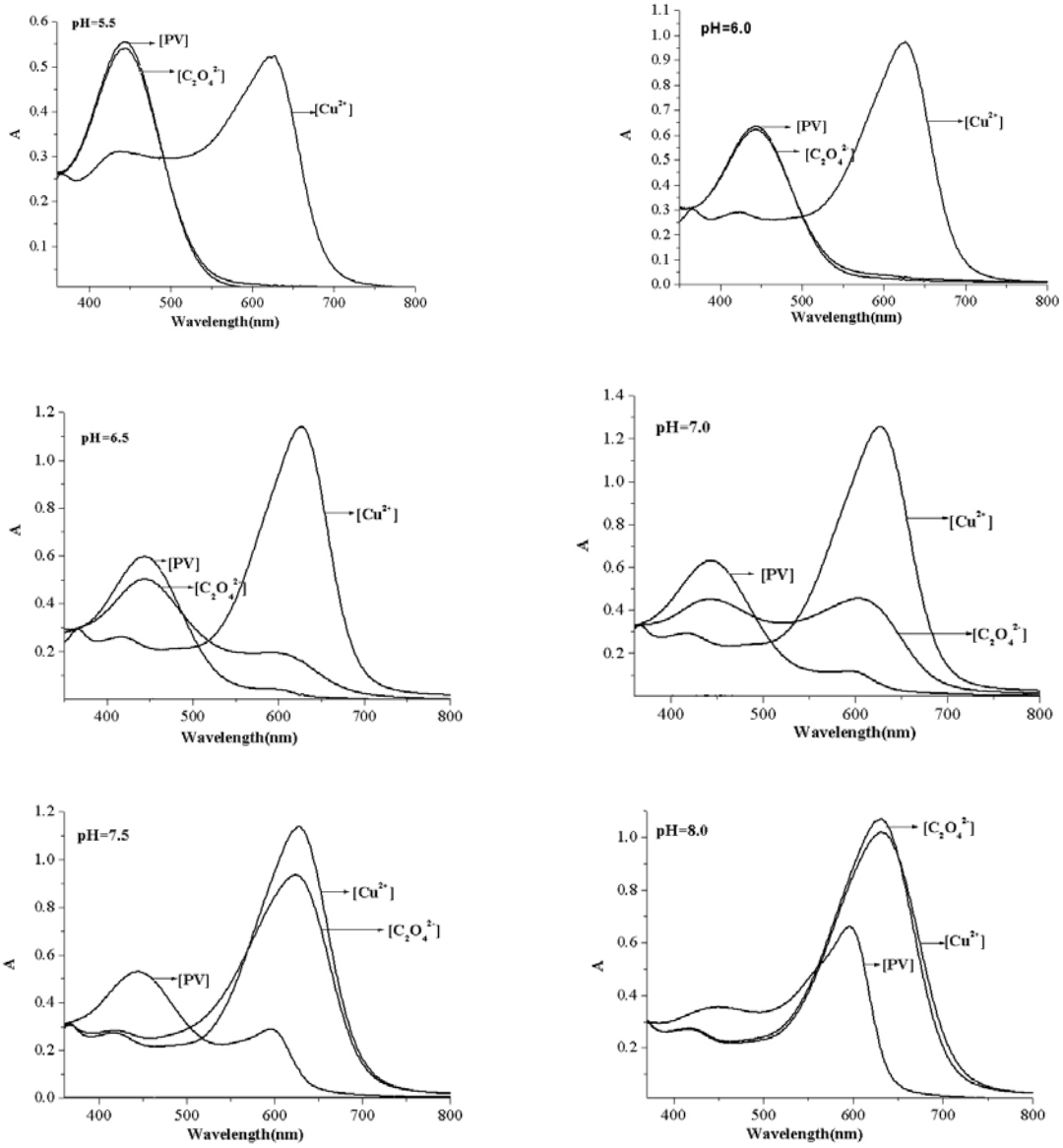


Figure 1S The absorbance under various pH values. These black lines represent the absorbance of pyrocatechol violet (50 μM), red ones are the absorbance of [Cu_2PV)] (50 μM pyrocatechol violet, 100 μM $Cu(NO_3)_2$), and the green ones the absorbance of the ensemble when 200 μM Oxalate anions was added into the solution of [Cu_2 PV](50 μM pyrocatechol violet. The pH (5.5-8.0) of the buffers (10 mM HEPES) was adjusted with 0.1 mM NaOH and HCl.

Figure 2S Dada of Absorbance for the Ensemble of Cu^{2+}-PV-OX

The working curve for OX measurement was plotted with the absorbance value against various concentrations of oxalate (0, 20, 40, 80, 160, 320, 640 μM) (**Table 1s**). The average of ε is 2920 $(mol/L)^{-1}$ cm^{-1}.

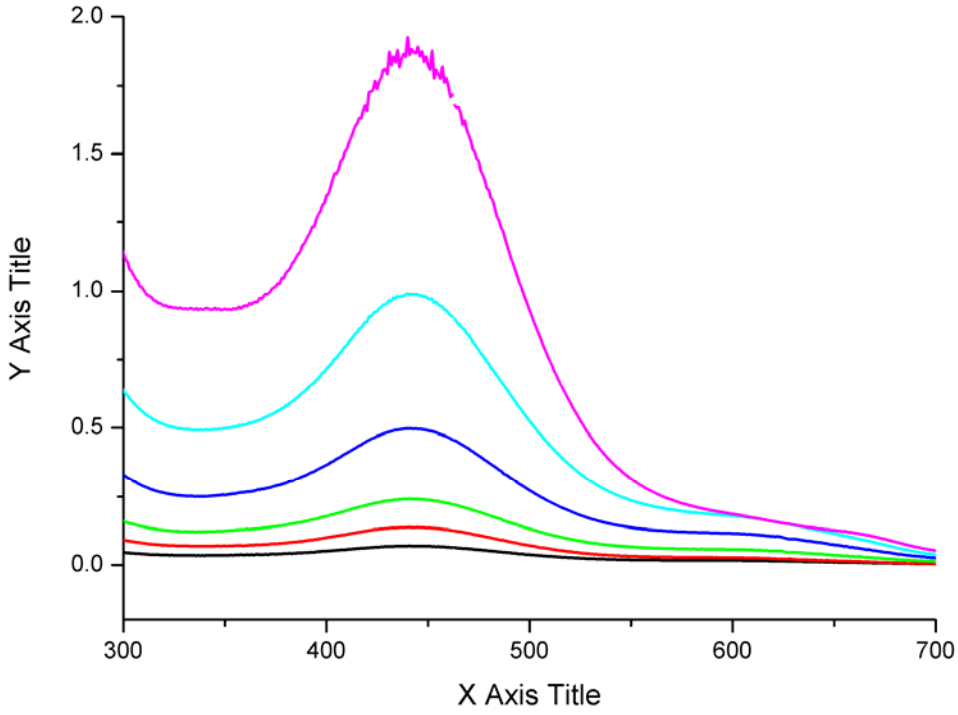
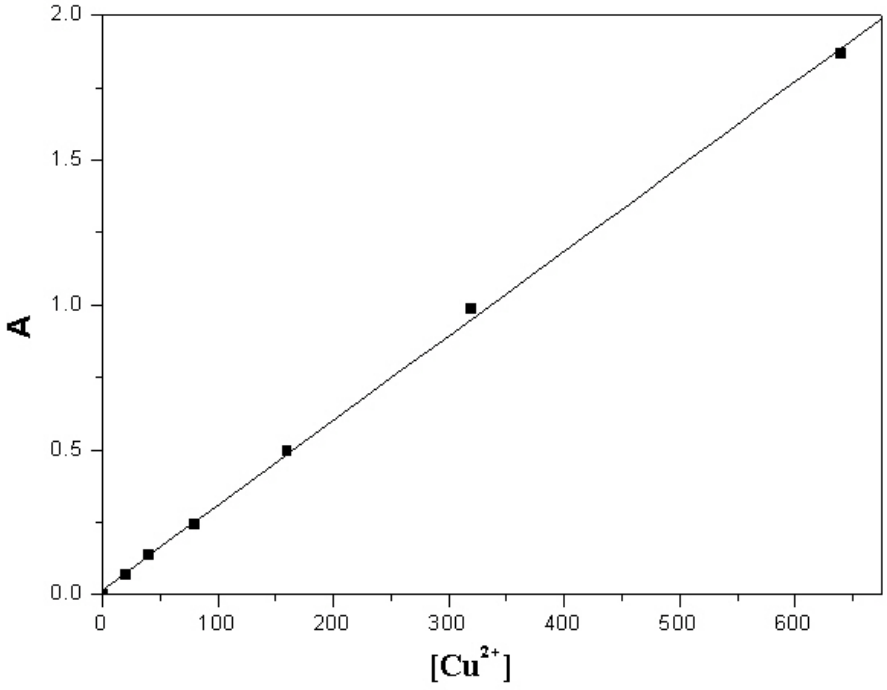


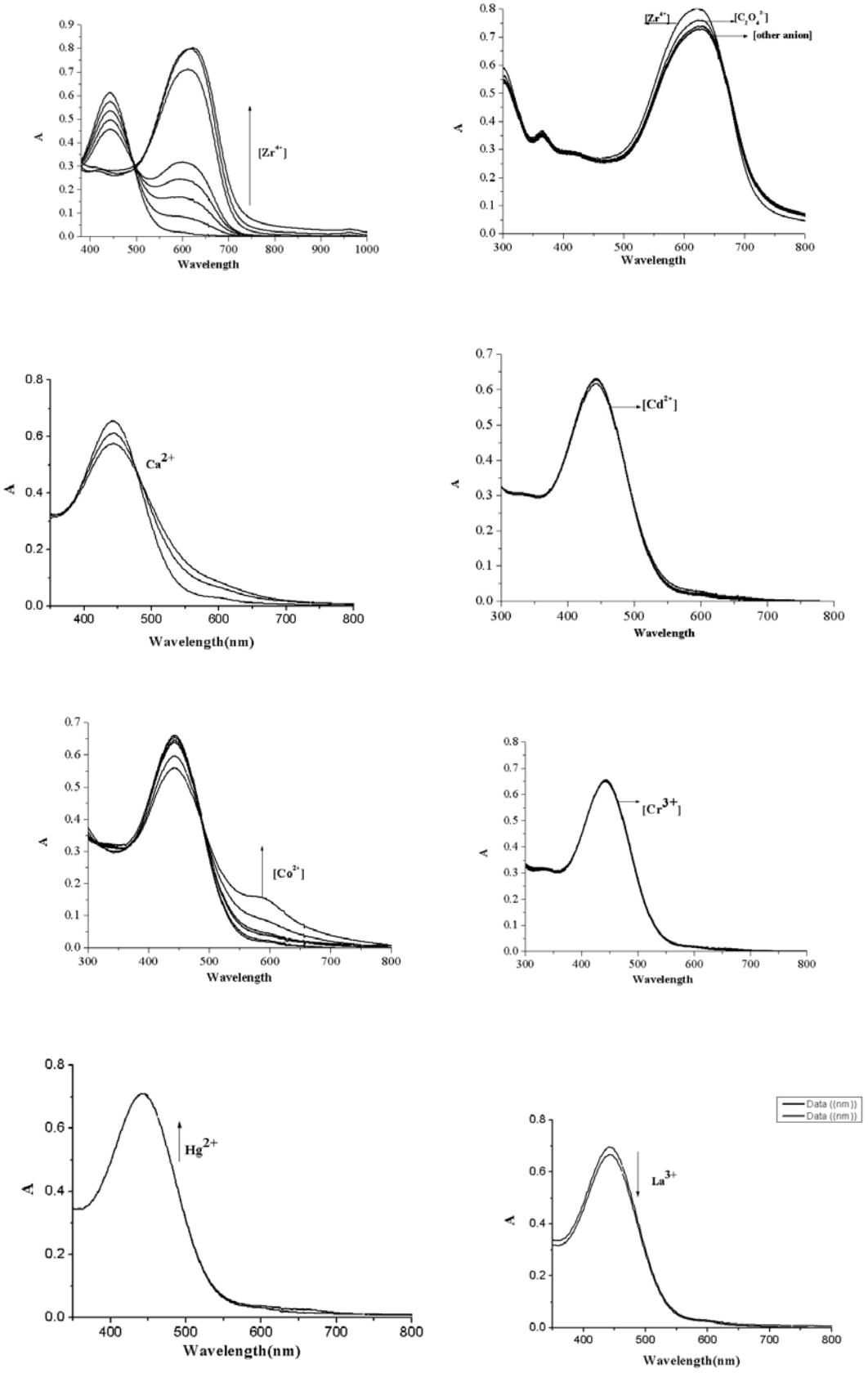
Table 1S

$[C_2O_4^{2-}]$/μM	A	ε /L·mol^{-1}·cm^{-1}
0	0	0
20	0.06954	3477
40	0.13751	3437
80	0.24122	3015
160	0.49715	3107
320	0.98563	3080
640	1.86760	2918



The working curve for OX measurement

Figure 3S With Other Metal Ions



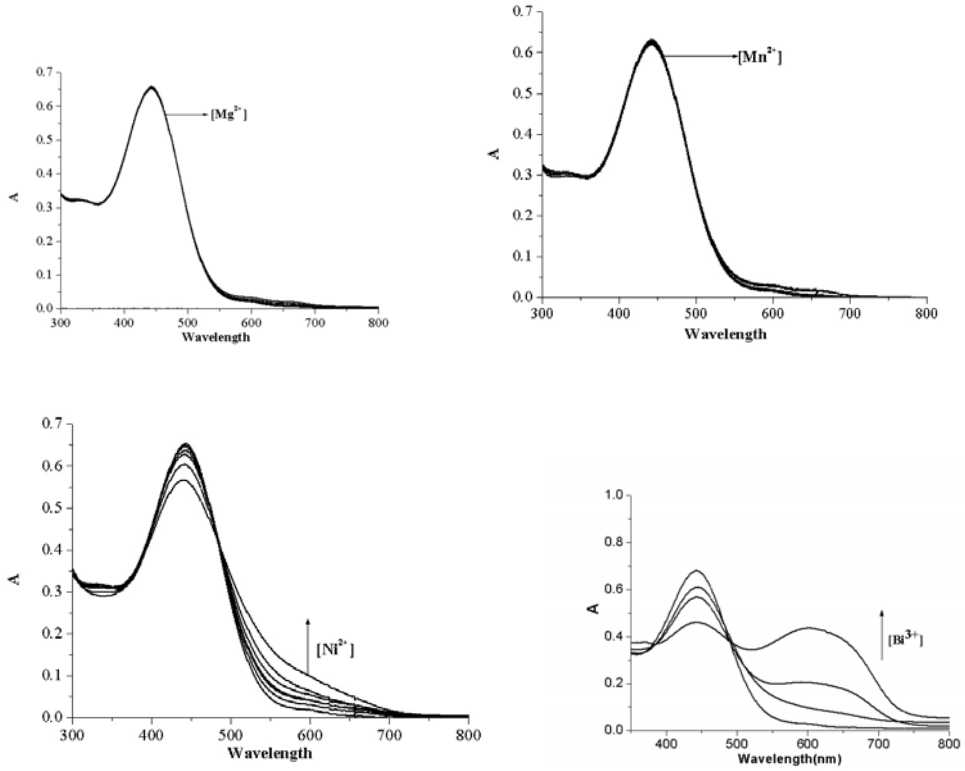
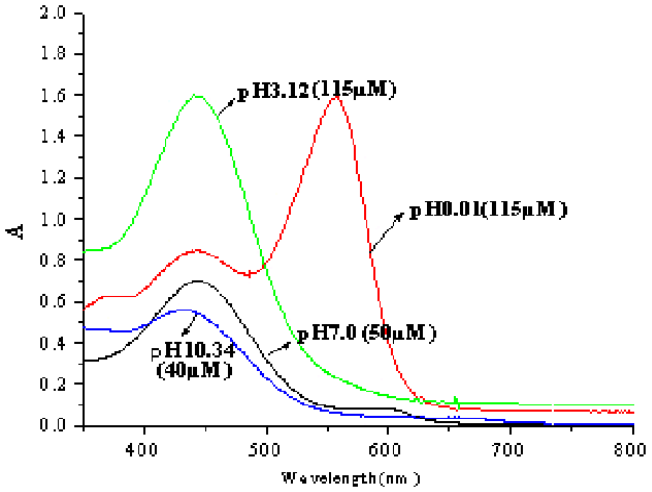
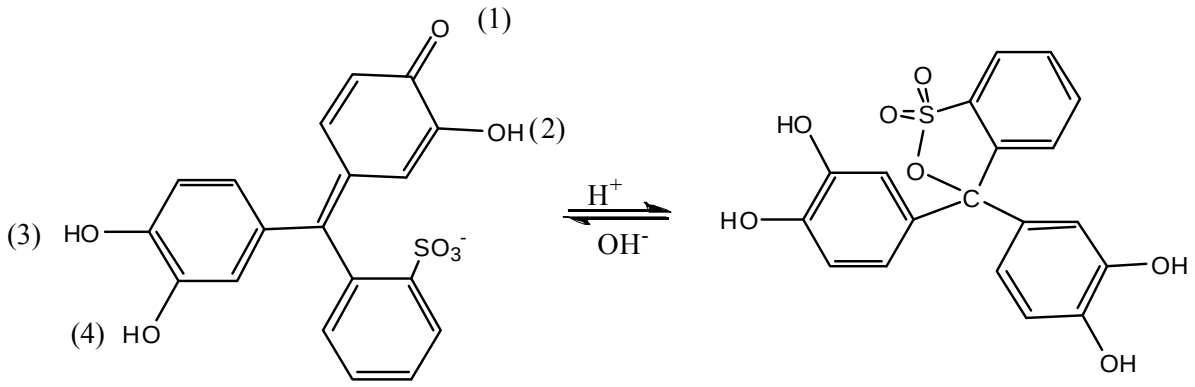


Figure 3s Both UV/Vis spectrophotometry and naked-eyes observations showed that other transition metal ions could not play the same sensor-role for the assay (given some typical ones).

Figure 4S The Evidence for Suggested Structure





I **II**

Figure 4s Why did we conclude the scheme of color changes in the text? We got the spectrum of some acidity (pH= 0.01, 3.12, 7.0, 10.34) solutuions. The above figure shows that the maximum of pyrocatechol violet will change gradually from shorter wave (444 nm about) to longer wave (600 nm about) with the acidity increasing. Pyrocatechol violet has two acid/base (see the scheme below). Under stronger acidity, it exists mainly in form **I**, it will change from **I** to **II** with the decrease of acidity. Here Cu^{2+} can play the role of acid. That is, at first , Cu^{2+} coordinates with **I** at position (1) and (2), this will promote the formation of **II** and its complexation. Accordingly, the maximum absorption peak of pyrocatechol violet will change from 444 nm to 623 nm. Moreover, in our experiment we found it is most perfect in a 1:2 molar ratio for pyrocatechol violet : Cu^{2+} , so we deduce Cu^{2+} also coordinate in (3) and (4).