Supporting Material

Thiol–Phenolic Interactions in Electropolymerized Methimazole Enable Superior Isomer Discrimination for Hydroquinone and Catechol Sensing

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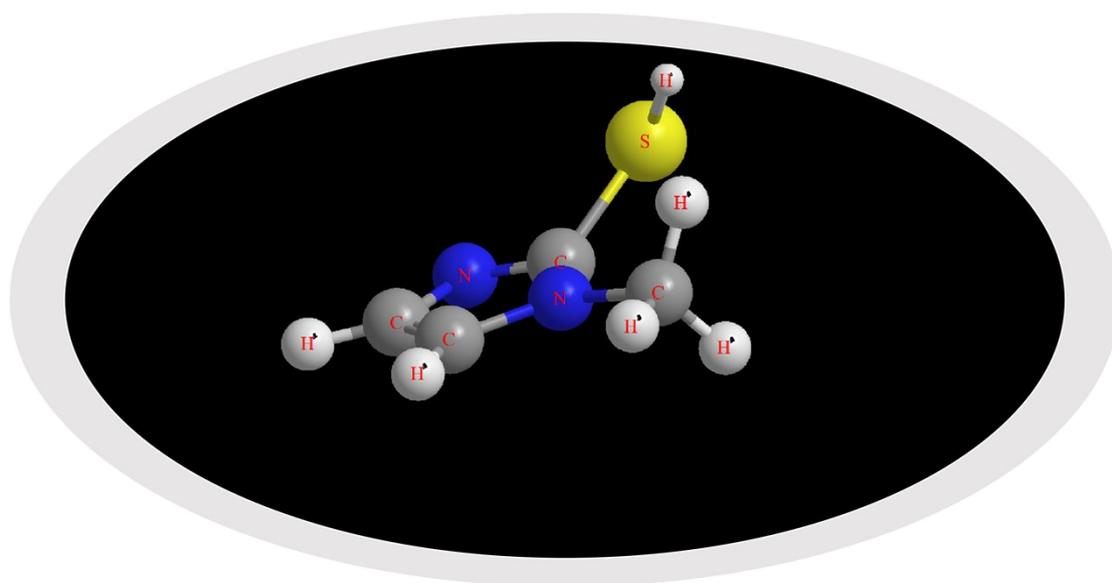y.w.chi@fzu.edu.cn (Y. Chi)

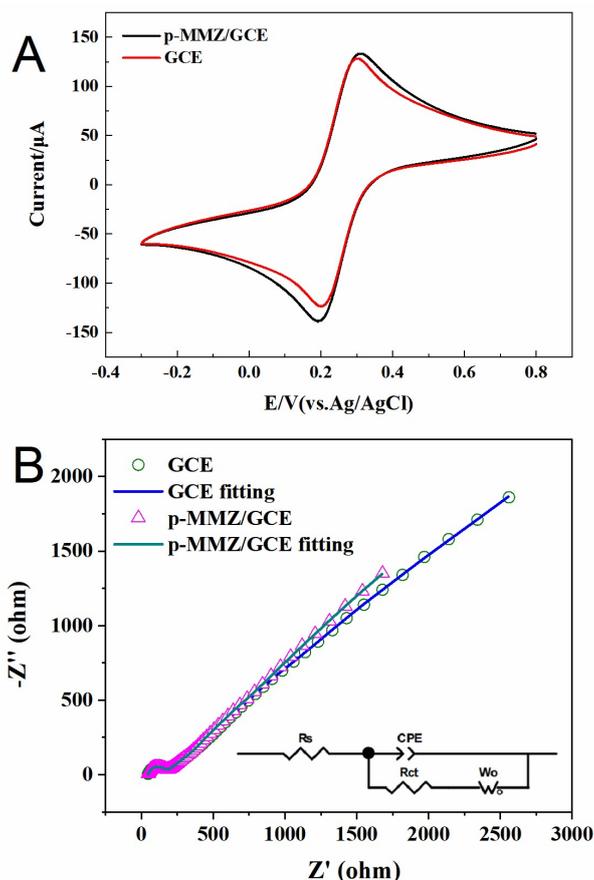Fig. S1 Proposed lying orientation of MMI molecule on the GCE surface

Fig. S2 CV (A) and EIS (B) comparison of GCE and p-MMI/GCE, including the fitting plots and the inset is the equivalent circuit in B. The working solution was 5.0 mM $K_3Fe(CN)_6$/$K_4Fe(CN)_6$ solution containing 0.5 M KCl. In A, the scan rate: 100 mV s^{-1}. In B, amplitude: 5 mV; frequency range: 0.01 Hz-10 kHz.

CV and EIS spectra were employed to gain the electrocatalytic performance of p-MMI/GCE compared to GCE (Fig. S1). The redox combination $K_4[Fe(CN)_6]$/$K_3[Fe(CN)_6]$ was chosen for the evaluation redox capability and the properties of the electrode–electrolyte interface was evaluated by the EIS. No significant redox enhancement towards $K_3Fe(CN)_6$/$K_4Fe(CN)_6$ was found for p-MMI/GCE (Fig. S1A). This phenomenon might be due to the poor interaction between the p-MMI film with $K_4[Fe(CN)_6]$/$K_3[Fe(CN)_6]$. In the EIS spectra, both Nyquist plots displayed a similar pattern, but the p-MMI/GCE had a smaller semicircle width than GCE (Fig. S1B). The equivalent circuit fitting was performed to extract the resistance (Rct) of them, the fitting results revealed that the Rct value of p-MMI/GCE is 116.6 Ω, while that of GCE is 128.1 Ω, which was consistent with the

semicircle's width analysis. However, the Warburg impedance of p-MMI/GCE in the low-frequency region is 10064 Ω, whereas that of GCE is 8897 Ω. Provided that the Rct value of p-MMI/GCE is lower, the closely stacking of MMI film may result in a longer diffusion path for ions in the low-frequency region. This increased diffusion resistance leads to a higher Warburg impedance compared to GCE.
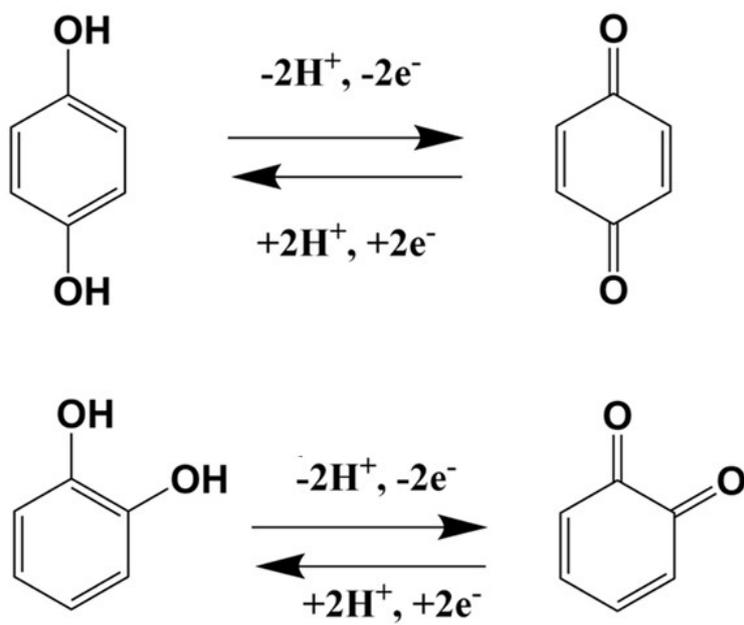
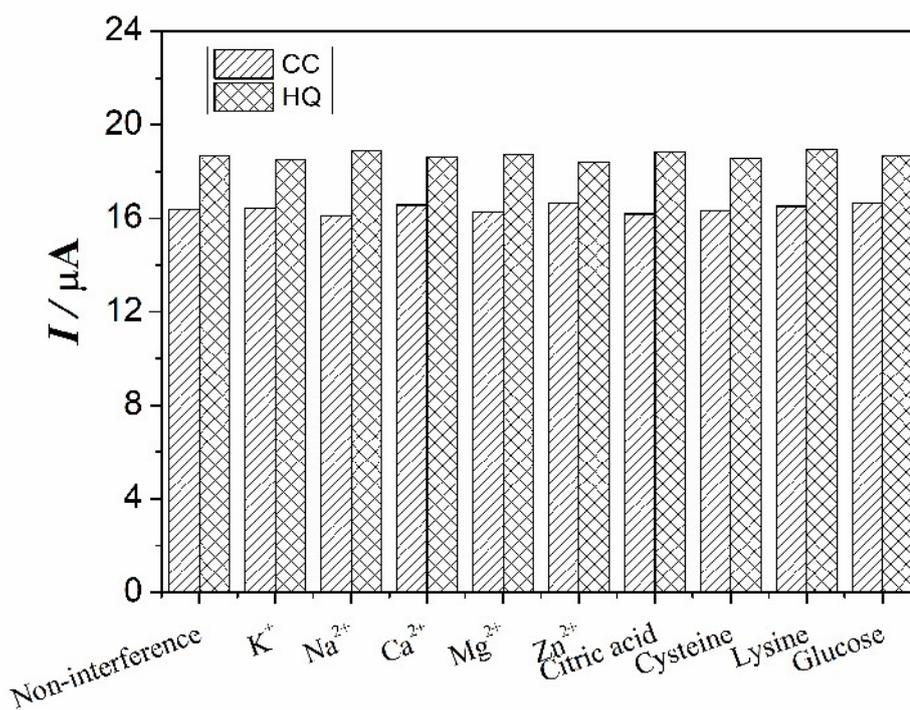FIg. S3 The redox mechanism for HQ and CC

Fig. S4 Interference study of HQ and CC under various chemicals, the concentrations of HQ and CC were all 100 μM, while potential interferents including, 400 μM K⁺, Na⁺, Ca²⁺, Mg²⁺, Zn²⁺, 200 μM citric acid, 100 μM cysteine, lysine and glucose.

Table S1 The linear detection ranges of HQ and CC on p-MMZ/GCE

Compounds	Concentration ranges (µM)	Linear functions	R^2	Detection limit with S/N=3 (µM)
HQ	1.0 – 300.0	$I_{pa}=0.1423C + 1.2246$	0.9967	0.6
	300.0 – 800.0	$I_{pa}=0.0589C + 27.296$	0.9968	
CC	1.0 – 300.0	$I_{pa}=0.1412C + 1.1711$	0.9952	0.2
	300.0 – 800.0	$I_{pa}=0.0504C + 27.6$	0.9926	
HQ	1.0 – 300.0	$I_{pa}=0.124C + 2.4452$	0.9950	0.6
	300.0 – 800.0	$I_{pa}=0.0373C + 27.627$	0.9938	
CC	1.0 – 300.0	$I_{pa}=0.1348C + 2.5036$	0.9911	0.2
	300.0 – 800.0	$I_{pa}=0.0372C + 30.554$	0.9931	