Supporting Information for

Electrode Kinetic Studies of the Hydroquinone-Benzoquinone System and the Reaction between Hydroquinone and Ammonia in Propylene Carbonate: Application to the Indirect Electro-analytical Sensing of Ammonia

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Figure Legend

Figure I

Schematic diagram of the tubular flow cell, showing the relative position of electrode within the ESR cavity.

Figure II

(a) Comparisons of the oxidation peak current and the reduction current of 0.5mM hydroquinone in 0.1M TBAP with PC between experimental results and simulation data at various scan rates. (b, c) Comparisons of the redox peak potentials between experimental results and simulation data at various scan rates.

Figure III

Steady state voltamogram of 5.0 mM benzoquinone (10 mVs^{-1}) in PC with 0.1M TBAP obtained at a 25 μm platinum microdisk. The inset figure is the experimental (–) and fitted theoretical (○) chronoamperometric transient following a potential step from 0 V to -0.8 V.

Figure IV

ESR spectra for 2mM benzoquinone in PC with 0.1M TBAP observed during in situ electrolysis using a modulation width of 0.24 mT. The inset Figure is steady state voltammetric response ($10mVs^{-1}$) obtained from a gold tube working electrode.

Figure V

(a) Plot of limiting current against flow rate (V_f) for 2 mM benzoquinone at two different step potentials: -0.6 V (▲) and -1.4 V (●). (b) Log-log plots of current

normalized ESR signal (S/i_{lim}) as a function of flow rate (V_f) for 2 mM benzoquinone at two different step potentials: -0.6 V (●) and -1.4 V (■).

Figure VI

Nicholson plot of ψ versus the square root of various scan rates for the 1.0 mM Benzoquinone in propylene carbonate with 0.1M TBAP.

Figure VII

(a) Plots comparing peak currents for the experimental CVs represented in Figure (11) to those simulated with Digisim. (b) Plots comparing peak potential separations for the experimental CVs represented in Figure (11) to those simulated with Digisim.

Figure VIII

The experiment set-up for ammonia determination.

Figure I

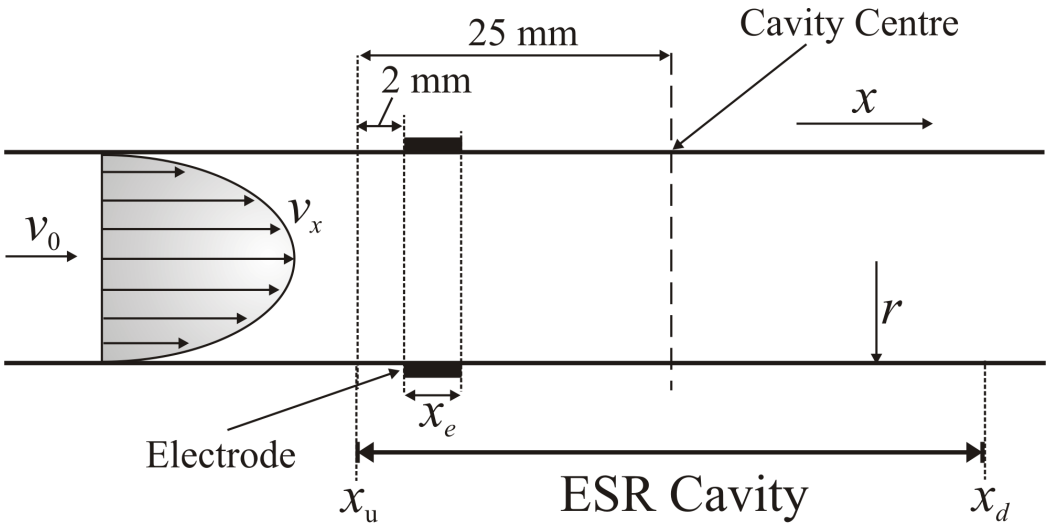


Figure II

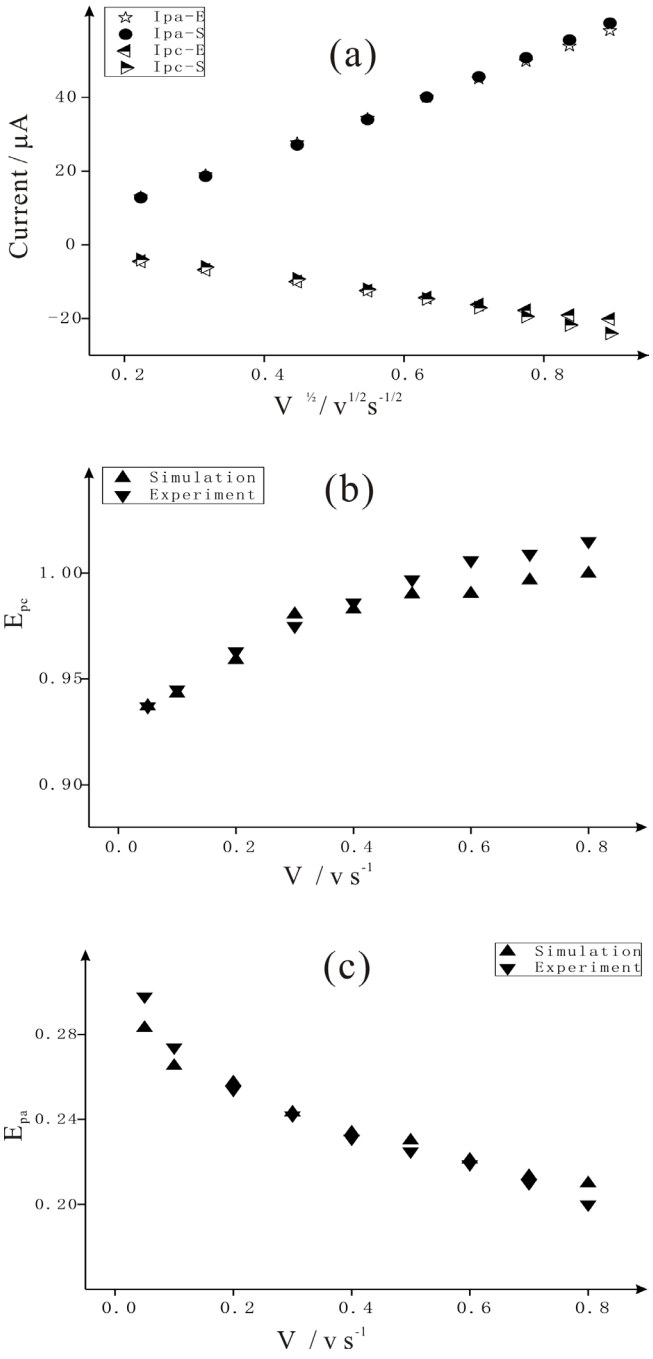

(a)
Ipa-E
Ipa-S
Ipc-E
Ipc-S
Current / μA
40
20
0
-20
0.2
0.4
0.6
0.8
V ½ / v^1/2 s^-1/2
(b)
Simulation
Experiment
E_pc
1.00
0.95
0.90
0.0
0.2
0.4
0.6
0.8
V / v s^-1
(c)
Simulation
Experiment
E_pa
0.28
0.24
0.20
0.0
0.2
0.4
0.6
0.8
V / v s^-1

Figure III

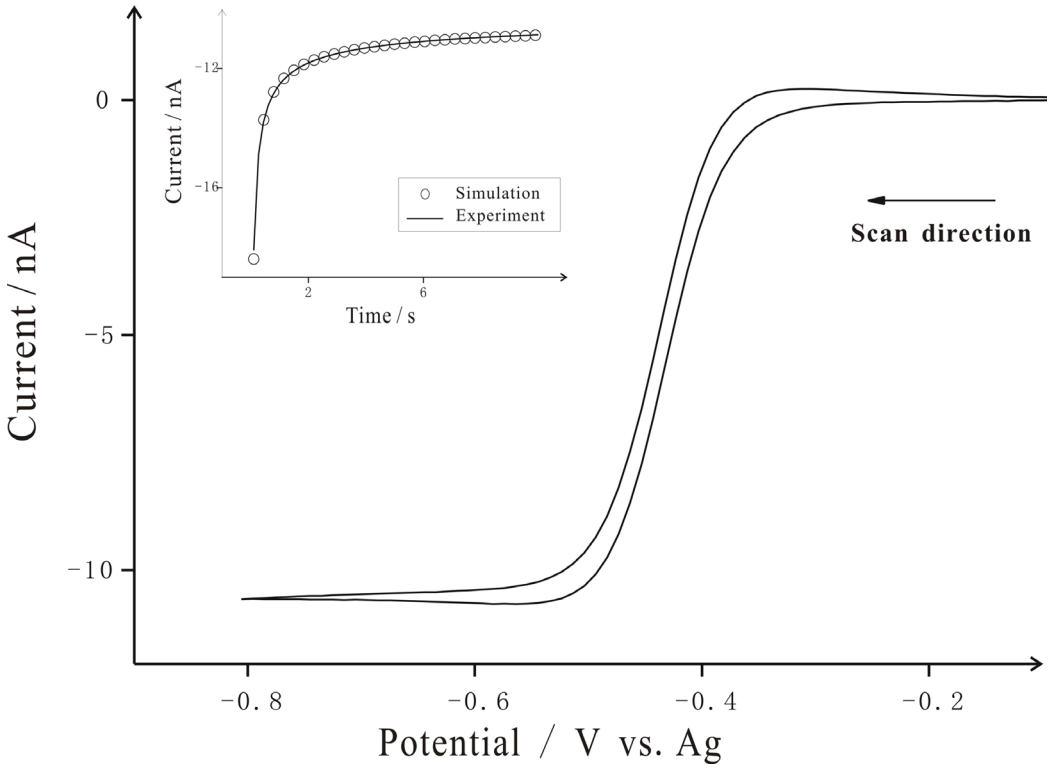

Current / nA
0
−5
−10
−0.8
−0.6
−0.4
−0.2
Potential / V vs. Ag
Scan direction
Current / nA
−12
−16
Simulation
Experiment
2
6
Time / s

Figure IV

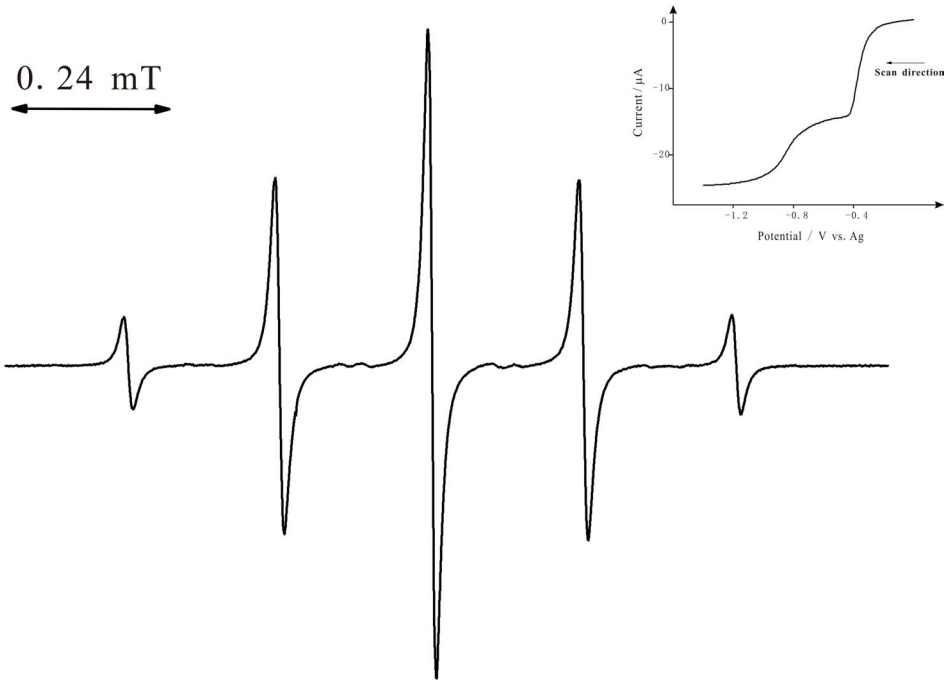
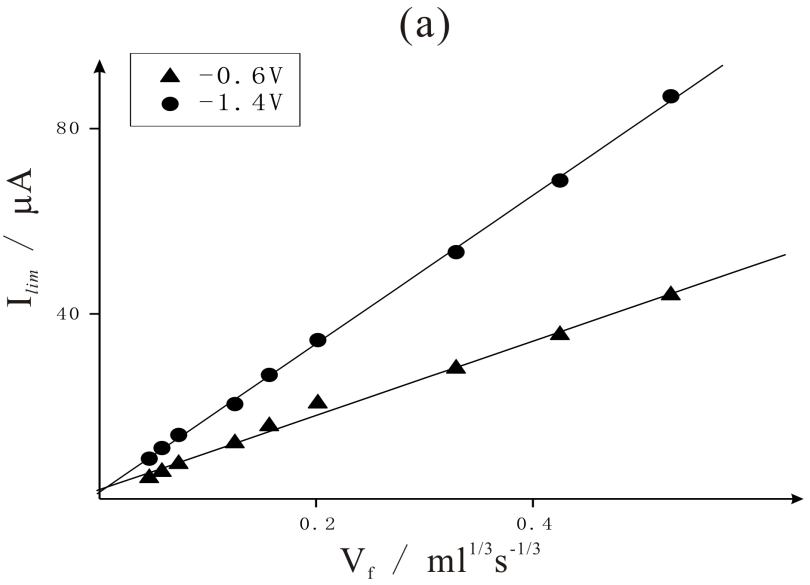

0. 24 mT
0
−10
−20
Current / μA
Scan direction
−1. 2
−0. 8
−0. 4
Potential / V vs. Ag

Figure V


(a)
−0.6V
−1.4V
80
40
I_{lim} / μA
0.2
0.4
V_f / $ml^{1/3}s^{-1/3}$

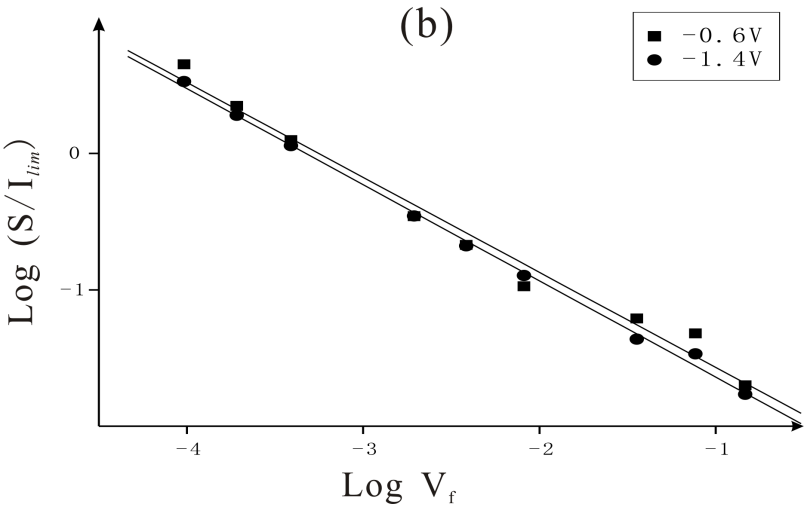

(b)
−0.6V
−1.4V
0
−1
Log (S/I_{lim})
−4
−3
−2
−1
Log V_f

Figure VI

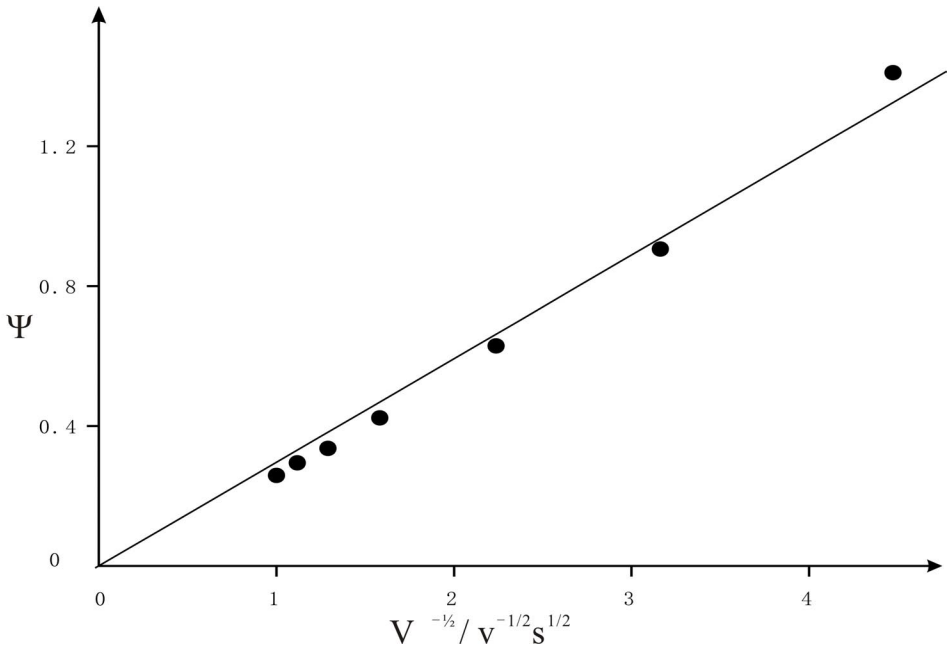
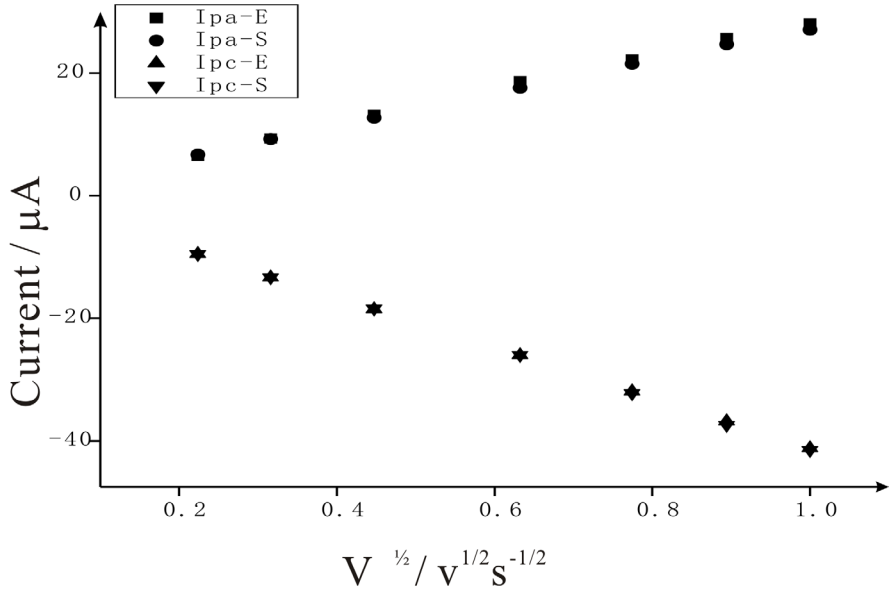


Figure VII


Ipa-E
Ipa-S
Ipc-E
Ipc-S
20
0
-20
-40
Current / μA
0.2
0.4
0.6
0.8
1.0
V ½/ v1/2s-1/2

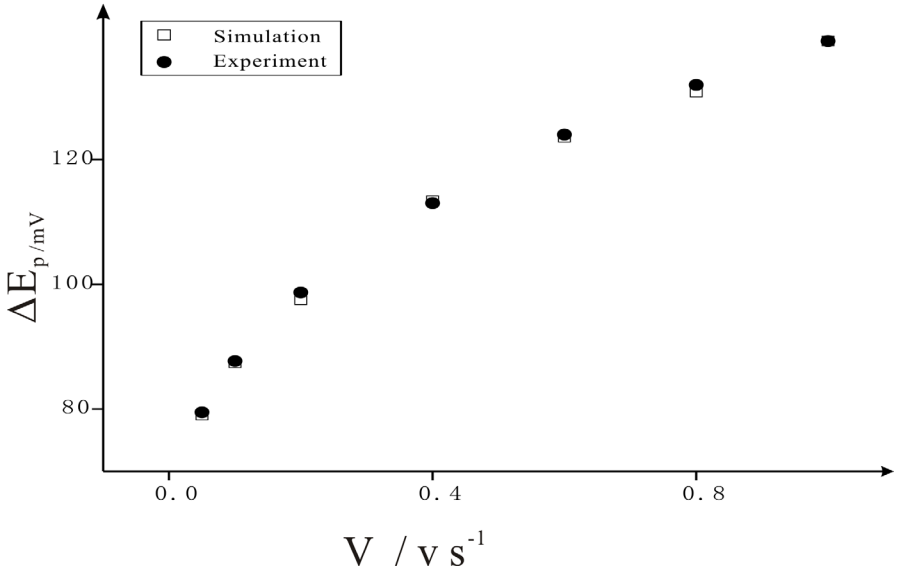
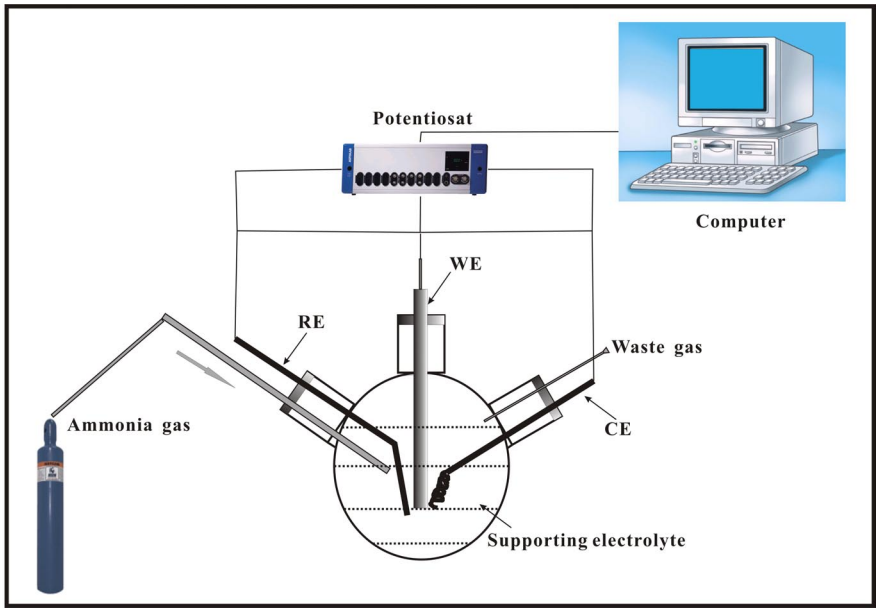

Simulation
Experiment
120
100
80
ΔEp/mV
0.0
0.4
0.8
V / v s-1

Figure VIII


Potentiosat
Computer
WE
RE
Waste gas
Ammonia gas
CE
Supporting electrolyte