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Supplementary Materials

Development of a Disposable Electrochemical Sensor based on Nanocomposite/Ionic Liquid Assisted Hollow Fiber-Graphite Electrode for Measurement of Lorazepam Using Central Composite Design

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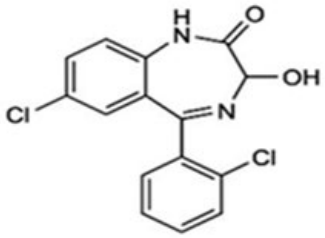

Lorazepam
pKa = 1.3, 11.5 (20°)
Log k_{ow} (octanol/pH 7.4) = 2.4

Fig. S1. Chemical structure of LRZ

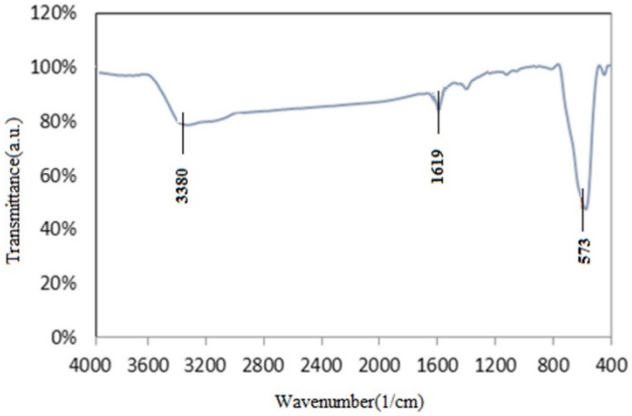

Fig. S2a. FTIR spectrum of Fe_3O_4 nanoparticles

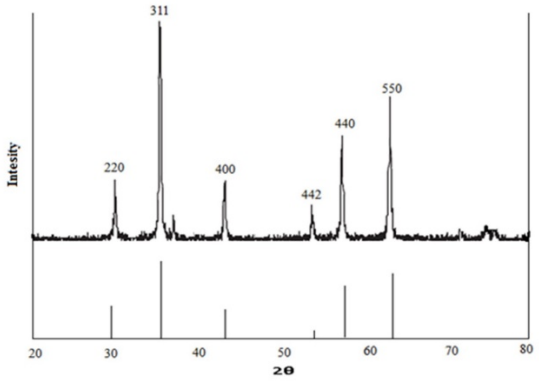

Fig. S2b. x-ray diffraction patterns of Fe_3O_4 nanoparticles

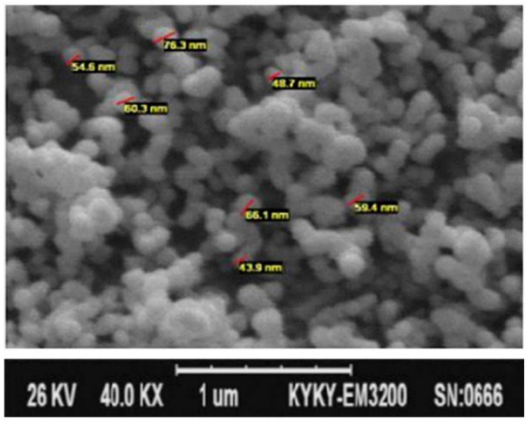

Fig. S2c. SEM images of Fe_3O_4 nanoparticles

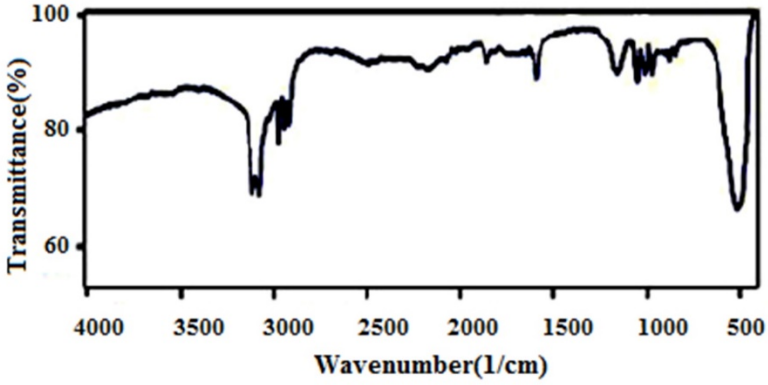

Fig. S3a. FT-IR spectra Fe_3O_4 nanoparticles/[OMIM] [BF4] (a),

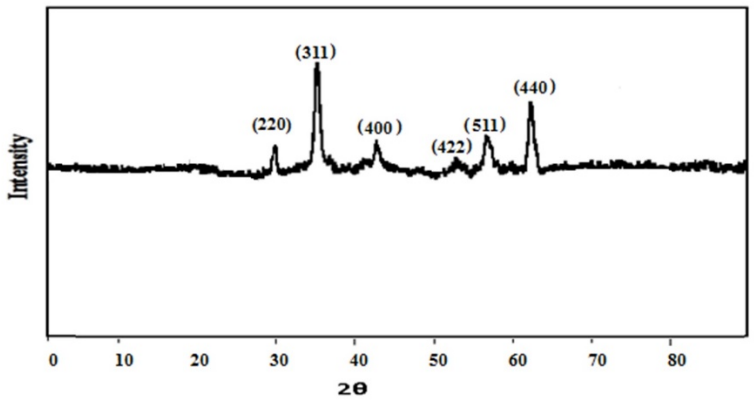

Fig. S3b. XRD spectrum Fe_3O_4 nanoparticles/[OMIM] [BF4] (b)

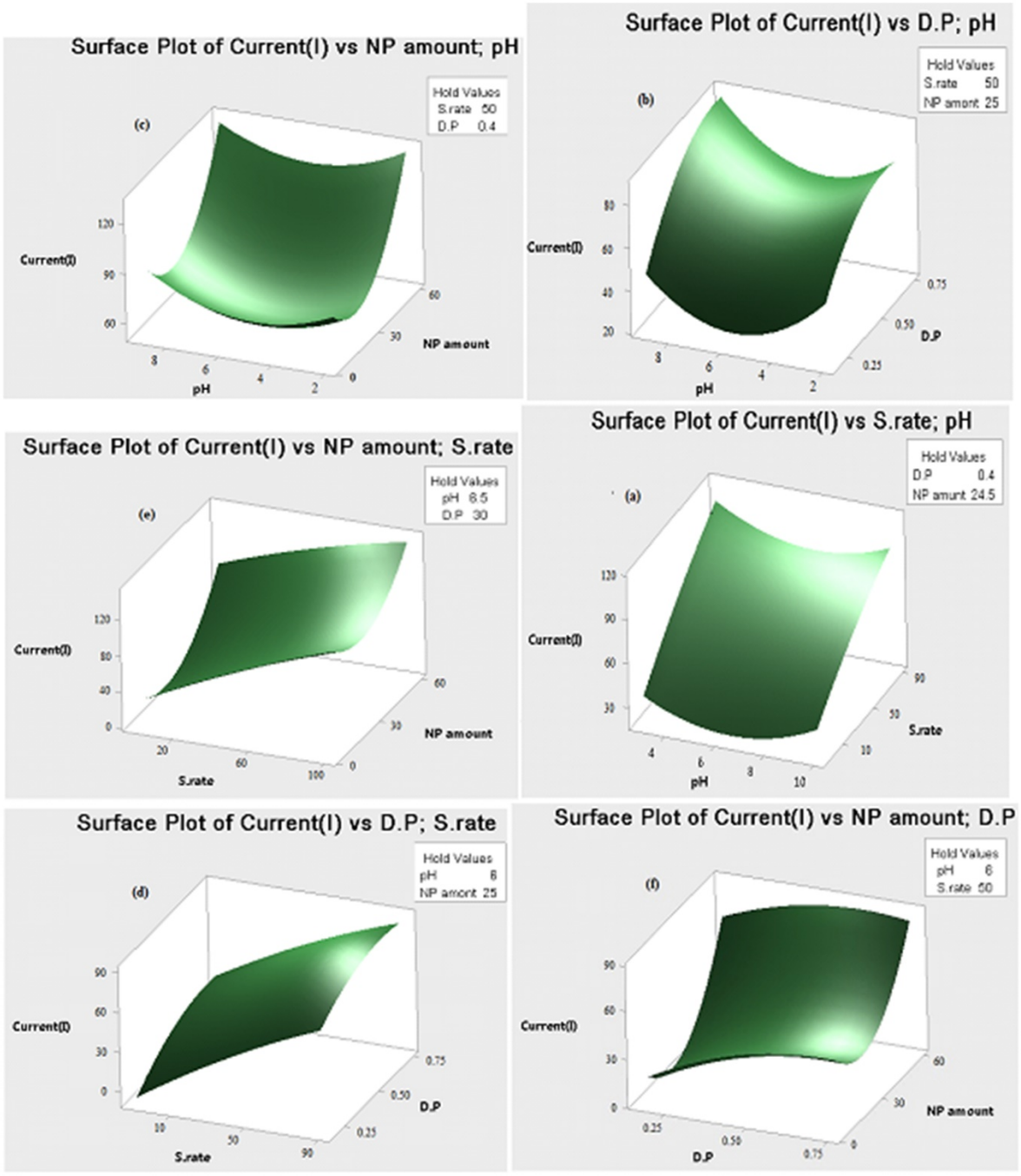

Fig. S4. Surfaces response of CCD design obtained by plotting: (a) pH *vs.* S.rate (b) pH *vs.* amount D.P (c) pH of *vs.* NP amount (d) S.rate *vs.*NP amount (e) D.P vs. NP amount.

Table S1. Experimental factors and levels of the PBD

Variable	Symbol	Low(-)	High(+)
NP amount(mg)	A	5	45
pH	B	2	10
BZ Concentration(mg/L)	C	4	36
Deposition time(s)	D	50	550
Deposition potential(V)	E	0.2	0.6
Scan rate(mVS^{-1})	F	50	90

Twelve experiments were undergone and each experiment was repeated three times, with the average response (current) listed in Table 2.

Table S2. The results of PBD experimental design matrix

Std order	Run order	A	B	C	D	E	F	I(μA)
1	1	45	2	36	50	0.2	50	27.21
2	2	45	10	4	550	0.2	50	72.91
3	3	5	10	36	50	0.6	50	43.26
4	4	45	2	36	550	0.2	90	37.04
5	5	45	10	4	550	0.6	50	107.55
6	6	45	10	36	550	0.2	90	70.30
8	7	5	2	36	550	0.6	50	49.72
9	9	5	2	4	50	0.6	90	21.10
10	10	45	2	4	50	0.6	90	59.40
11	11	5	10	4	50	0.2	90	18.70
12	12	5	2	4	50	0.2	50	12.50

Table S3. Designed Matrix in Central Composite Design

Run	Block	A	B	C	D	Current(I)
1	1	1	-1	-1	-1	6.21
2	1	-1	1	-1	-1	70.00
3	1	-1	-1	1	-1	29.01
4	1	1	1	1	-1	63.91
5	1	-1	-1	-1	1	54.09
6	1	1	1	-1	1	91.32
7	1	1	-1	1	1	61.02
8	1	-1	1	1	1	99.07
9	1	0	0	0	0	35.90
10	1	0	0	0	0	35.63
11	2	-1	-1	-1	-1	7.31
12	2	1	1	-1	-1	45.04
13	2	1	-1	1	-1	28.98
14	2	-1	1	1	-1	87.99
15	2	1	-1	-1	1	55.01
16	2	-1	1	-1	1	89.02
17	2	-1	-1	1	1	62.09
18	2	1	1	1	1	97.91
19	2	0	0	0	0	35.96
20	2	0	0	0	0	34.95
21	3	-2	0	0	0	46.87
22	3	2	0	0	0	53.05
23	3	0	-2	0	0	45.93
24	3	0	2	0	0	60.03
25	3	0	0	-2	0	29.02
26	3	0	0	2	0	38.96
27	3	0	0	0	-2	40.05
28	3	0	0	0	2	70.52
29	3	0	0	0	0	53.71
30	3	0	0	0	0	36.04

Table S4. Analysis of Variance Data

Source	DF	Adj SS	Adj MS	F-Value	P-Value	
Model	16	16541.3	1033.83	32.71	<0.0001	Significant
Blocks	2	280.0	140.01	4.43	0.034	
Linear	4	12985.3	3246.32	102.71	<0.0001	
pH	1	41.2	41.17	1.30	0.274	
S.rate	1	8105.8	8105.79	256.46	<0.0001	
D.P	1	593.0	592.96	18.76	0.001	
NP amount	1	4273.8	4273.79	135.22	<0.0001	
Square	4	2245.0	561.26	17.76	<0.0001	
pH*pH	1	66.5	66.46	2.10	0.171	
S.rate*S.rate	1	3.5	3.53	0.11	0.743	
D.P*D.P	1	63.1	63.13	2.00	0.181	
NP amount*NP amount	1	285.6	285.64	9.04	0.010	
2-Way Interaction	6	548.0	91.34	2.89	0.051	
pH*S.rate	1	38.4	38.44	1.22	0.290	
pH*D.P	1	37.8	37.82	1.20	0.294	
pH*NP amount	1	52.6	52.56	1.66	0.220	
S.rate*D.P	1	36.6	36.60	1.16	0.301	
S.rate*NP amount	1	318.6	318.62	10.08	0.007	
D.P*NP amount	1	64.0	64.00	2.02	0.178	
Error	13	410.9	31.61			
Lack-of-Fit	10	243.4	24.34	0.44	0.860	Not significant
Pure Error	3	167.5	55.82			
Total	29	16952.2				

DF: Degrees of freedom, Adj SS: Adjusted sum of squares, Adj MS: Adjusted mean squares