Supplementary Information

The experiment divided into 65 groups, as shown in Table 1. For the first 50 experiments, every 10 groups had the same ammonium concentration and PH value. Firstly, a certain amount of sodium hypochlorite was added to the ammonium chloride solution to control the chlorine/ammonia-nitrogen ratio between 0 and 15. After that, the PH value was adjusted to the design value by adding hydrochloric acid or sodium hydroxide. When the PH value of the solution was stable, the cyclic voltammetry was performed, while the PH value and temperature value of the solution were recorded, and the total chlorine value of the solution was measured by DPD method. As a special case, ammonium chloride was not added in the last 15 groups. In this case, the total chlorine value of the solution is equal to the free chlorine value. In groups 50 to 55, the concentration of total chlorine increased gradually, while in groups 55 to 60 and 61 to 65, only the PH value of the solution adjusted. Similarly, cyclic voltammetry was performed in the last 15 experiments and total chlorine, PH, and temperature were recorded.

Table 1

The layout and results of the experiment.

Group	Factors					Result
	PH	Temperature(℃)	Ammonium ion (mg/L)	Ratio(chlorine/ ammonia-nitrogen)	Total chlorine(mg/L)	
1	9.46	20.8	10	0.00	0.0	Fig.S1(1)
2	9.47	21.2	10	0.97	4.0	Fig.S1(2)
3	9.52	21.6	10	2.14	8.8	Fig.S1(3)
4	9.50	21.7	10	2.58	10.6	Fig.S1(4)
5	9.53	21.9	10	3.79	15.6	Fig.S1(5)
6	9.48	22.0	10	4.62	19	Fig.S1(6)
7	9.51	22.0	10	5.56	16.8	Fig.S1(7)
8	9.49	22.0	10	12.75	21.2	Fig.S1(8)
9	9.49	22.0	10	13.48	24.2	Fig.S1(9)
10	9.49	22.0	10	14.60	28.8	Fig.S1(10)
11	8.50	19.9	20	0.00	0.0	Fig.S1(11)
12	8.52	20.2	20	0.34	2.8	Fig.S1(12)
13	8.49	20.9	20	1.20	9.9	Fig.S1(13)
14	8.51	21.5	20	2.48	20.4	Fig.S1(14)
15	8.54	21.7	20	3.21	26.4	Fig.S1(15)
16	8.53	21.9	20	3.77	31	Fig.S1(16)
17	8.48	21.9	20	6.84	12.5	Fig.S1(17)
18	8.48	22.1	20	7.23	6.0	Fig.S1(18)
19	8.52	22.2	20	9.12	12.5	Fig.S1(19)
20	8.50	22.1	20	10.27	22	Fig.S1(20)
21	7.45	20.0	30	0.00	0.0	Fig.S1(21)
22	7.44	20.3	30	0.87	10.8	Fig.S1(22)

23	7.51	20.7	30	1.78	22	Fig.S1(23)
24	7.50	21.0	30	2.43	30	Fig.S1(24)
25	7.46	21.2	30	3.48	43	Fig.S1(25)
26	7.49	21.2	30	5.94	41	Fig.S1(26)
27	7.45	21.0	30	6.26	33	Fig.S1(27)
28	7.44	20.7	30	7.56	1.0	Fig.S1(28)
29	7.51	20.6	30	8.38	9.6	Fig.S1(29)
30	7.51	20.7	30	9.58	24.5	Fig.S1(30)
31	6.50	17.5	40	0.00	0.0	Fig.S1(31)
32	6.5	18.0	40	1.03	17	Fig.S1(32)
33	6.53	18.5	40	1.94	32	Fig.S1(33)
34	6.54	18.8	40	3.10	51	Fig.S1(34)
35	6.50	19.2	40	3.83	63	Fig.S1(35)
36	6.51	19.6	40	4.25	70	Fig.S1(36)
37	6.50	19.5	40	5.72	62	Fig.S1(37)
38	6.50	19.6	40	5.96	54	Fig.S1(38)
39	6.55	19.4	40	7.39	6.8	Fig.S1(39)
40	6.53	19.9	40	8.94	22	Fig.S1(40)
41	5.50	18.9	50	0.00	0.0	Fig.S1(41)
42	5.46	19.5	50	0.87	18	Fig.S1(42)
43	5.54	19.8	50	1.94	40	Fig.S1(43)
44	5.57	20.2	50	3.28	54	Fig.S1(44)
45	5.52	20.4	50	4.25	70	Fig.S1(45)
46	5.48	20.5	50	5.04	83	Fig.S1(46)
47	5.53	20.6	50	5.17	80	Fig.S1(47)
48	5.51	20.6	50	5.56	67	Fig.S1(48)
49	5.49	20.4	50	7.08	17	Fig.S1(49)
50	5.54	19.8	50	8.82	20	Fig.S1(50)
51	5.51	16.8	0	-	0.0	Fig.S1(51)
52	7.75	17.0	0	-	6.2	Fig.S1(52)
53	8.09	17.0	0	-	9.4	Fig.S1(53)
54	8.32	17.5	0	-	19.6	Fig.S1(54)
55	8.68	17.9	0	-	24.5	Fig.S1(55)
56	7.89	18.2	0	-	24.5	Fig.S1(56)
57	7.42	18.3	0	-	24.5	Fig.S1(57)
58	7.04	18.5	0	-	24.5	Fig.S1(58)
59	6.49	18.7	0	-	24.5	Fig.S1(59)
60	4.54	18.8	0	-	24.5	Fig.S1(60)
61	7.02	19.0	0	-	44	Fig.S1(61)
62	7.40	19.0	0	-	44	Fig.S1(62)
63	7.84	19.2	0	-	44	Fig.S1(63)
64	8.55	19.2	0	-	44	Fig.S1(64)
65	9.37	19.2	0	-	44	Fig.S1(65)

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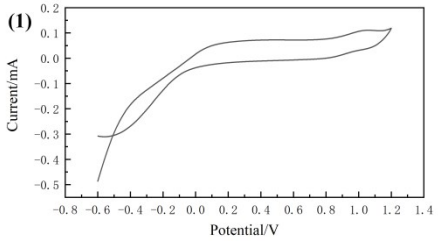

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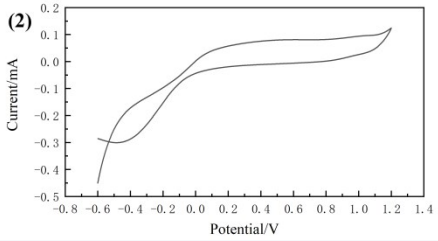

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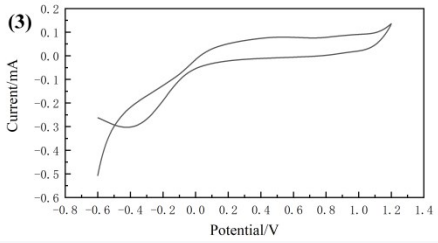

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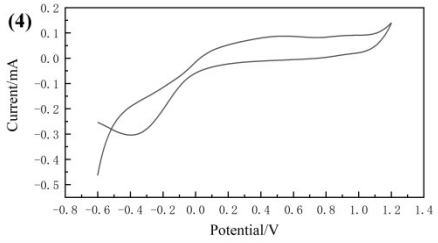

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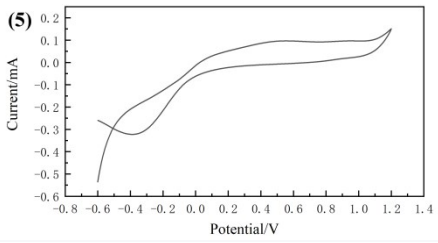

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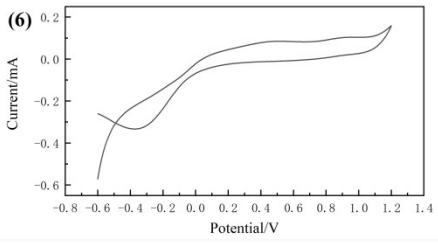

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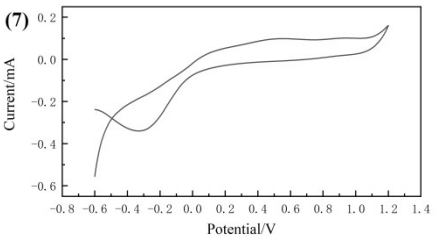

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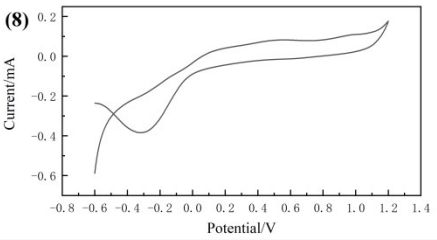

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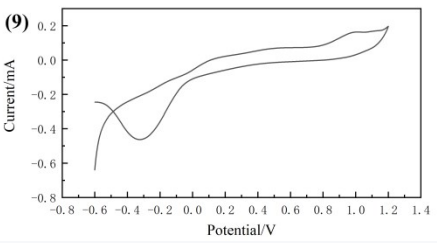

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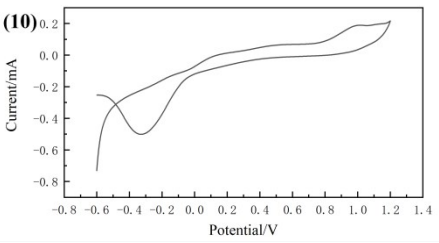

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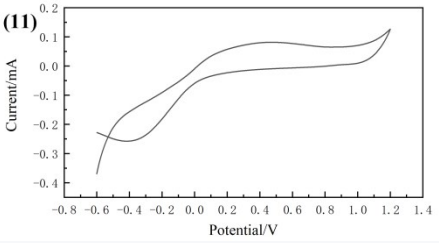

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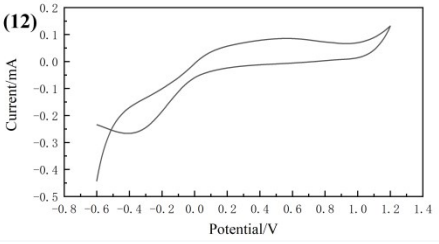

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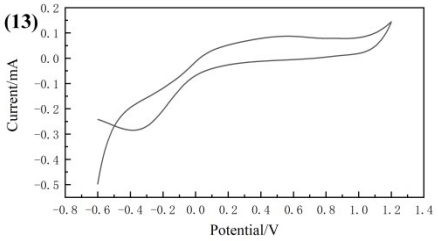

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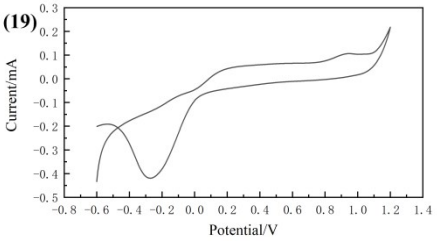

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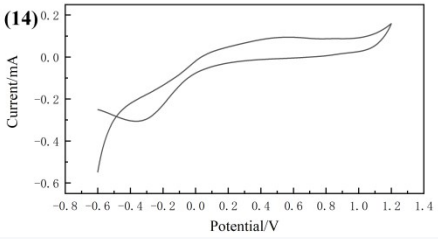

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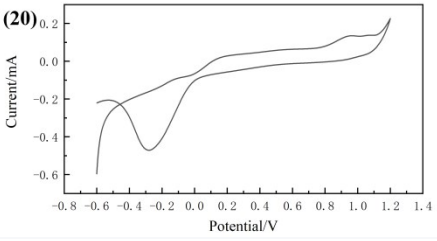

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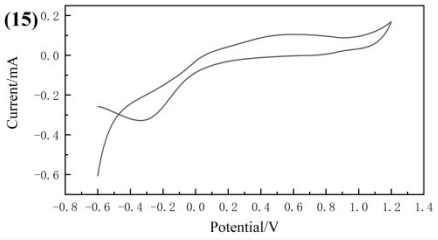

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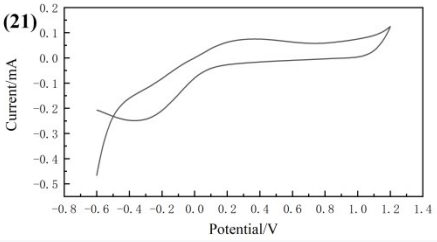

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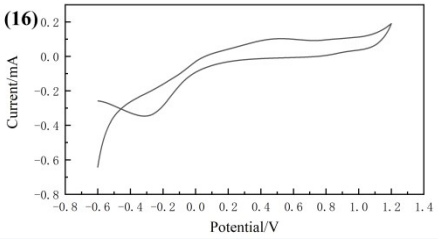

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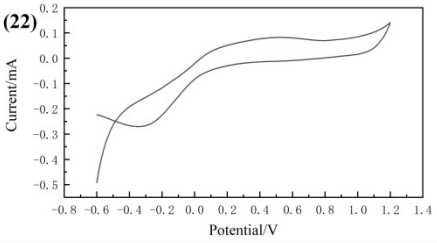

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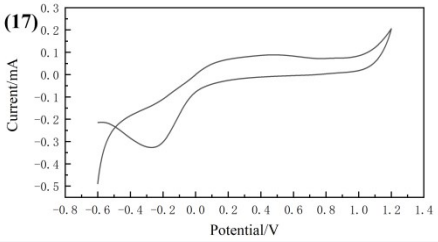

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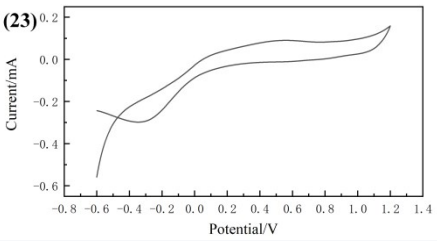

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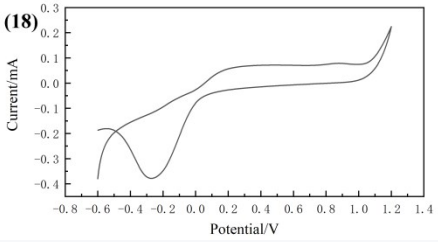

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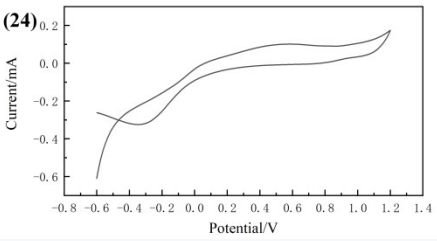

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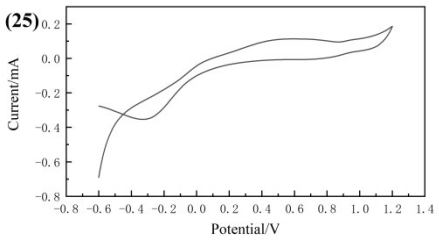

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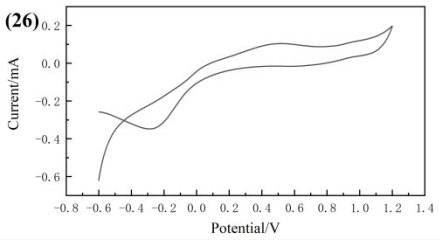

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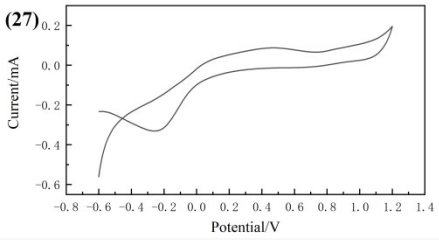

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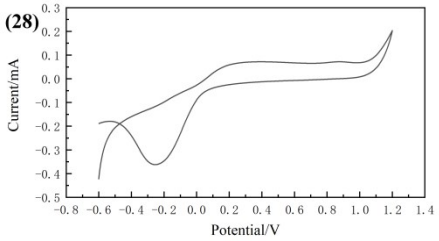

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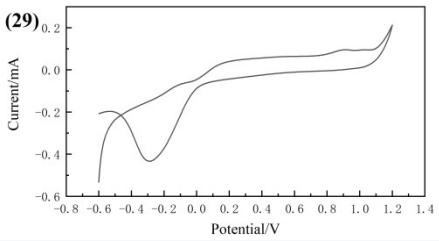

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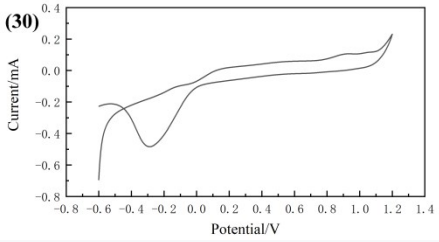

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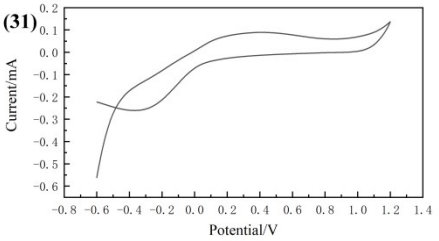

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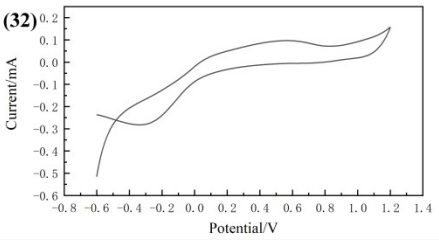

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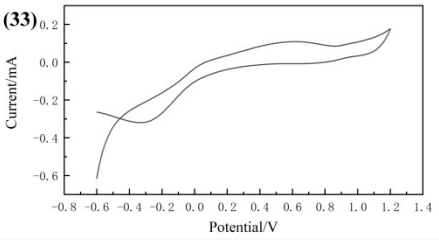

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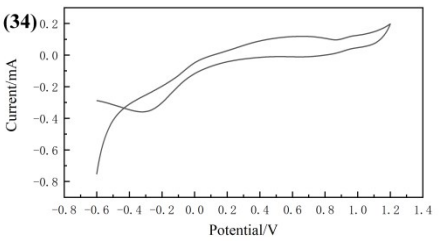

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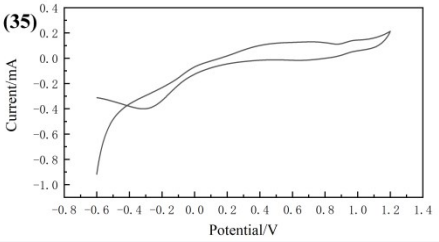

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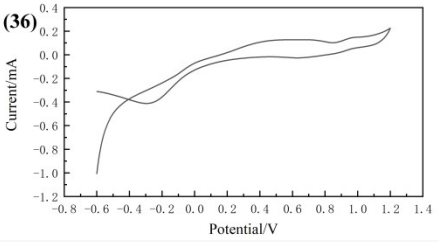

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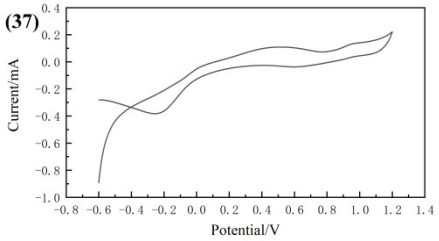

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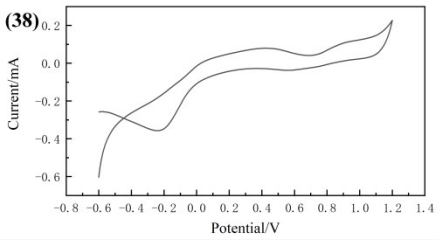

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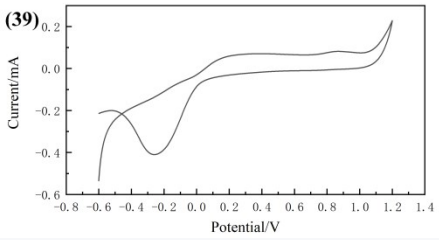

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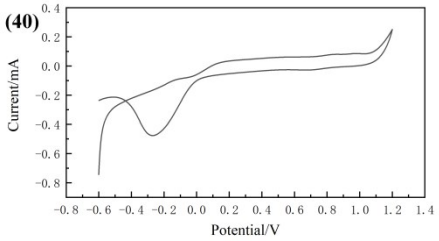

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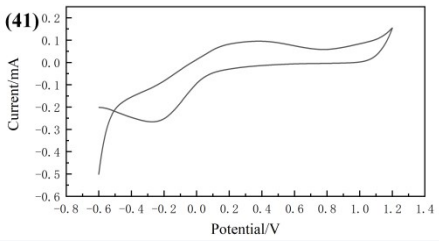

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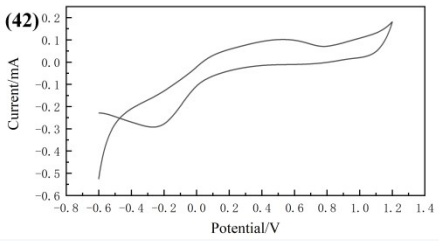

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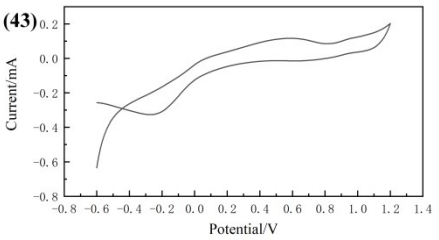

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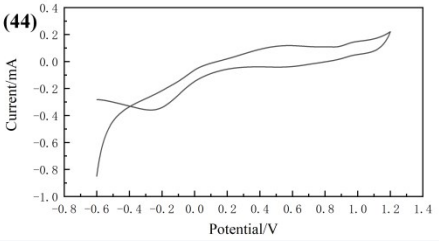

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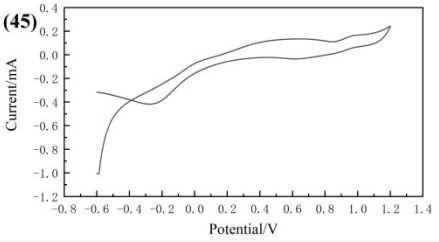

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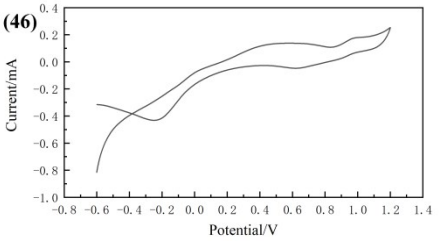

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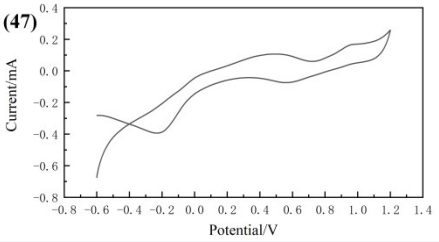

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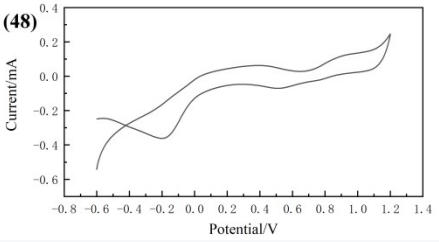

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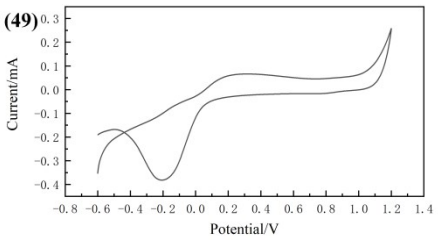

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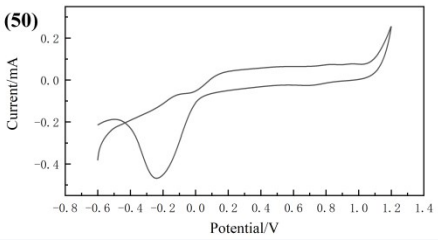

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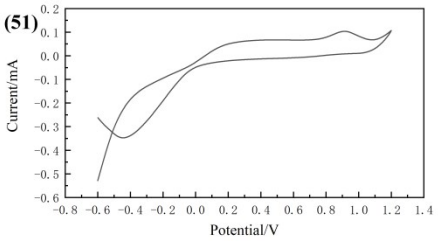

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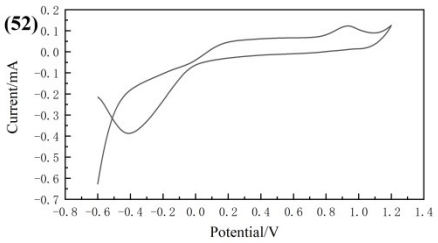

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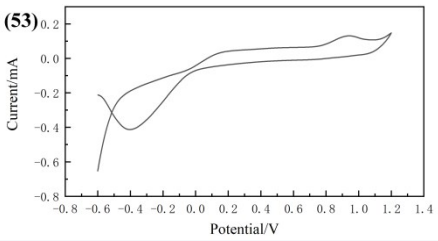

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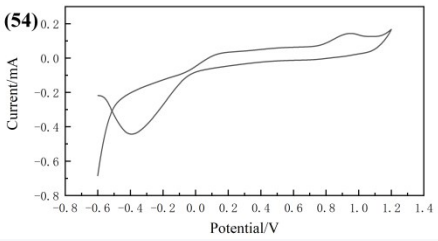

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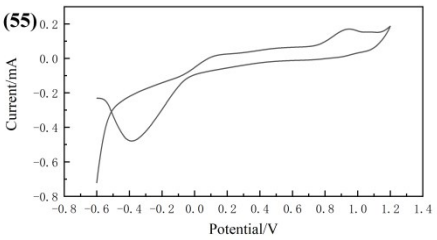

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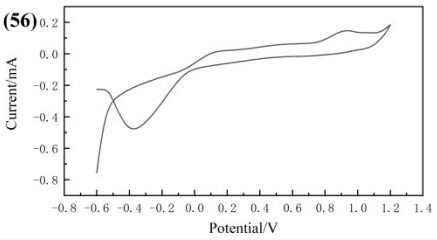

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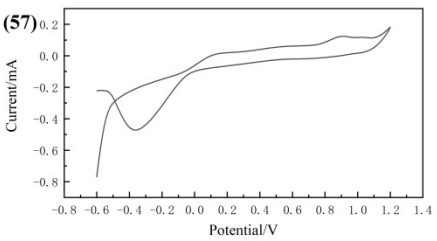

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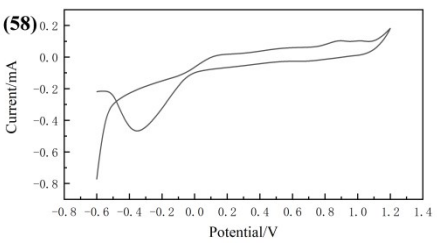

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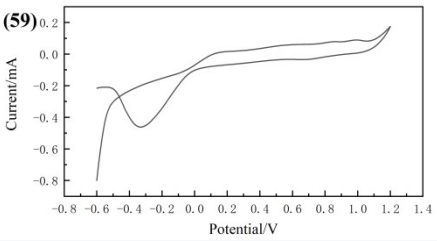

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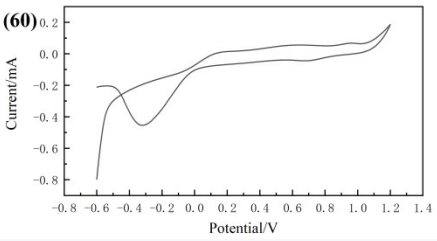

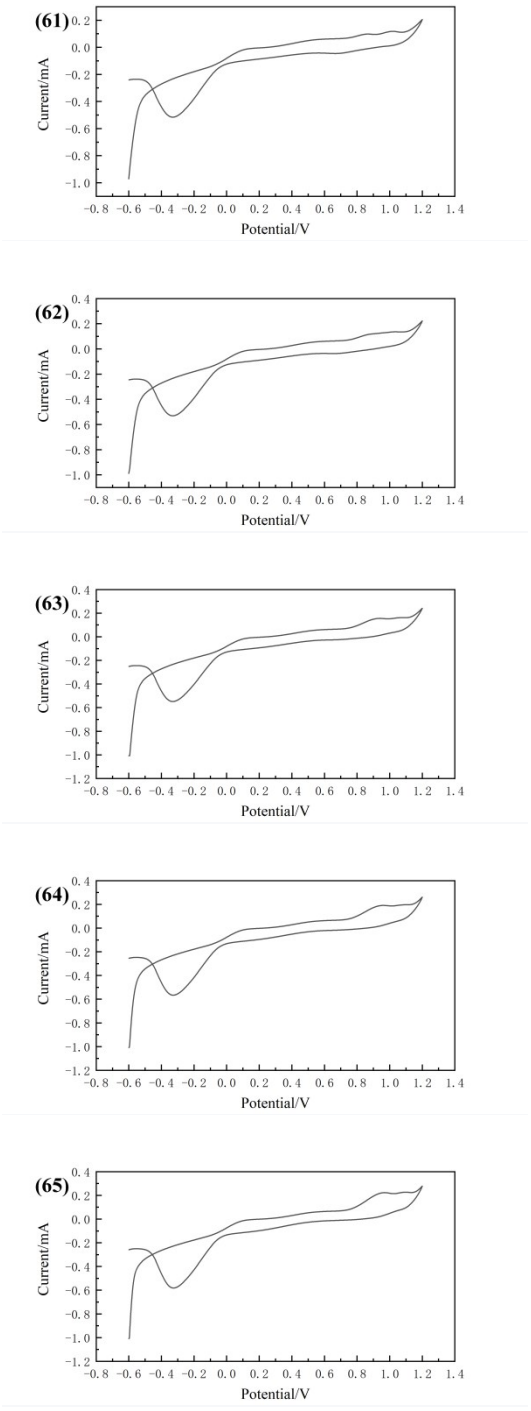

Fig.S1 the Cyclic voltammograms results of the experiment.