

Electronic Supplementary Material

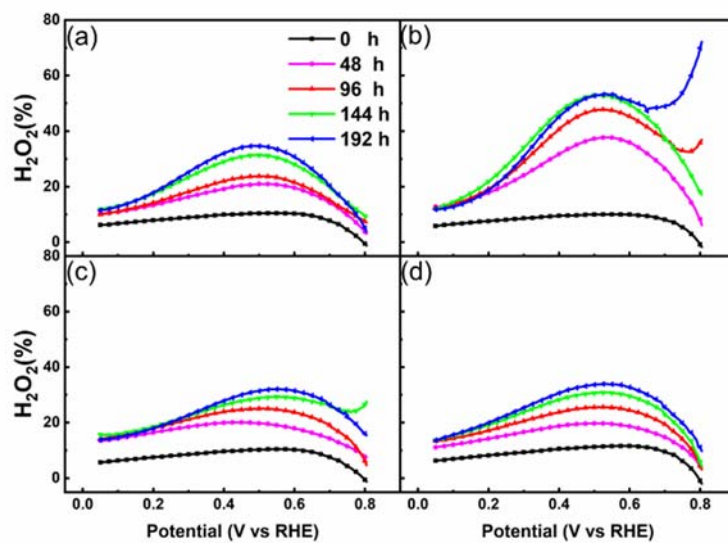


Fig. S1 H₂O₂ yield during AST with 0.1 M HClO₄ as electrolyte.

(a) C-0.4 V; (b) C-0.6 V; (c) C-0.8 V; (d) C-1.0 V.

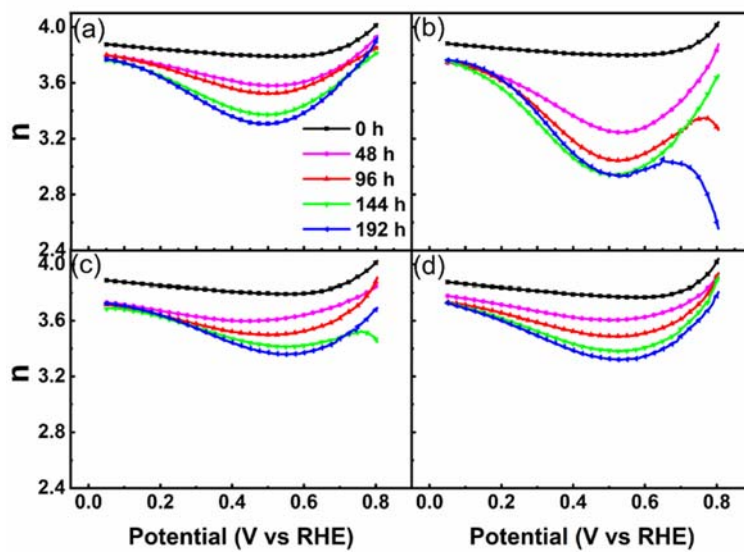


Fig. S2 Transferred electron number (*n*) during AST with 0.1 M HClO₄ as electrolyte

(a) C-0.4 V; (b) C-0.6 V; (c) C-0.8 V; (d) C-1.0 V.

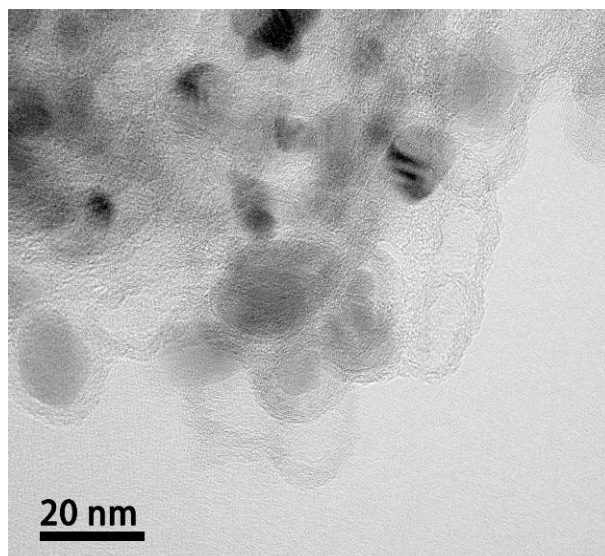


Fig. S3 High resolution TEM image of C-0.6 V.

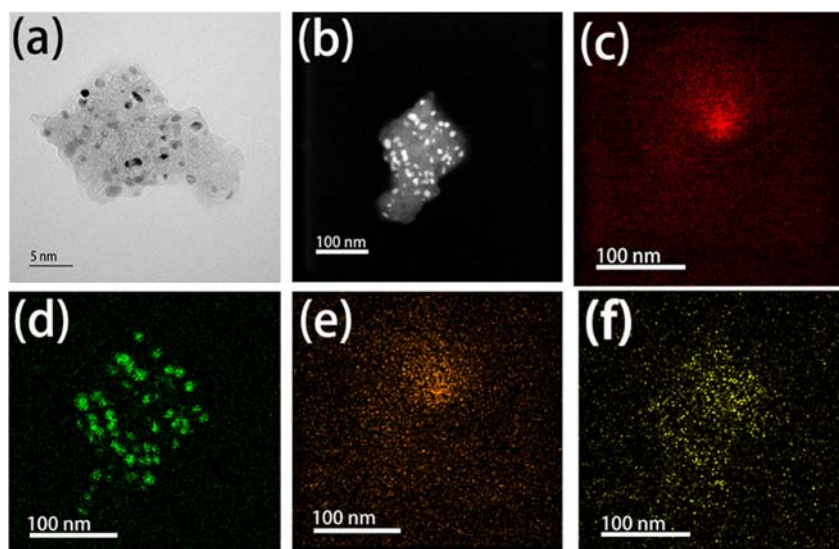


Fig. S4 Characterization of C-0.6 V.

(a) High-resolution TEM image; (b) HAADF image; (c-f) elemental maps of the element of C, Fe, N, O.

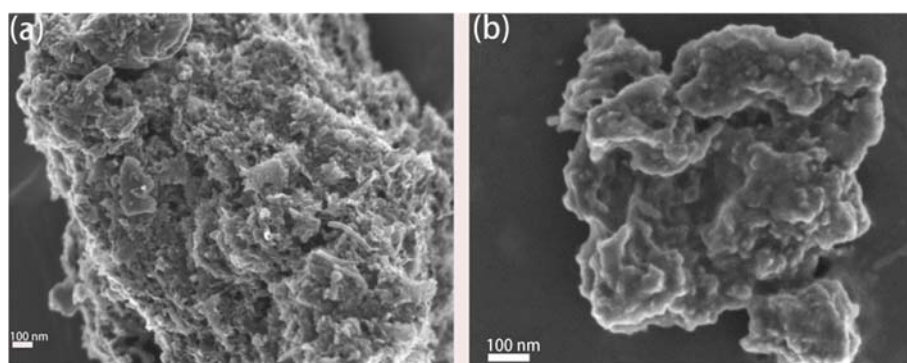


Fig. S5 SEM images.

(a) P-C; (b) C-0.6 V.

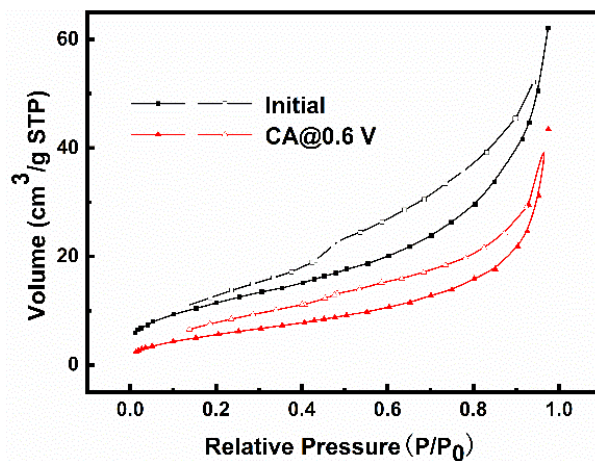


Fig. S6 N₂ adsorption-desorption isotherms of gas diffusion.

layers (GDLs) with fresh catalyst and C-0.6 V.

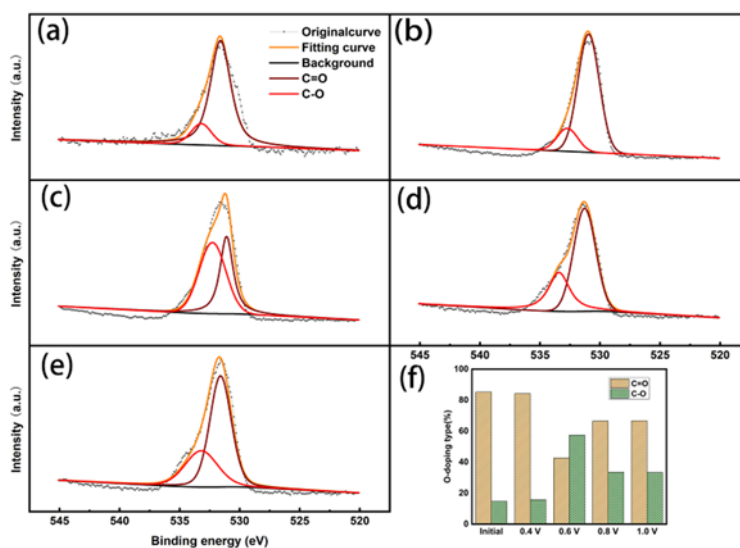


Fig. S7 High-resolution O 1s spectra.

(a) P-C; (b) C-0.4 V; (c) C-0.6 V; (d) C-0.8 V; (e) C-1.0 V; (f) different atomic concentration of oxygen configurations.

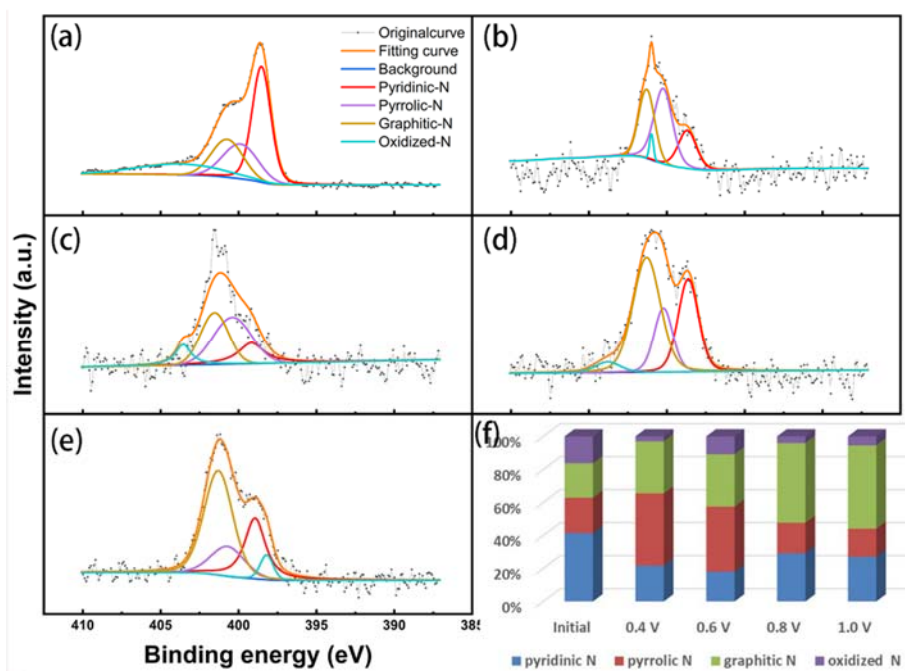


Fig. S8 High-resolution N 1s spectra.

(a) P-C; (b) C-0.4 V; (c) C-0.6 V; (d) C-0.8 V; (e) C-1.0 V; (f) different atomic concentration of nitrogen configurations.

Table S1 Composition of catalysts based on broad scan results of XPS

	C 1s	N 1s	O 1s	Fe 2p	O/C
P-C	79.77	9.07	9.5	1.66	0.1191
C-0.4 V	49.88	1.12	49	-	0.9824
C-0.6 V	51.44	1.27	47.3	-	0.9195
C-0.8 V	52.67	2.06	45.27	-	0.8595
C-1.0 V	74.1	2.06	23.84	-	0.3217

Table S2 Relative intensities of different carbon species observed in high-resolution C_{1s} spectra of catalysts before and after AST (C-F_x excluded)

	Initial	C-0.4 V	C-0.6 V	C-0.8 V	C-1.0 V
C-C	0.6440	0.5517	0.5043	0.6812	0.6929
C-O	0.1532	0.3292	0.3831	0.2186	0.2265
C = O	0.0424	0.0875	0.1010	0.0407	0.0514
C-Fe	0.0435	-	-	-	-
C-N	0.1168	0.0316	0.0116	0.0595	0.0292