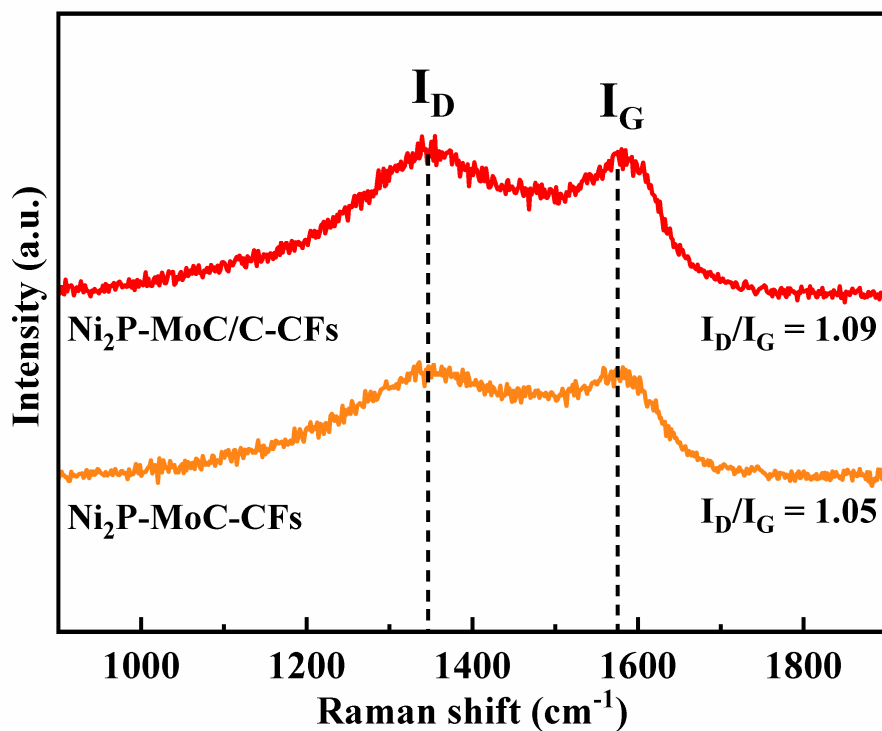
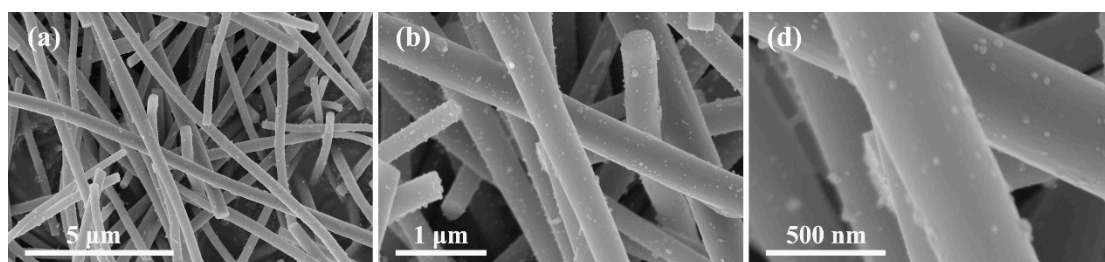


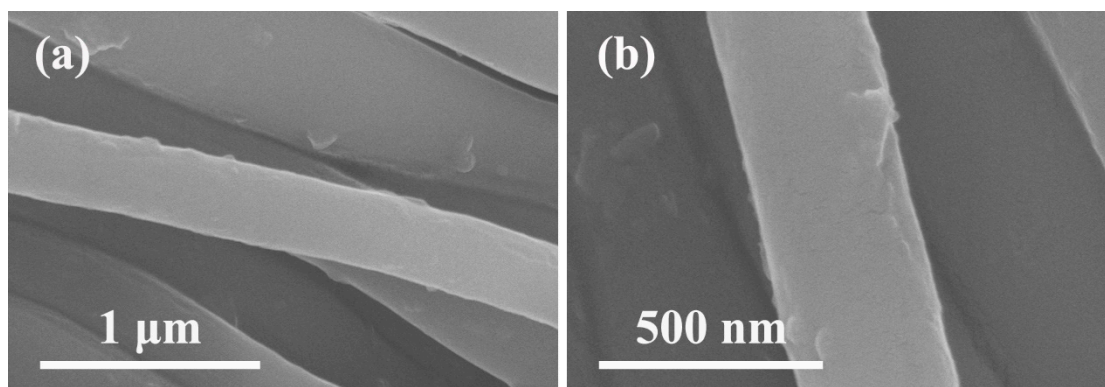
## Supplementary Materials



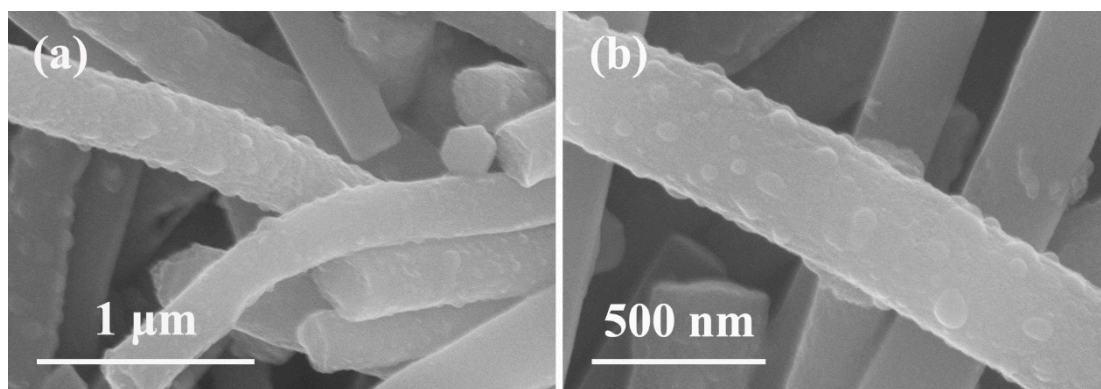
**Figure S1.** Raman spectra of the prepared Ni<sub>2</sub>P-MoC/C-CFs and Ni<sub>2</sub>P-MoC-CFs.



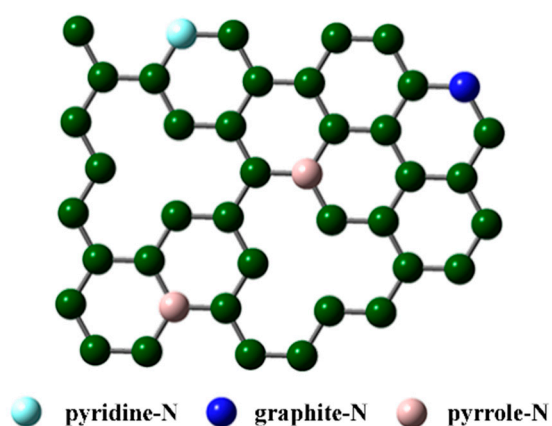
**Figure S2.** SEM of Ni<sub>2</sub>P-MoC/C-CFs at different magnifications.



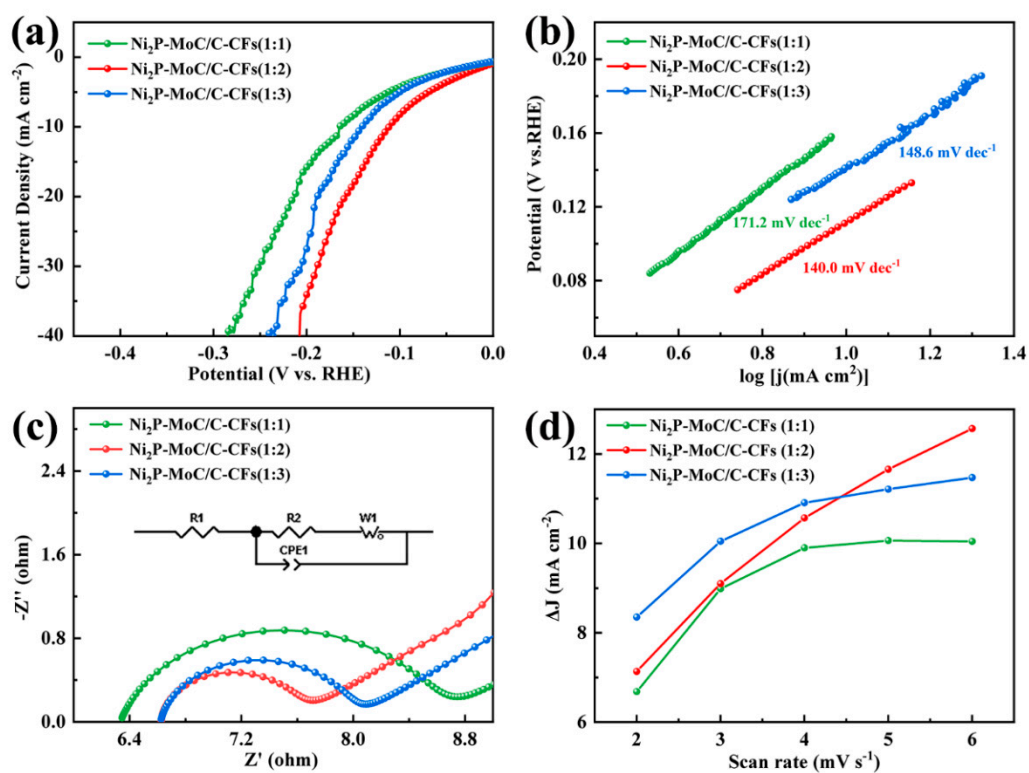
**Figure S3.** SEM of MoC/C-CFs at different magnifications.



**Figure S4.** SEM of  $\text{Ni}_2\text{P}/\text{C-CFs}$  at different magnifications.

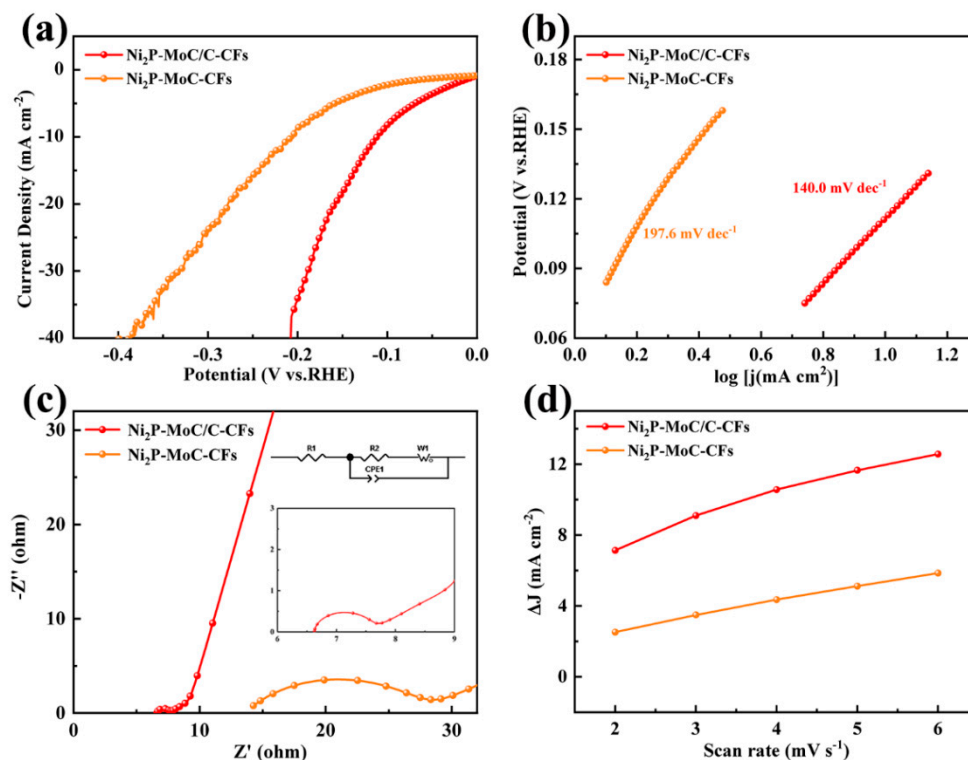


**Figure S5.** schematic diagram of different N types.

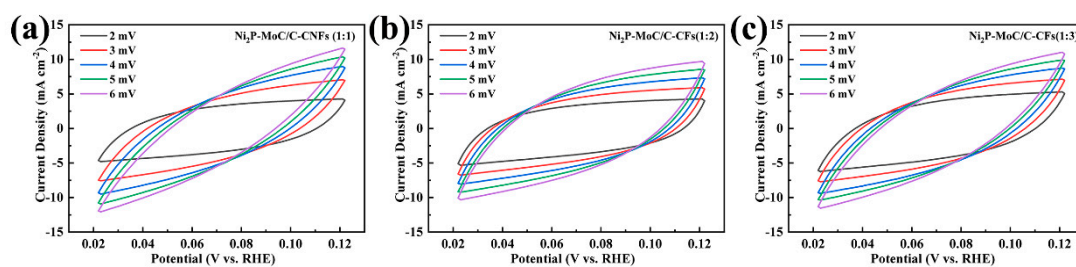


**Figure S6.** The electrocatalytic measures of  $\text{Ni}_2\text{P-MoC/C-CFs}$ (1:1),

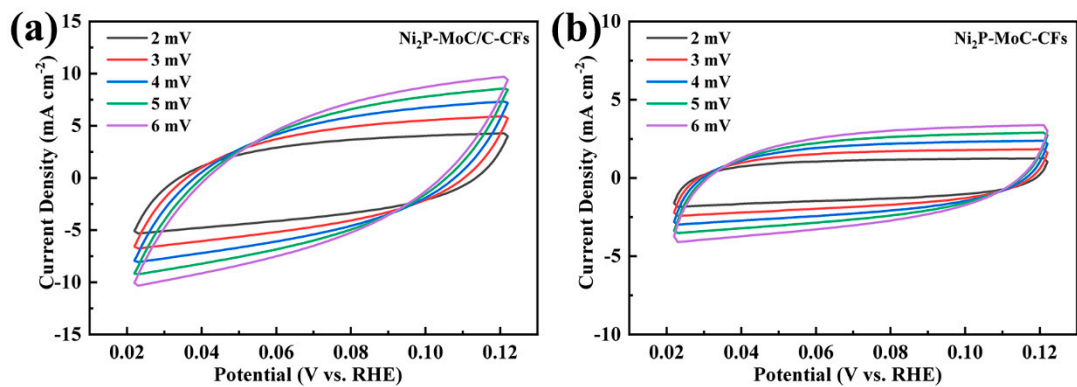
$\text{Ni}_2\text{P-MoC/C-CFs}(1:2)$ , and  $\text{Ni}_2\text{P-MoC/C-CFs}(1:3)$  (a) LSV polarization curves; (b) Tafel diagram (c) Nyquist diagram, and (d)  $C_{dl}$  measurement.



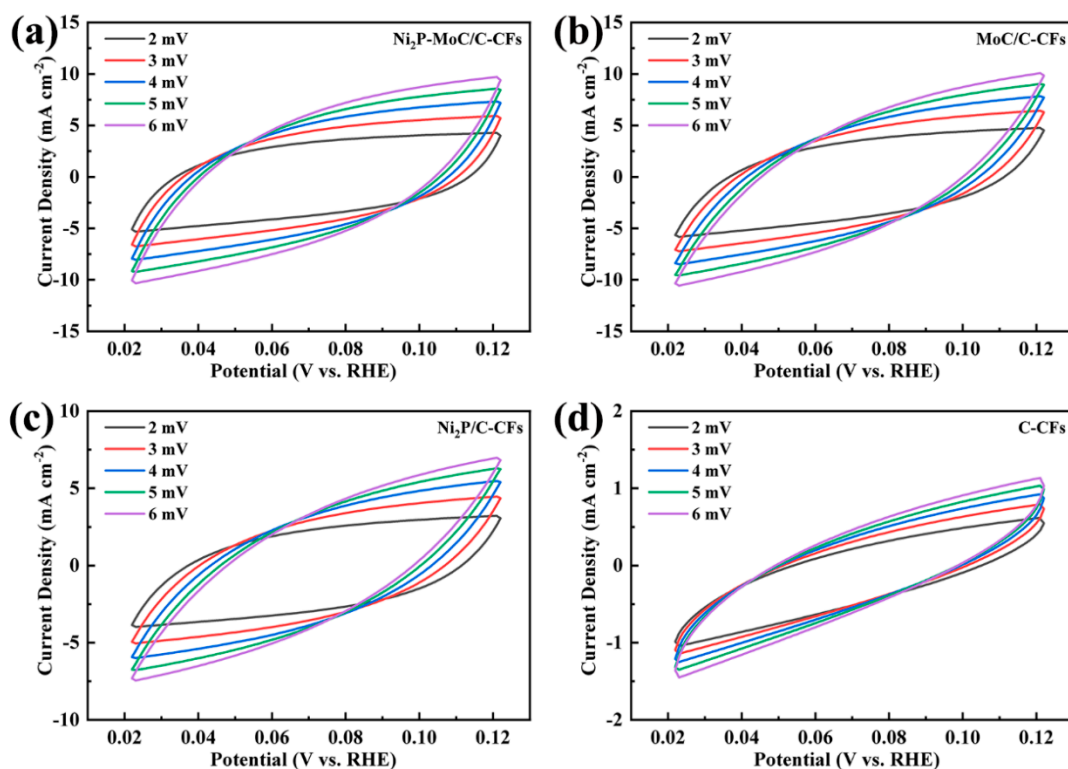
**Figure S7.** The electrocatalytic measures of  $\text{Ni}_2\text{P-MoC/C-CFs}$  and  $\text{Ni}_2\text{P-MoC-CFs}$  (a) LSV polarization curves; (b) Tafel diagram; (c) Nyquist diagram and (d)  $C_{dl}$  measurement.



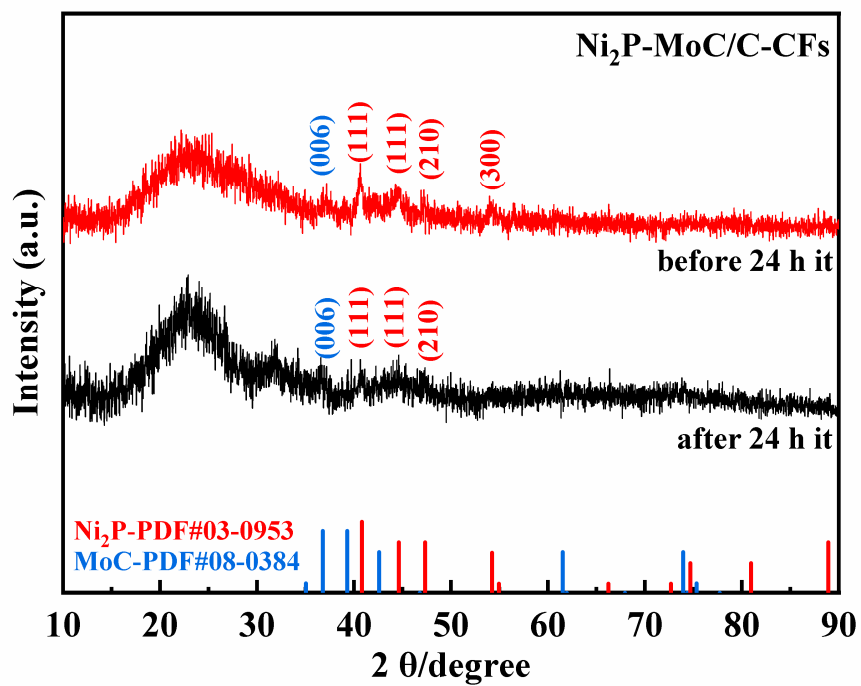
**Figure S8.** Typical cyclic voltammograms at different scan rates for (a)  $\text{Ni}_2\text{P-MoC/C-CFs}(1:1)$ ; (b)  $\text{Ni}_2\text{P-MoC/C-CFs}(1:2)$ , and (c)  $\text{Ni}_2\text{P-MoC/C-CFs}(1:3)$  with scan rates ranging from 2  $\text{mV s}^{-1}$  to 6  $\text{mV s}^{-1}$  in 0.5 M  $\text{H}_2\text{SO}_4$ .



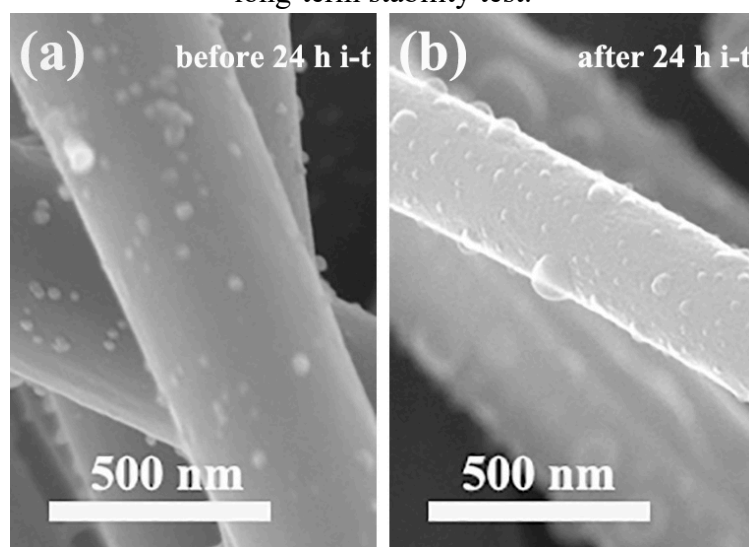
**Figure S9.** Typical cyclic voltammograms at different scan rates. (a)  $\text{Ni}_2\text{P-MoC/C-CFs}$  and (b)  $\text{Ni}_2\text{P-MoC-CFs}$  with scan rates ranging from  $2 \text{ mV s}^{-1}$  to  $6 \text{ mV s}^{-1}$  in  $0.5 \text{ M H}_2\text{SO}_4$ .



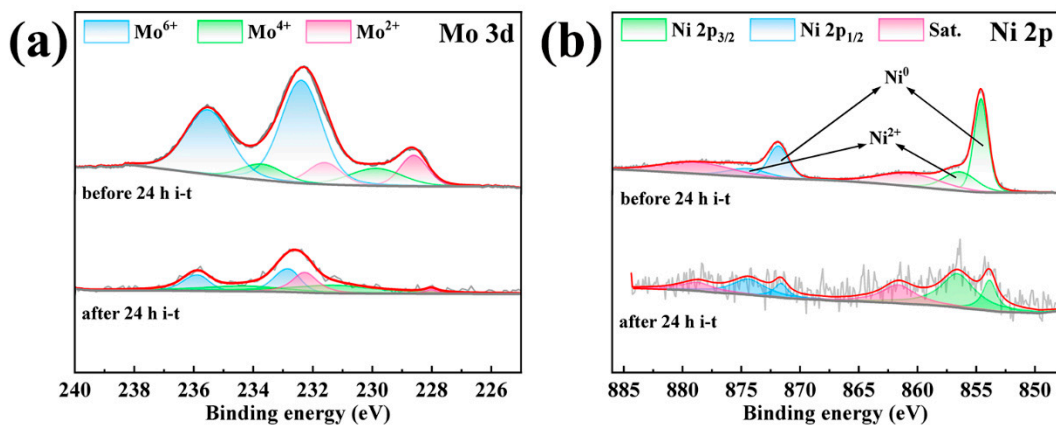
**Figure S10.** Typical cyclic voltammograms at different scan rates. (a)  $\text{Ni}_2\text{P-MoC/C-CFs}$ ; (b)  $\text{MoC/C-CFs}$ ; (c)  $\text{Ni}_2\text{P/C-CFs}$ , and (d)  $\text{C-CFs}$  with scan rates ranging from  $2 \text{ mVs}^{-1}$  to  $6 \text{ mV s}^{-1}$  in  $0.5 \text{ M H}_2\text{SO}_4$ .



**Figure S11.** XRD characterization of  $\text{Ni}_2\text{P-MoC/C-CFs}$  catalysts before and after long-term stability test.



**Figure S12.** SEM image of  $\text{Ni}_2\text{P-MoC/C-CFs}$  catalysts before and after long-term stability test.



**Figure S13.** High resolution XPS (a) Mo 3d and (b) Ni 2p spectra of Ni<sub>2</sub>P-MoC/C-CFs catalysts before and after long-term stability testing.

**Table S1.** Comparison of HER activity data for different catalysts.

Material	$\eta_{10}$ (mV)	Electrolyte	Ref.
MoC/Ni <sub>2</sub> P-C-CFs (this work)	112	0.5 M H <sub>2</sub> SO <sub>4</sub>	This work
Ni-Mo <sub>2</sub> C-0.67	165	0.5 M H <sub>2</sub> SO <sub>4</sub>	[51]
SS-MoC	182	0.5 M H <sub>2</sub> SO <sub>4</sub>	[59]
Ni/Ni <sub>2</sub> P/Mo <sub>2</sub> C@C	183	0.5 M H <sub>2</sub> SO <sub>4</sub>	[60]
CoN/MoC/NMCNFs	199.2	0.5 M H <sub>2</sub> SO <sub>4</sub>	[42]
Ni-MoC@NGC	202	0.5 M H <sub>2</sub> SO <sub>4</sub>	[61]
Mo <sub>2</sub> C&MoS <sub>2</sub> @NSC <sub>3</sub>	209	0.5 M H <sub>2</sub> SO <sub>4</sub>	[62]
FeNiP/NPC800	277	0.5 M H <sub>2</sub> SO <sub>4</sub>	[63]
Terraced $\alpha$ -Mo <sub>2</sub> C	294	0.5 M H <sub>2</sub> SO <sub>4</sub>	[64]
4%-SPCNF	310.86	0.5 M H <sub>2</sub> SO <sub>4</sub>	[65]
CN@Ni-1e17	381	0.5 M H <sub>2</sub> SO <sub>4</sub>	[66]