Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Electronic Supplementary Information

Porous one-dimensional Mo_2C/amorphous carbon composites: high-efficient and durable electrocatalysts for hydrogen generation

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Table S1. Comparisons of the overoptentials at different current densities in HER among the three Mo_2C-based catalysts

J (mA cm^{-2}) / η_i (mV)	1	2	5	10	20	50	100
Mo_2C-1	63	91	117	134	150	172	190
Mo_2C-2	49	75	98	115	131	154	174
Mo_2C-3	30	46	103	146	173	201	221

Table S2. The comparisons of HER performances among different Mo-based catalysts

Catalysts	**Tafel slope [mV dec^{-1}]**	**j_0 (μA cm^{-2})**	**η_1 (mV)**	**η_{10} (mV)**	**J_{200} (mA cm^{-2})**	**Electrolyte**	**Refs**
Li–MoS_2	62	167	—	~118	200	0.5M H_2SO_4	2f
MoP	54	34	~50	~130	>30	0.5M H_2SO_4	3a
MoP-CA2	54	86	40	125	100	0.5M H_2SO_4	3b
MoP thin film on the Ti foil	50	50	—	117	100 (180 mV)	0.5M H_2SO_4	3e
Mo_2C/CNT-GR	58	62	~62	130	—	0.5M H_2SO_4	5
Mo_2N/CNT-GR	72	39.4	~118	186	~15	0.5M H_2SO_4	5
Bulk Mo_2C	56	1.3	~150	~210	~6.5	1M H_2SO_4	6
Mo_2C/CNT	55.2	14	64	~152	—	0.1M $HClO_4$	7
np-Mo_2C NWs	53	—	~70	130	60	0.5M H_2SO_4	9
Mo_2C–RGO	57.3	—	~70	130	—	0.5M	10

						H_2SO_4	
β-Mo_2C	120	17.29	~200	—	<0.5	0.1M $HClO_4$	11
Mo_2C/GCSs	62.6	12.5	~120	200	10	0.5M H_2SO_4	12
Mo_2C/NWs	55.8	—	~160	—	10.2	0.5M H_2SO_4	13
Mo_2C-R	58	33	68	—	32	0.5M H_2SO_4	14
Mo_2C-1	**57.5**	**50.6**	**63**	**134**	**143.5**	0.5M H_2SO_4	This work
Mo_2C-2	**57.6**	**102.3**	**49**	**115**	**216.8**	0.5M H_2SO_4	This work
Mo_2C-3	**74**	**76.6**	**30**	**146**	**49.3**	0.5M H_2SO_4	This work

Note: η_1 and η_{10} denote overpotentials driving current densities of 1 and 10 mA cm^{-2}, respectively. J_{200} denote the current density at a overpotential of 200 mV.

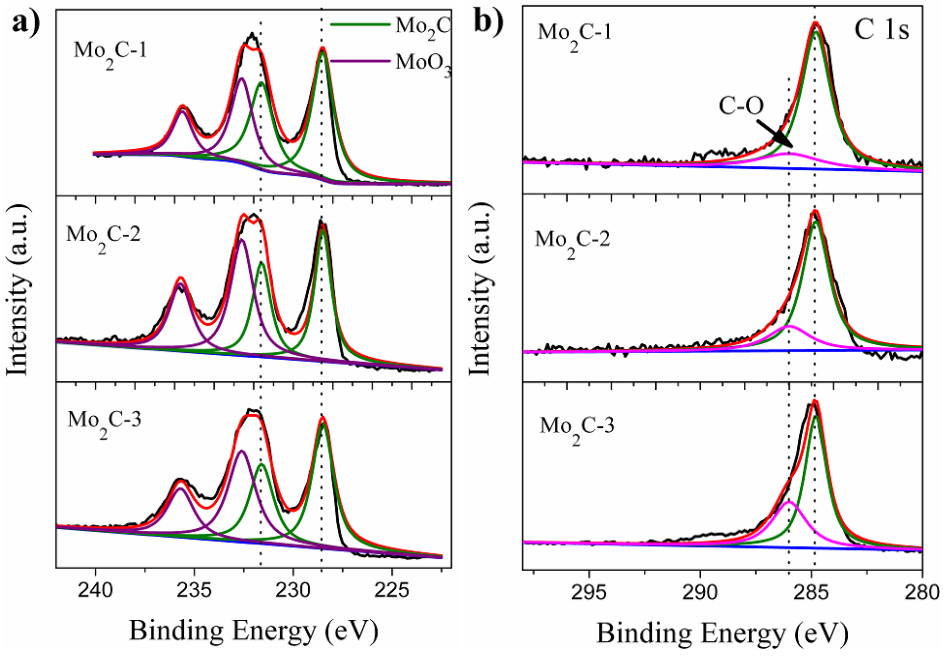

Figure S1 XPS spectra of Mo_2C-based samples. (a) Mo 3d spectrum, and (b) C 1s spectrum.

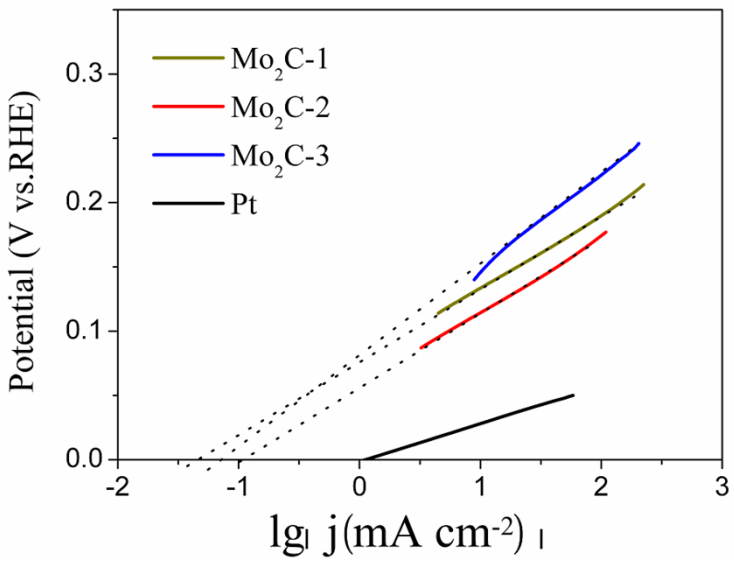

Figure S2 Exchange current densities for all Mo_2C-based catalysts extracted from Tafel plots.

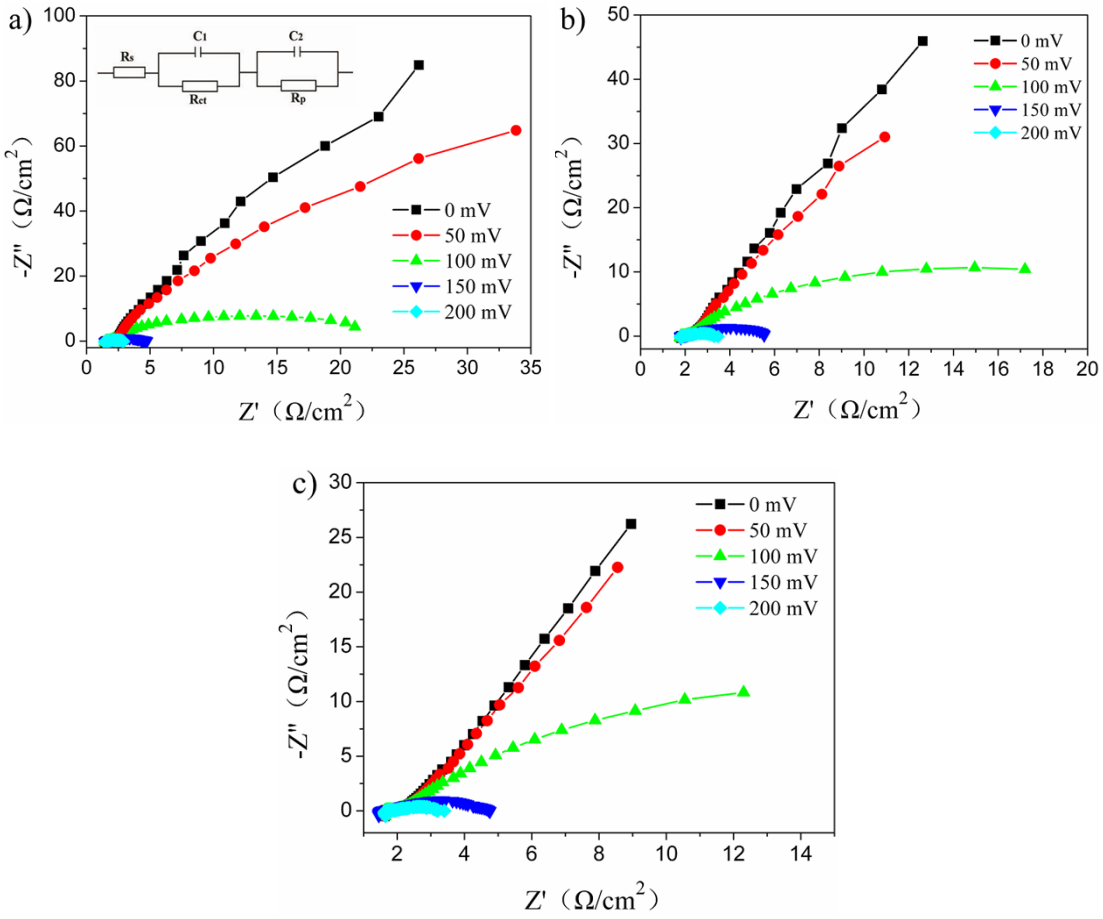

Figure S3 Nyquist plots of impedance spectroscopy analysis of a) Mo_2C-1, b) Mo_2C-2, and c) Mo_2C-3, the inset in Figure S2 a) showing the corresponding equivalent circuit.

Table S3 Comparison of charge-transfer resistances among the three Mo_2C-based catalysts at different overpotentials.

η_i (mV) / R_{ct} (Ω/cm^2)	0	50	100	150	200	Ref.
Mo_2C-1	254.8	137.8	17.2	2.2	1.0	This work
Mo_2C-2	163.3	96.5	19.9	2.9	1.1	This work
Mo_2C-3	83.0	66.3	18.7	2.1	1.0	This work
Mo_2C/CNT	—	—	21	—	—	7
Mo_2C-R	—	—	—	—	1.4	14
np-Mo_2C NWs	—	—	—	90	—	9