Electronic Supplementary Material (ESI) for CrystEngComm.


# Template-assisted preparation of imbricate N-$Mo_xC$ nanotubes for effective electrocatalytic hydrogen evolution reaction

Songjie Li,[a,b] Shilong Su,[a,b] Yun Tian,[a,b] Yuanyuan Li,[a,b] Xiaomei Yu,*[a,b] Panfei Sun,[a,b] and Jin You Zheng,*[a,b]

[a] *School of Chemical Engineering, Zhengzhou University, Zhengzhou 450001, China*

[b] *Engineering Research Center of Advanced Functional Material Manufacturing of Ministry of Education, Zhengzhou University, Zhengzhou 450001, China*

Corresponding authors:

Dr. Xiaomei Yu, Email: yuxm@zzu.edu.cn

Dr. Jin You Zheng, Email: jinyouzh@zzu.edu.cn

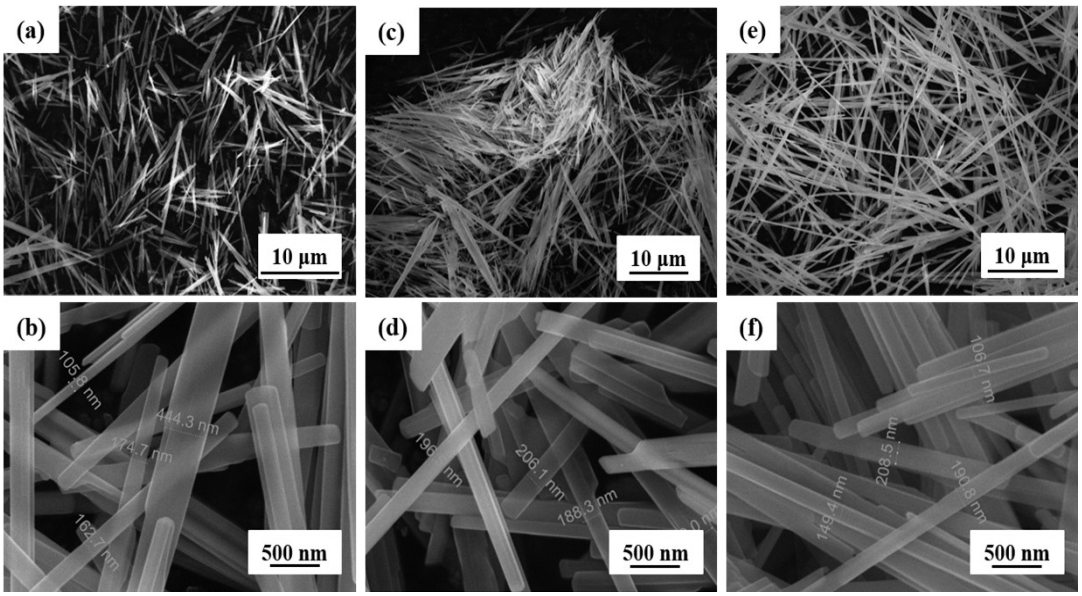


**Fig. S1**. SEM images of $MoO_3$ nanowires prepared with the different volume ratios of $HNO_3/H_2O$ of (a,b) 1 : 5, (c,d) 1 : 6 and (e,f) 1 : 7.

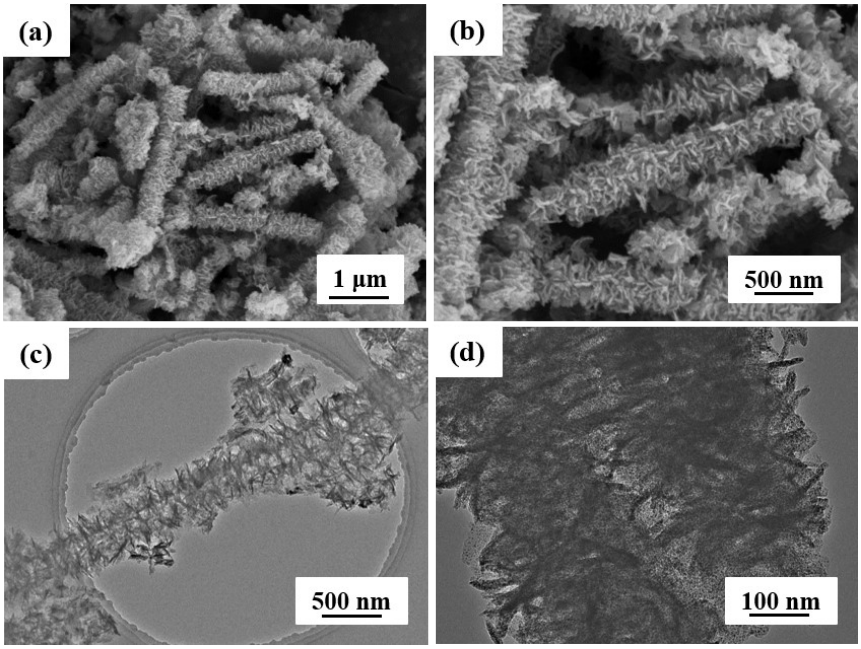


**Fig. S2**. (a,b) SEM and (c,d) TEM images of $Mo_2C$ NTs (pH-6.35).

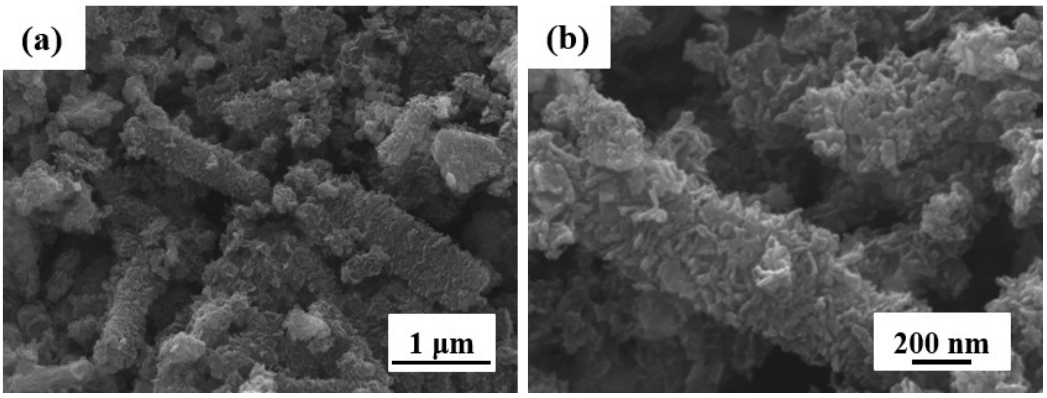


**Fig. S3**. SEM images of N-$Mo_xC$ prepared with the mass ratio of $Mo_2C/C_2H_4N_4$ of 1: 10, following the subsequent annealing under 700 ℃ for 2.0 h.

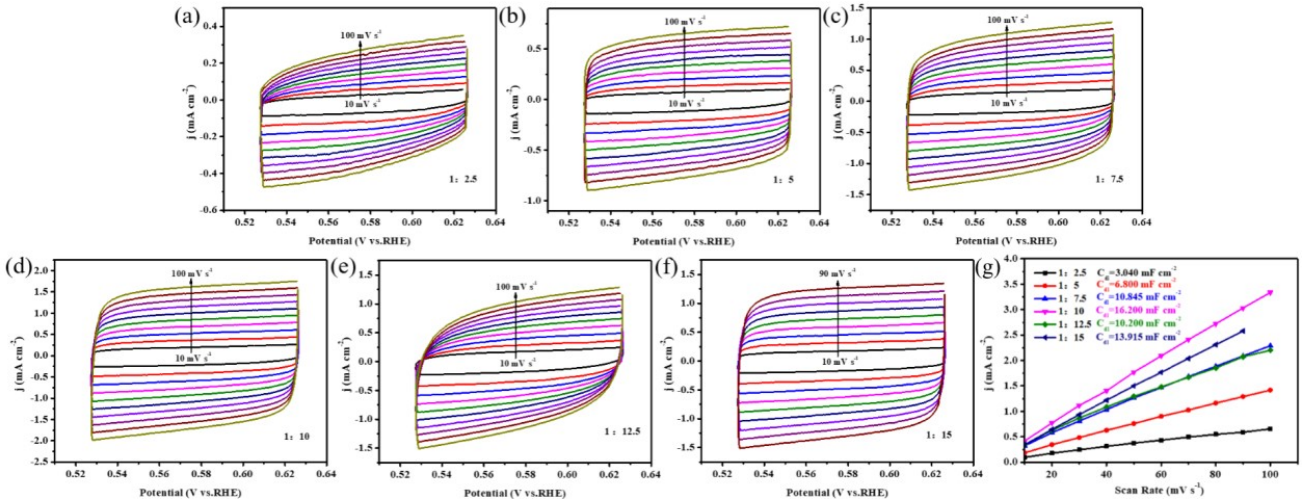


**Fig. S4**. (a-f) Cyclic voltammetry curves of N-$Mo_xC$ prepared at 700 ℃ for 2.0 h with the respective mass ratio of $Mo_2C/C_2H_4N_4$ varying from 1: 2.5 to 1: 15, and (g) the corresponding double-layer capacitance ($C_{dl}$) values were obtained from the plotting of the charging current density ($\Delta j = j_a - j_c$) against the scan rate.

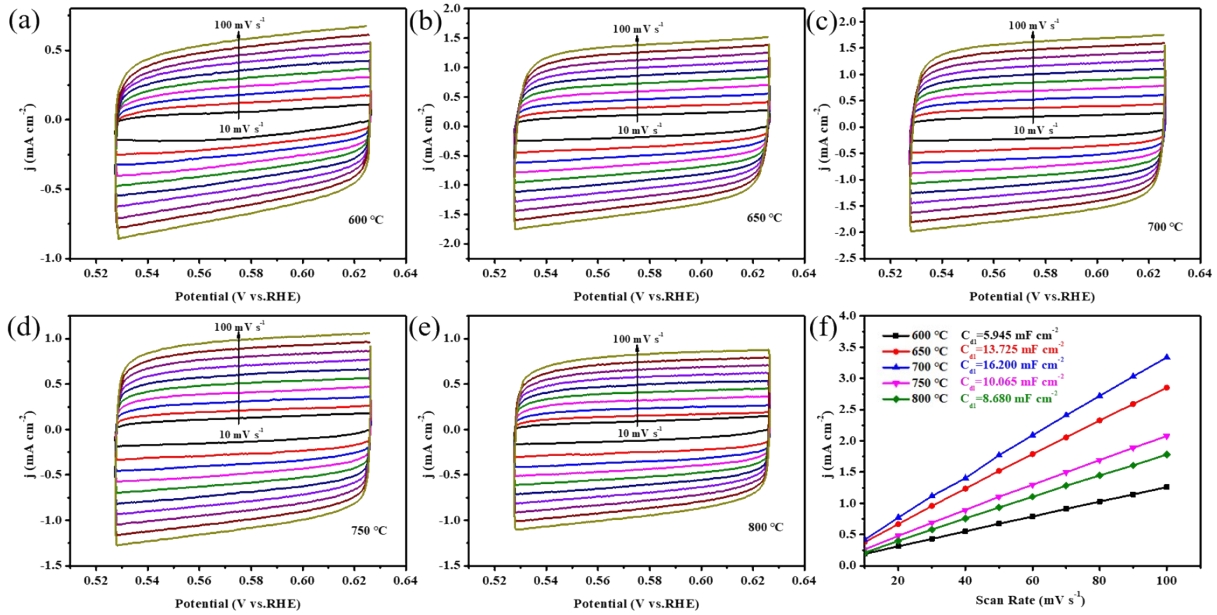


**Fig. S5**. (a-e) Cyclic voltammetry curves of N-$Mo_xC$ prepared with the mass ratio of $Mo_2C/C_2H_4N_4$ of 1: 10, following the subsequent annealing at temperatures varying from 600-800 ℃ for 2.0 h, respectively. (f) The corresponding double-layer capacitance ($C_{dl}$) values were obtained from the plotting of the charging current density ($\Delta j = j_a - j_c$) against the scan rate.

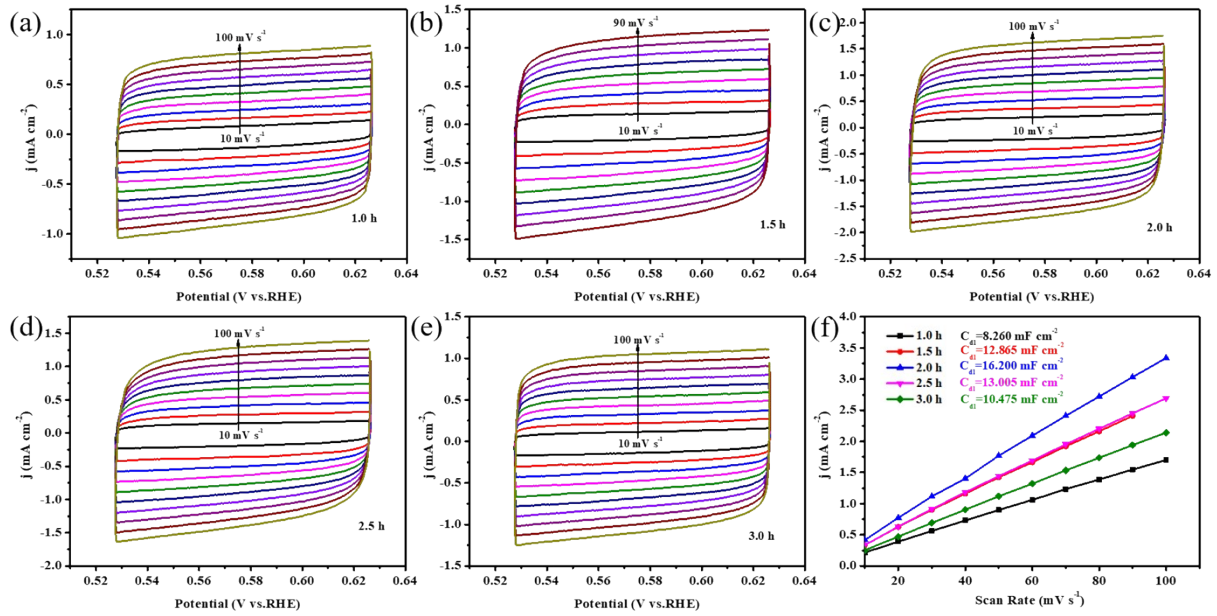


**Fig. S6**. (a-e) Cyclic voltammetry curves of N-$Mo_xC$ prepared with the mass ratio of $Mo_2C/C_2H_4N_4$ of 1: 10, following the subsequent annealing at 700 ℃ for a prolonged time of 1.0 to 3.0 h, respectively. (f) The corresponding double-layer capacitance ($C_{dl}$) values were obtained from the plotting of the charging current density ($\Delta j = j_a - j_c$) against the scan rate.

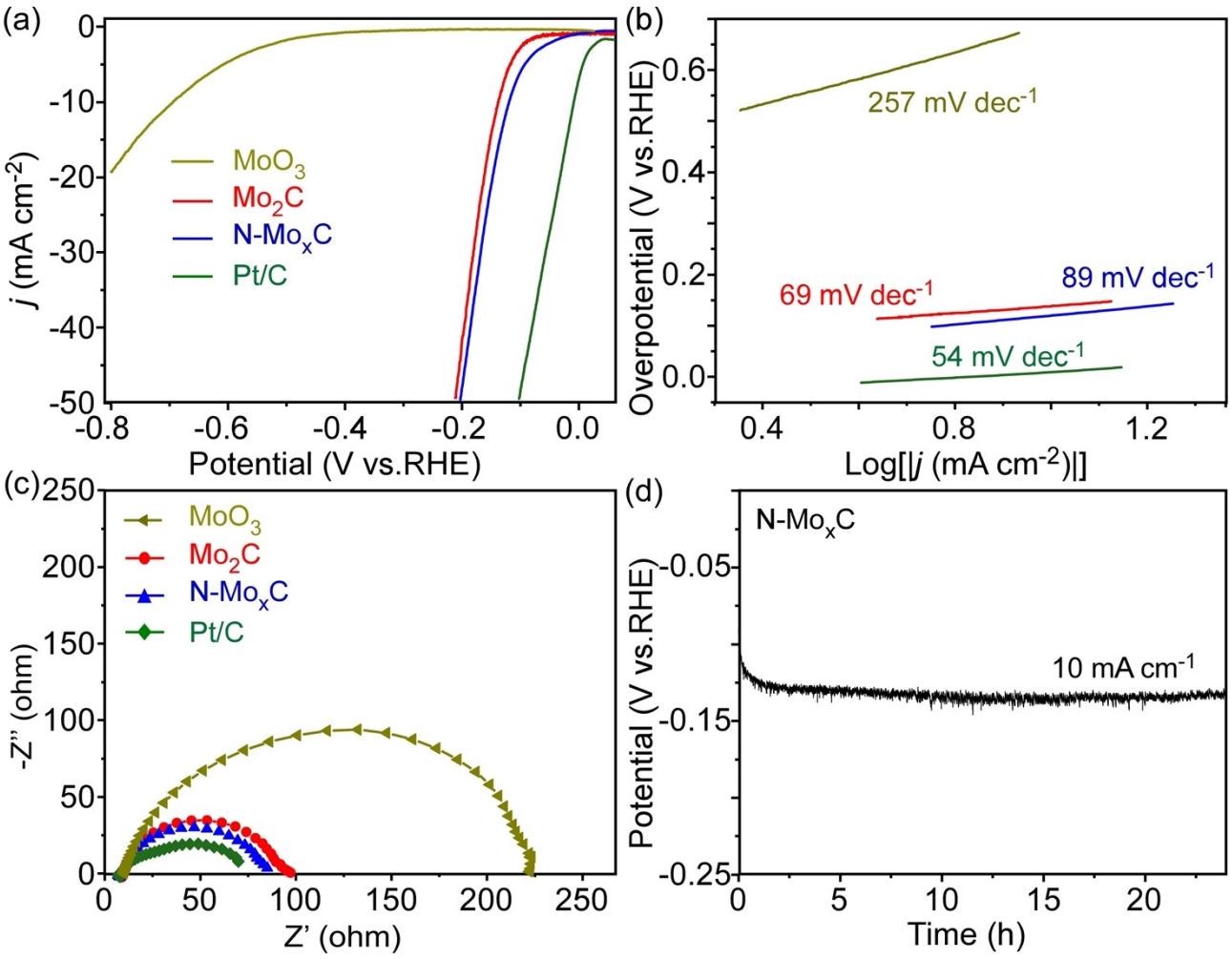


**Fig. S7**. (a) Polarization curves, (b) Tafel plots, and (c) Nyquist plots of $MoO_3$, the optimized $Mo_2C$, N-$Mo_xC$ and Pt/C. (d) Chronopotentiometry measurement of N-$Mo_xC$ at a current density of 10 mA $cm^{-2}$.

**Table S1.** Comparison of $\eta_{10}$ and Tafel slopes of N-$Mo_xC$ with other $Mo_2C$ based electrocatalysts reported previously for water splitting.

| Catalyst | Electrolyte | $\eta_{10}$ (mV) | Tafel slope (mV $dec^{-1}$) | Ref.s |
|---|---|---|---|---|
| Bulk $Mo_2C$ | 1.0 M KOH | 228 | 107 | 44 |
| 3D $Mo_2C$@GF | 1.0 M KOH | 129 | 62 | 45 |
| NP-$Mo_2C$ | 0.5 M $H_2SO_4$ | 210 | 64 | 46 |
| $Mo_2C$@NC | 0.5 M $H_2SO_4$ | 157 | 60.6 | 47 |
| $Pt_1$-$Mo_2C$-C | 1.0 M KOH | 155 | 64 | 48 |
| MoC QDs@NC | 1.0 M KOH | 160 | 55 | 49 |
| N-$Mo_xC$ | 1.0 M KOH | 120 | 89 | This work |