# Supporting Information

## Hierarchically Structured Nickel/Molybdenum Nitrides Heterojunctions as Superior Bifunctional Electrode for Overall Water Splitting

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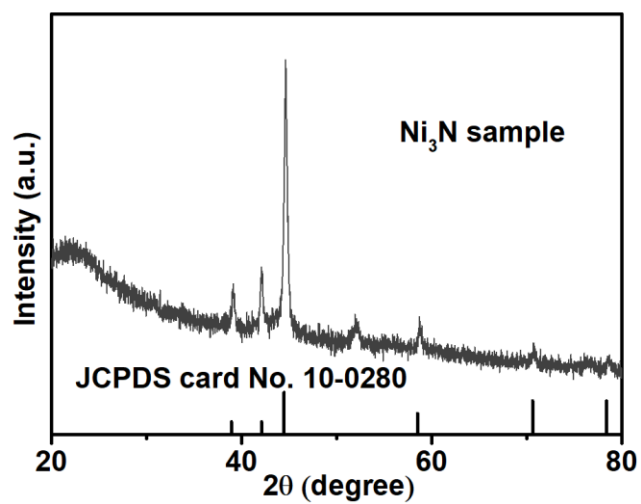
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**Figure S1** The XRD pattern of $Ni_3N$ sample that synthesized from $Ni(OH)_2$ precursor.
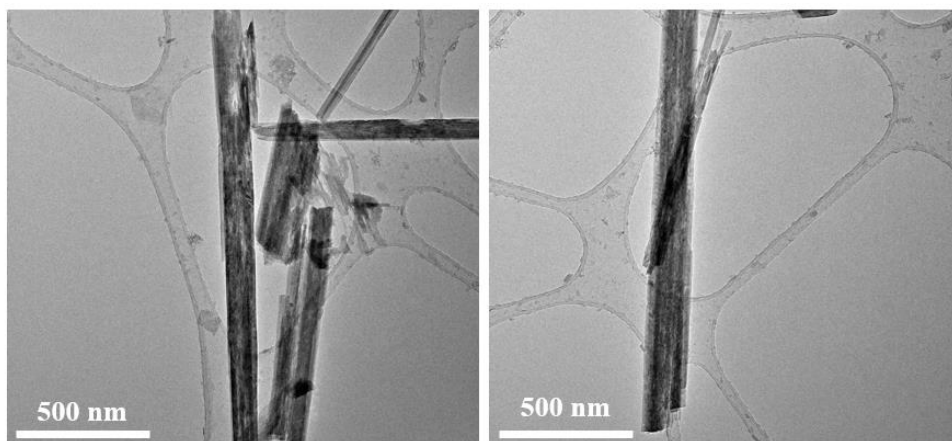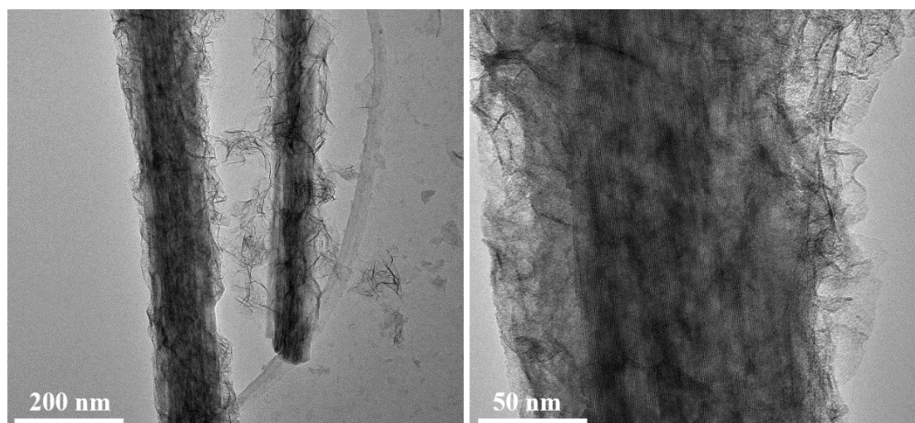


**Figure S2** The TEM images of $NiMoO_4$ precursor.
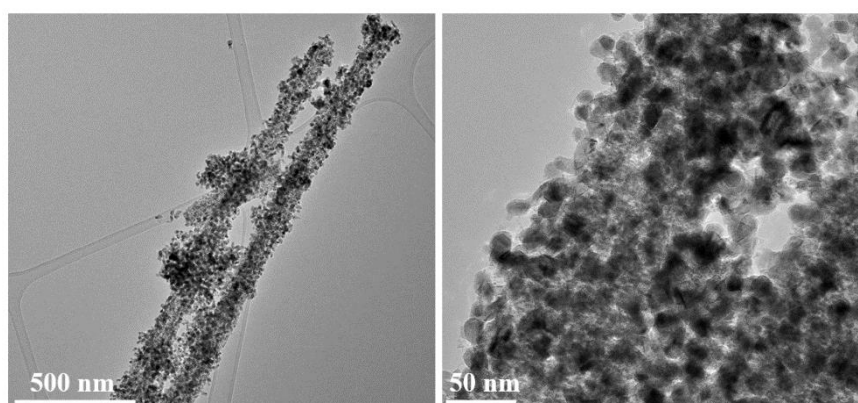
**Figure S3** The TEM images of Ni(OH)$_2$/NiMoO$_4$ precursor.



**Figure S4** The TEM images of Ni$_3$N@NiMoN$_x$ sample.
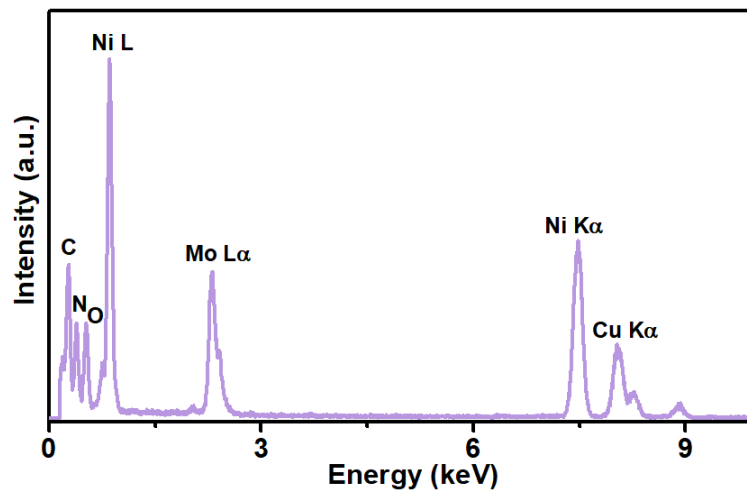
**Figure S5** The SEM images of $Ni_3N@NiMoN_x/NF$ sample.



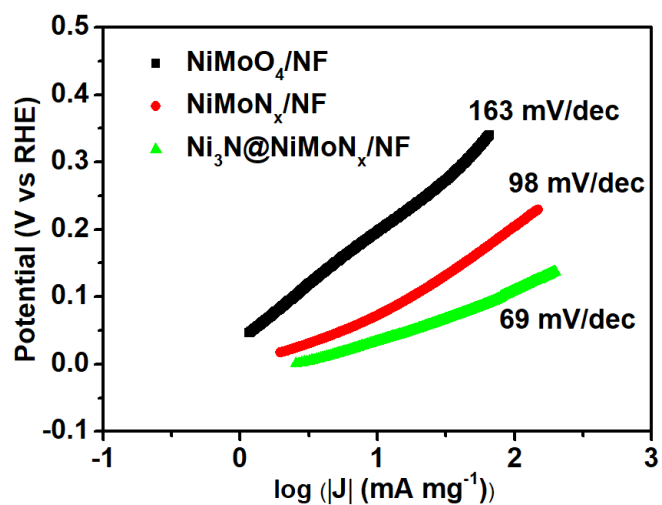**Figure S6** The EDS spectrum of $Ni_3N@NiMoN_x$ sample.

**Figure S7** The mass normalized Tafel slopes of $NiMoO_4/NF$, $NiMoN_x/NF$ and $Ni_3N@NiMoN_x/NF$ samples.
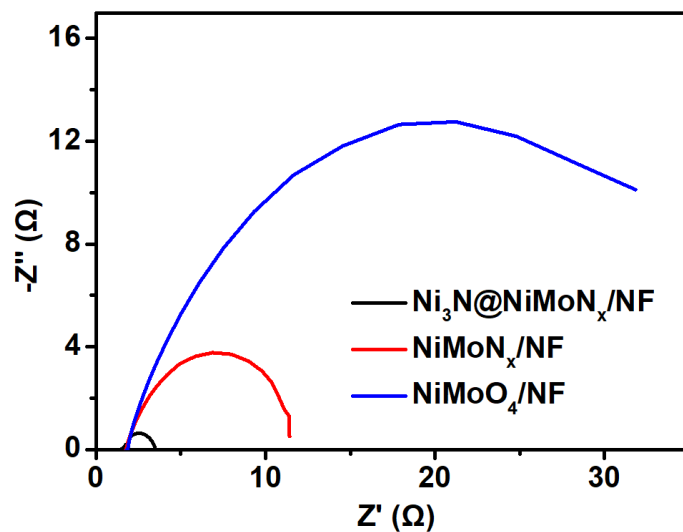


**Figure S8** The EIS spectra of $NiMoO_4/NF$, $NiMoN_x/NF$ and $Ni_3N@NiMoN_x/NF$ samples.
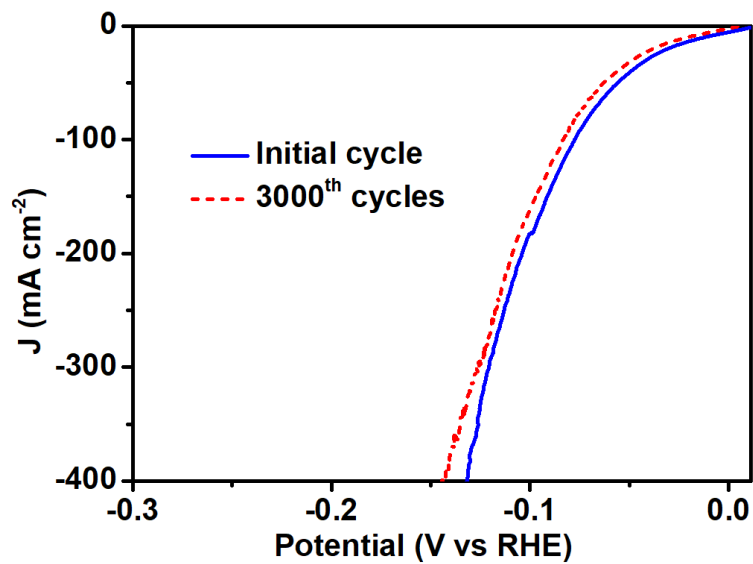
**Figure S9** The LSV curves of $Ni_3N@NiMoN_x/NF$ catalyst before and after $3000^{th}$ cycles.
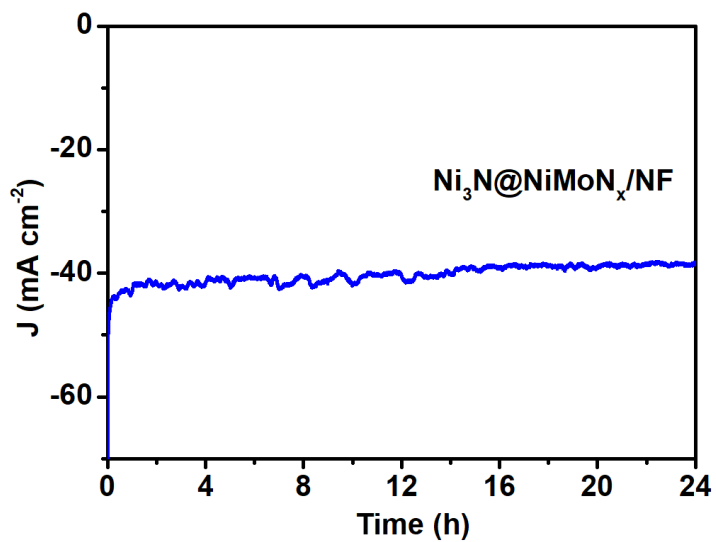


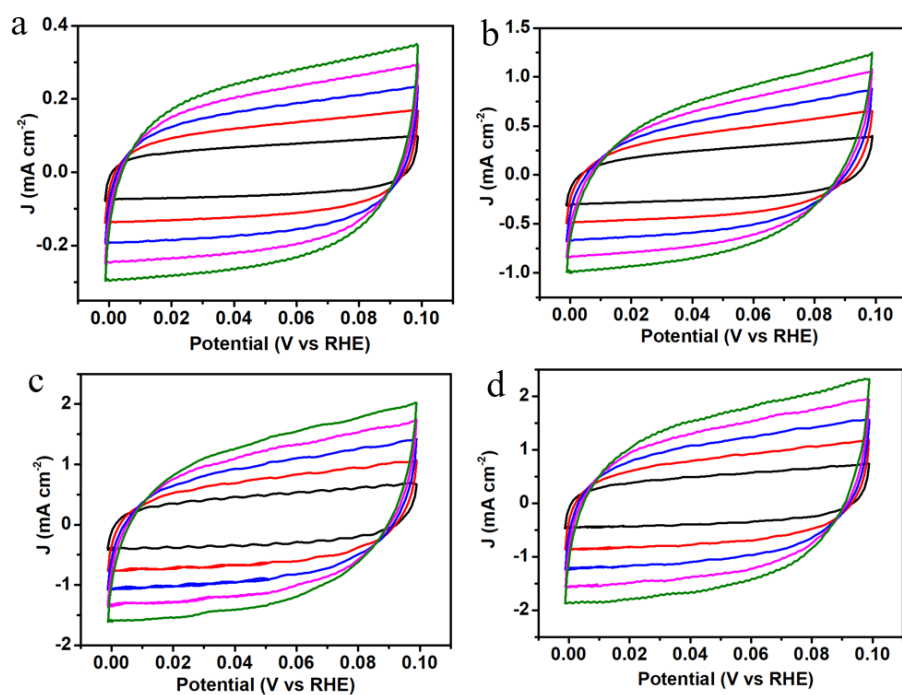**Figure S10** The stability test of $Ni_3N@NiMoN_x/NF$ sample for HER in 1 M KOH.

**Figure S11** The CV curves vs scan rates for a) NF, b) $NiMoO_4$/NF, c) $NiMoN_x$/NF and d) $Ni_3N@NiMoN_x$/NF catalysts.
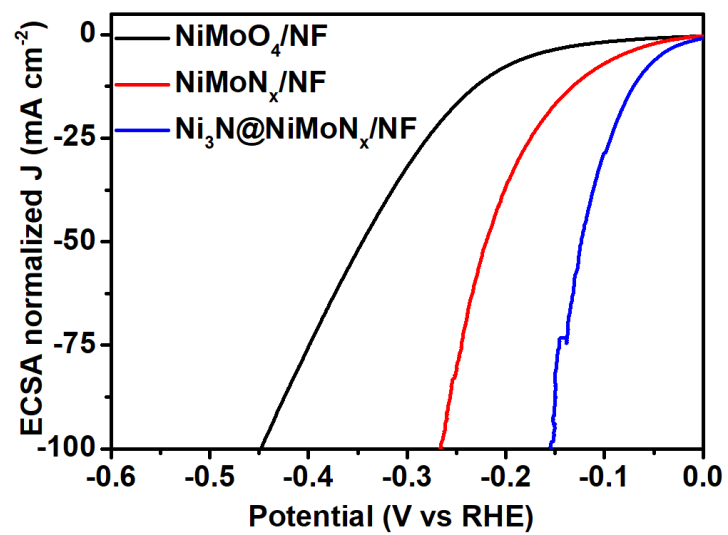
**Figure S12** The ECSA normalized current density of NiMoO$_4$/NF, NiMoN$_x$/NF and Ni$_3$N@NiMoN$_x$/NF samples for HER.
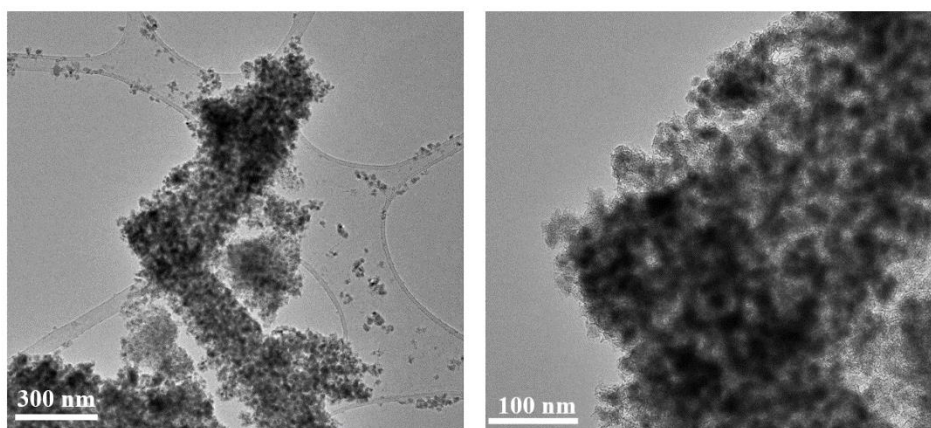
**Figure S13** The TEM image of $Ni_3N@NiMoN_x$ sample after HER test.



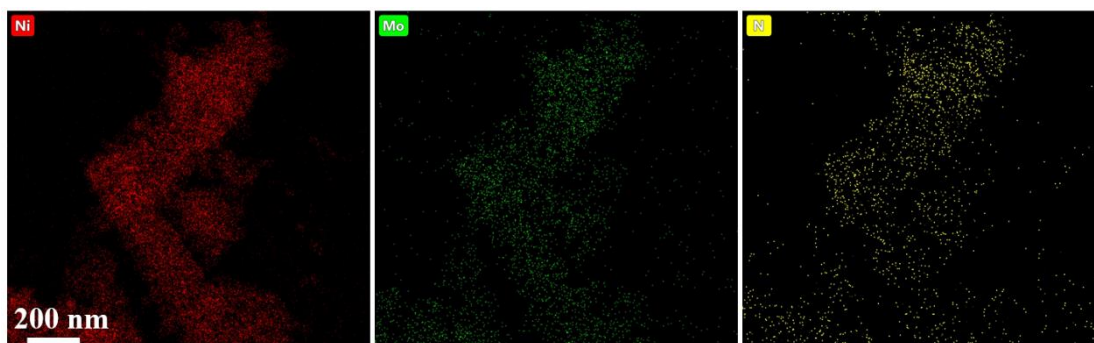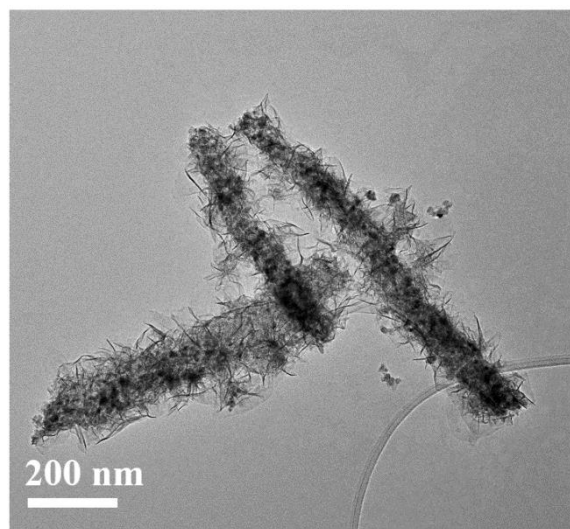**Figure S14** The element mapping images of $Ni_3N@NiMoN_x$ sample after HER test.

**Figure S15** The TEM image of $Ni_3N@NiMoN_x$ sample after OER test.

**Table S1** The atomic content of each elements in $Ni_3N@NiMoN_x$ sample

| Catalyst | Atomic content of each elements (%) | | |
|---|---|---|---|
| | Ni | Mo | N |
| $Ni_3N@NiMoN_x$ | 52 | 35 | 13 |