

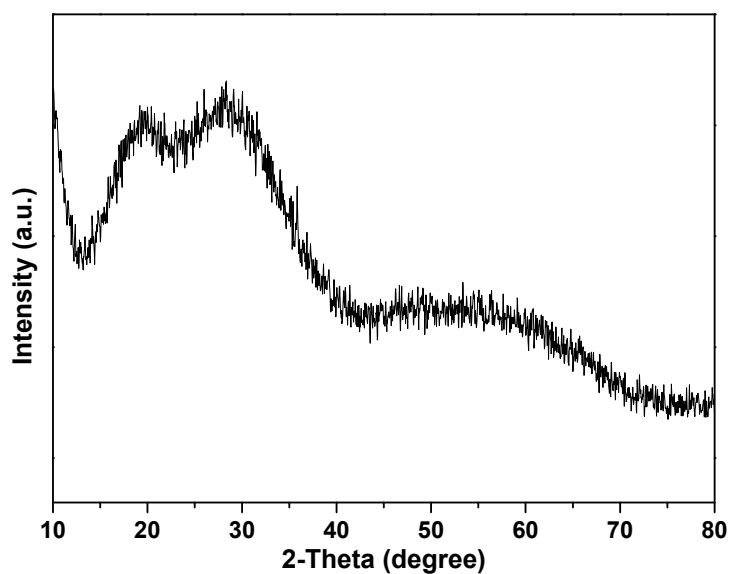


Fig. S1. The XRD pattern of as-prepared WO_x/aniline hybrid precursor.

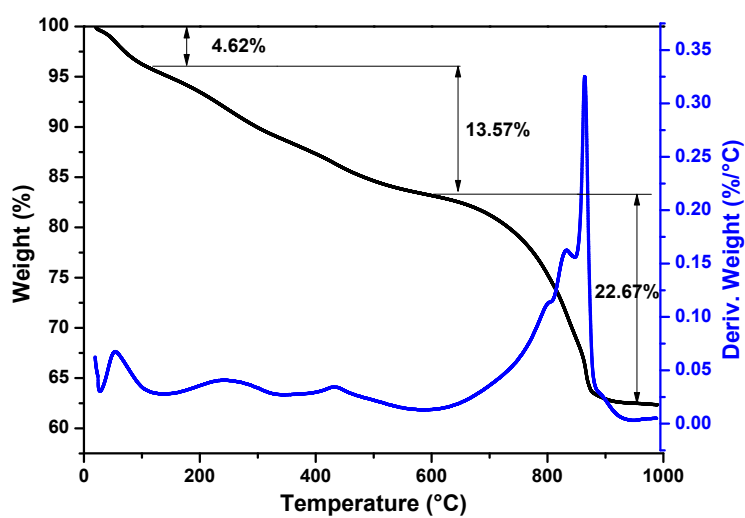


Fig. S2. The TG curve of as-prepared WO_x/aniline hybrid precursor.

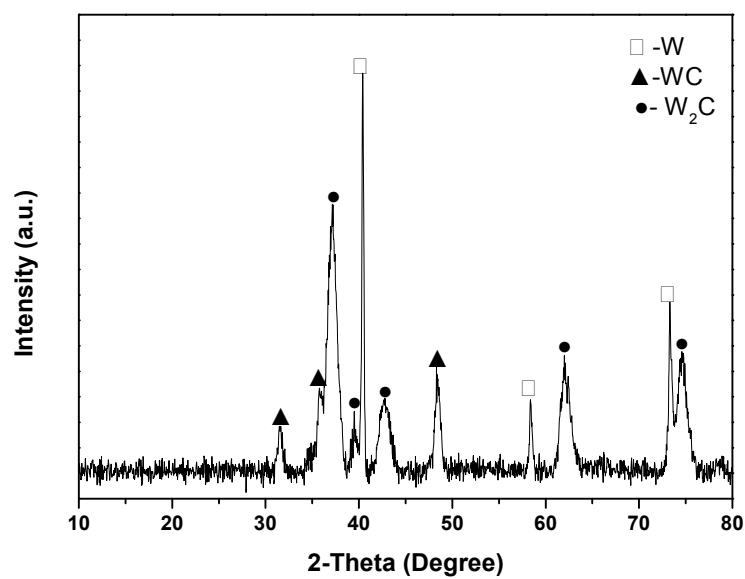


Fig. S3. The XRD pattern of as-prepared WC-W₂C nanocomposites.

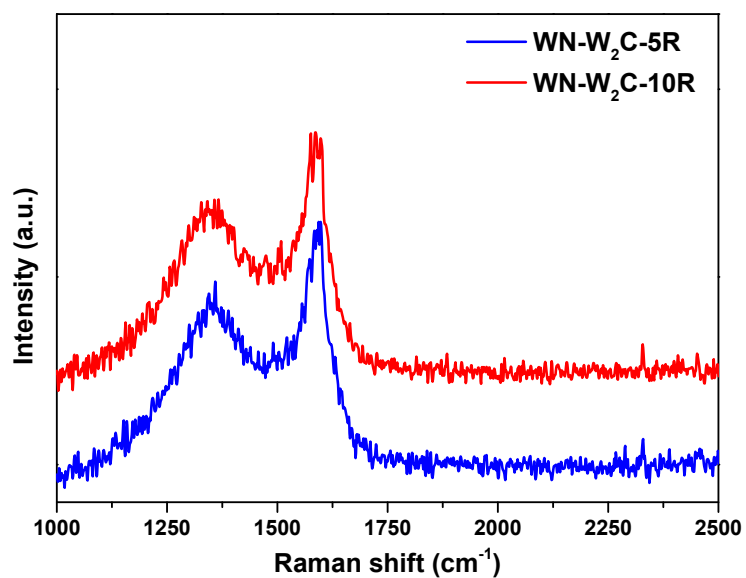


Fig. S4. The Raman spectrum of as-prepared WN-W₂C-5R and WN-W₂C-10R nanocomposites.

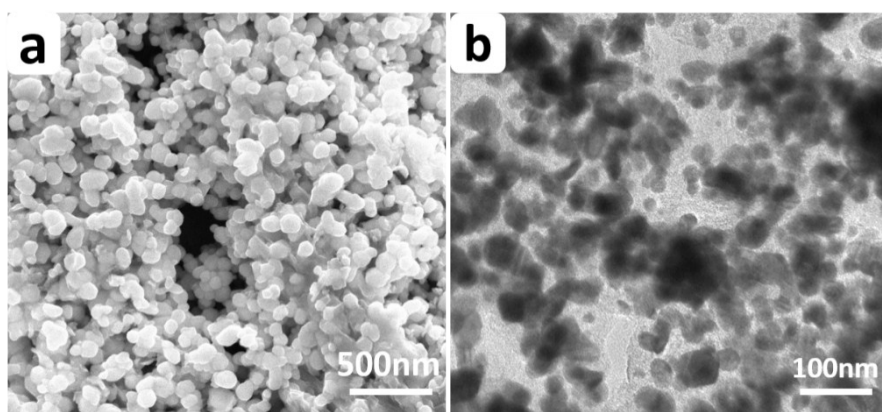


Fig. S5. SEM and TEM images of WN-W₂C-5R nanocomposite.

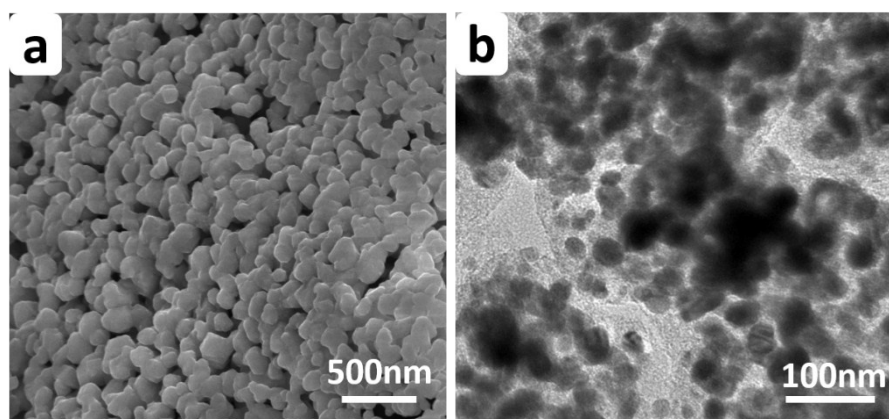


Fig. S6. SEM and TEM images of WN-W₂C-10R nanocomposite.

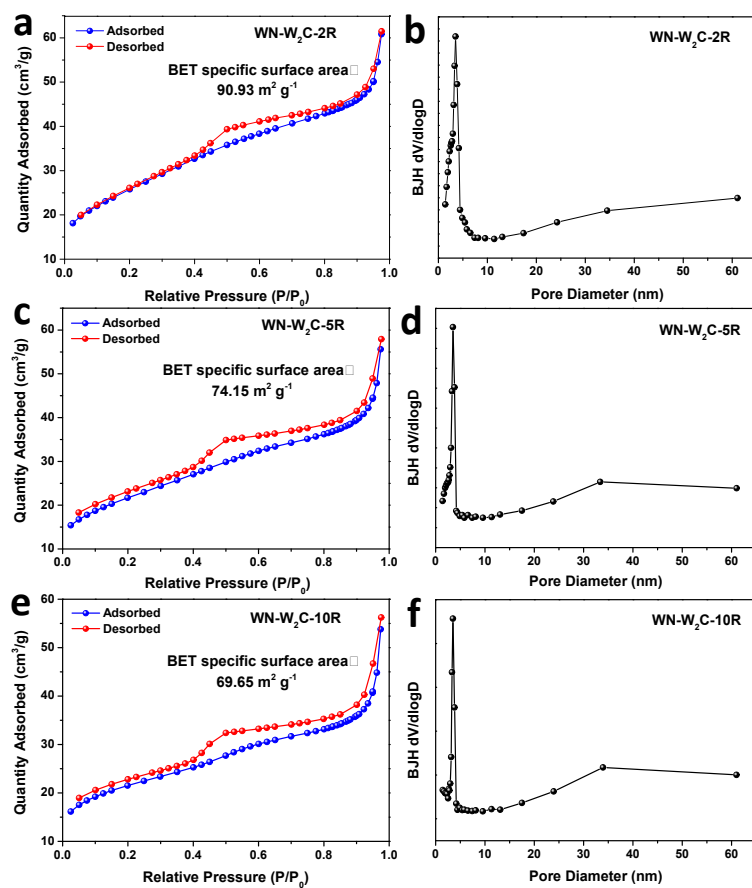


Fig. S7. Nitrogen adsorption-desorption isotherm and the corresponding BJH pore size distribution of obtained three nanocomposites.

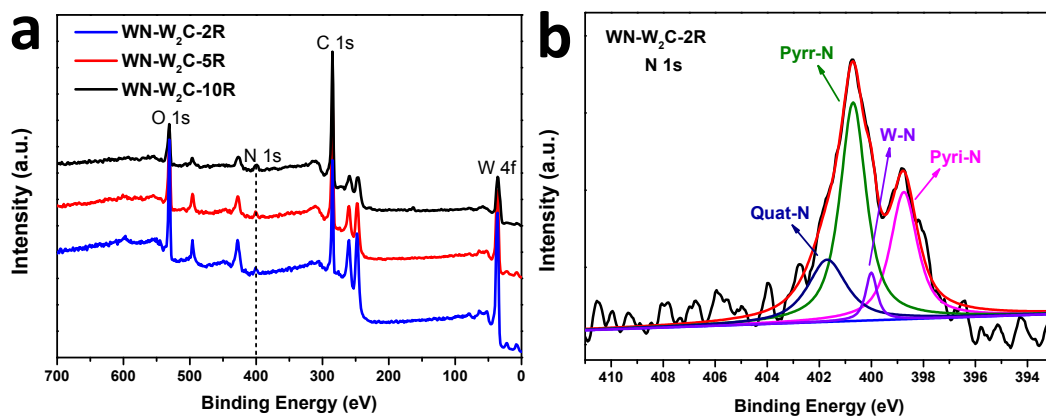


Fig. S8. (a) XPS survey spectra of the as-prepared WN-W₂C nanocomposite obtained under different heating rate and (b) N 1s spectrum of the as-prepared WN-W₂C-2R nanocomposite.

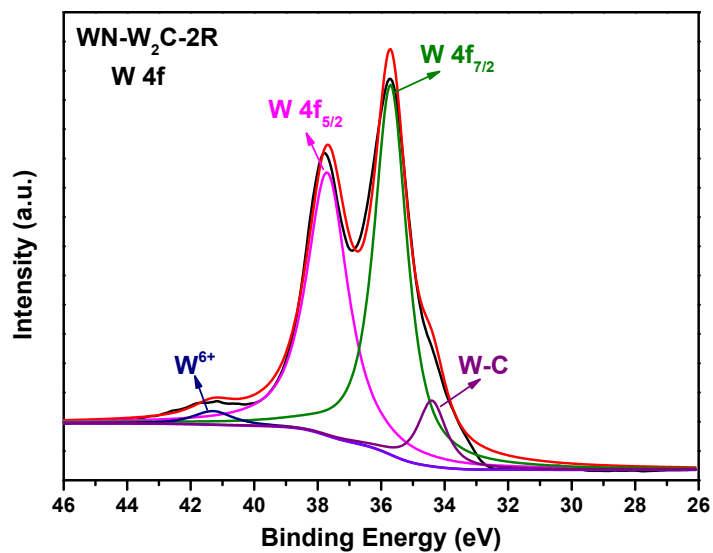


Fig. S9. W 4f spectrum of the as-prepared WN-W₂C-2R nanocomposite.

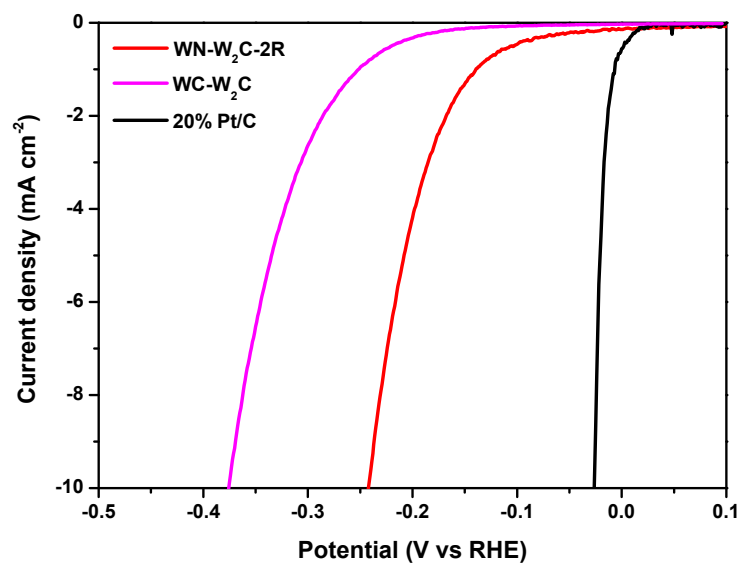


Fig. S10. The polarization curves of the as-prepared WN-W₂C-2R and WC-W₂C samples vs. RHE.

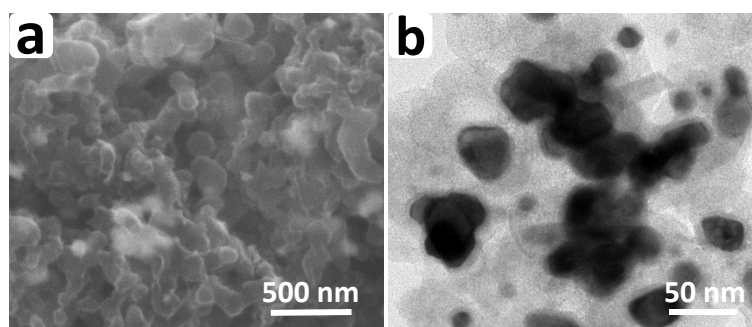


Fig. S11. (a) SEM and (b) TEM images of WN-W₂C-2R after cycling experiment.

Table S1. Non-precious/carbon based catalysts for HER.

Catalyst	Loading amount (mg cm ⁻²)	Overpotential at 10 mA cm ⁻² (mV)	Tafel slope (mV dec ⁻¹)	Cycles	Reference
WN-W ₂ C-2R	0.29	242	85	5000 th , 10h	This work
FeCo@NCNTs-NH	0.32	276	78	10000 th	22
N-Co@G	0.29	270	98	1000 th	30
Ni-Sn@C	0.1	350	35	100 th	46
CoNi@NC	0.32	224	89	1000 th	16
N-WC	10	193	75	10000 th	27
Mo ₂ C/NCNT	0.32	257	71	2000 th	26
Co@Co-N-C	0.29	314	59	2000 th	32