Construction of $MnCo_2O_4$@Ni_yM_x (S and P) crosslinked network for efficient electrocatalytic water splitting

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Gas detection

The same volume of gas sample in the headspace of the electrolytic cell was withdrawn by a SGE gas-tight syringe and analyzed by gas chromatography (GC). The H_2 in the sampled gas was separated by passing through a 2 m × 3 mm packed molecular sieve 5A column with an Ar carrier gas and quantified by a Thermal Conductivity Detector (TCD)(Shimadzu GC-9A).

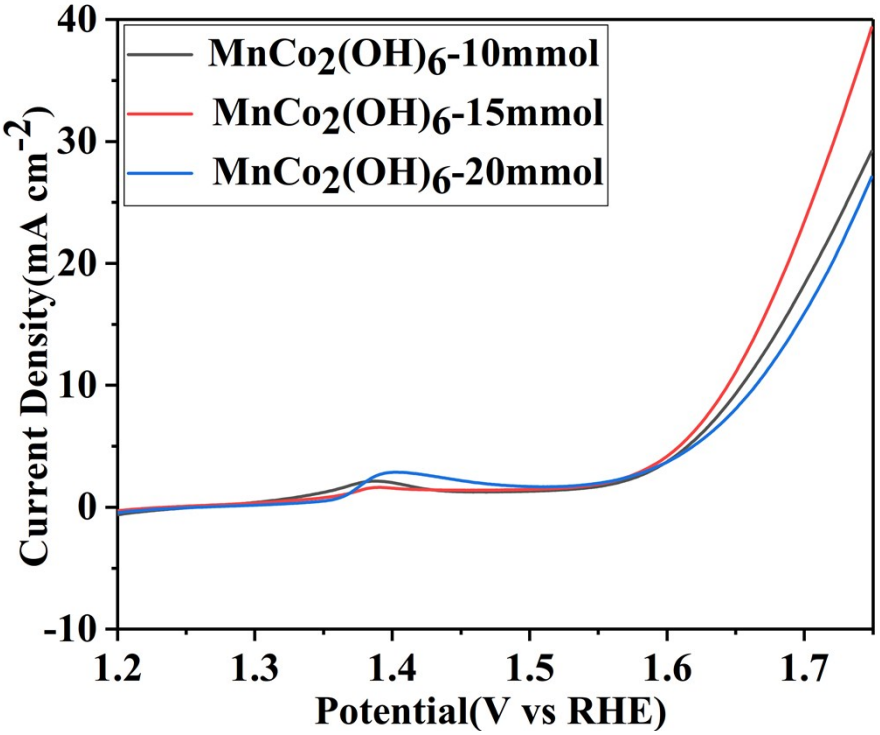

Fig. S1 OER polarization curves of $MnCo_2(OH)_6$-10mmol, $MnCo_2(OH)_6$-15mmol and $MnCo_2(OH)_6$-20mmol.

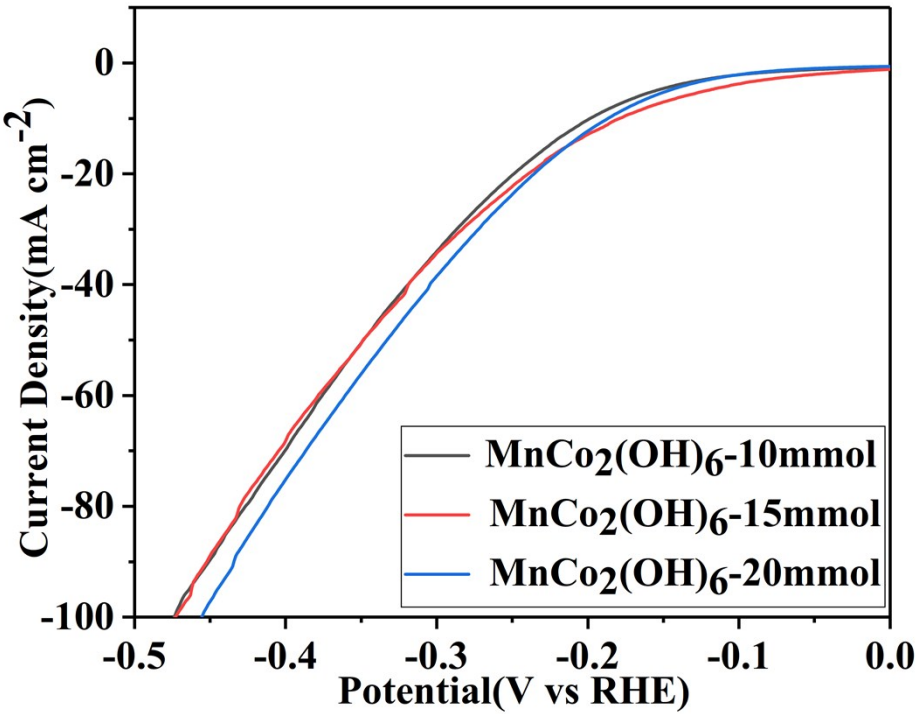

Fig. S2 HER polarization curves of $MnCo_2(OH)_6$-10mmol, $MnCo_2(OH)_6$-15mmol and $MnCo_2(OH)_6$-20mmol.

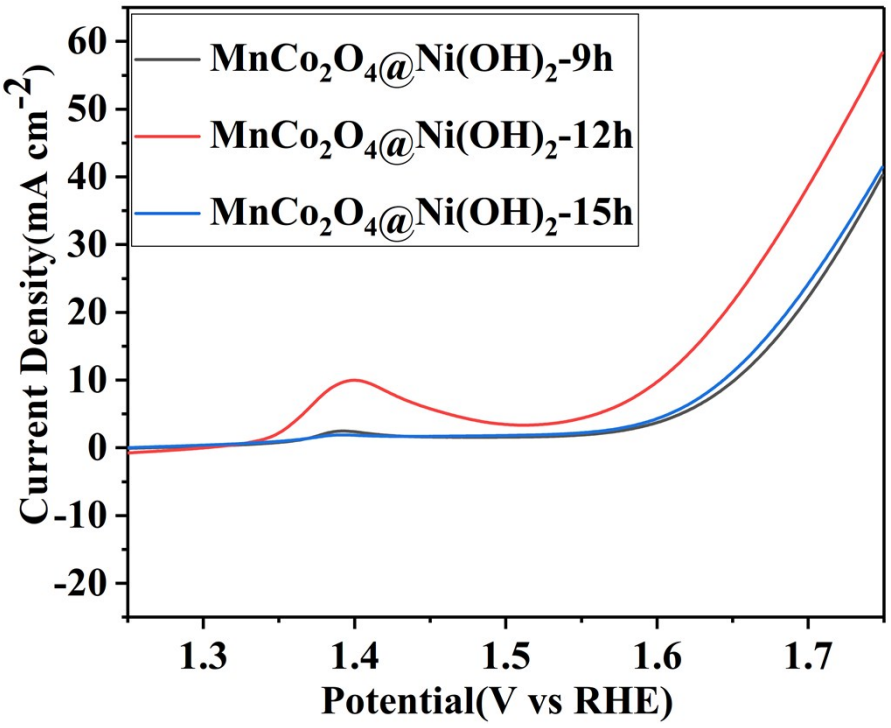

Fig. S3 OER polarization curves of $MnCo_2O_4$@$Ni(OH)_2$-9h, $MnCo_2O_4$@$Ni(OH)_2$-12h and $MnCo_2O_4$@$Ni(OH)_2$-15h.

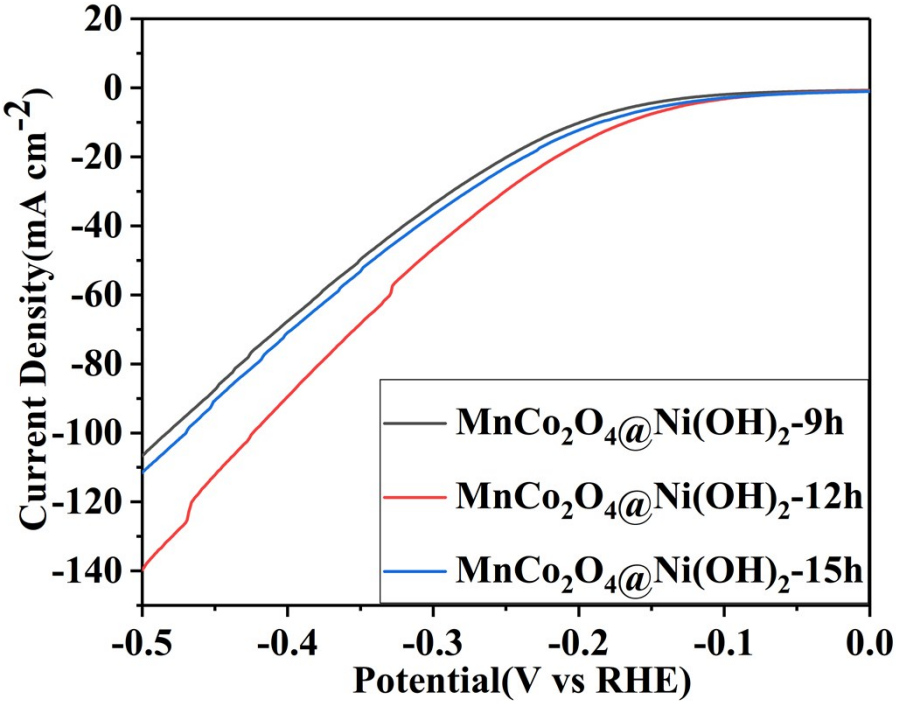

Fig. S4 HER polarization curves of $MnCo_2O_4$@$Ni(OH)_2$-9h, $MnCo_2O_4$@$Ni(OH)_2$-12h and $MnCo_2O_4$@$Ni(OH)_2$-15h

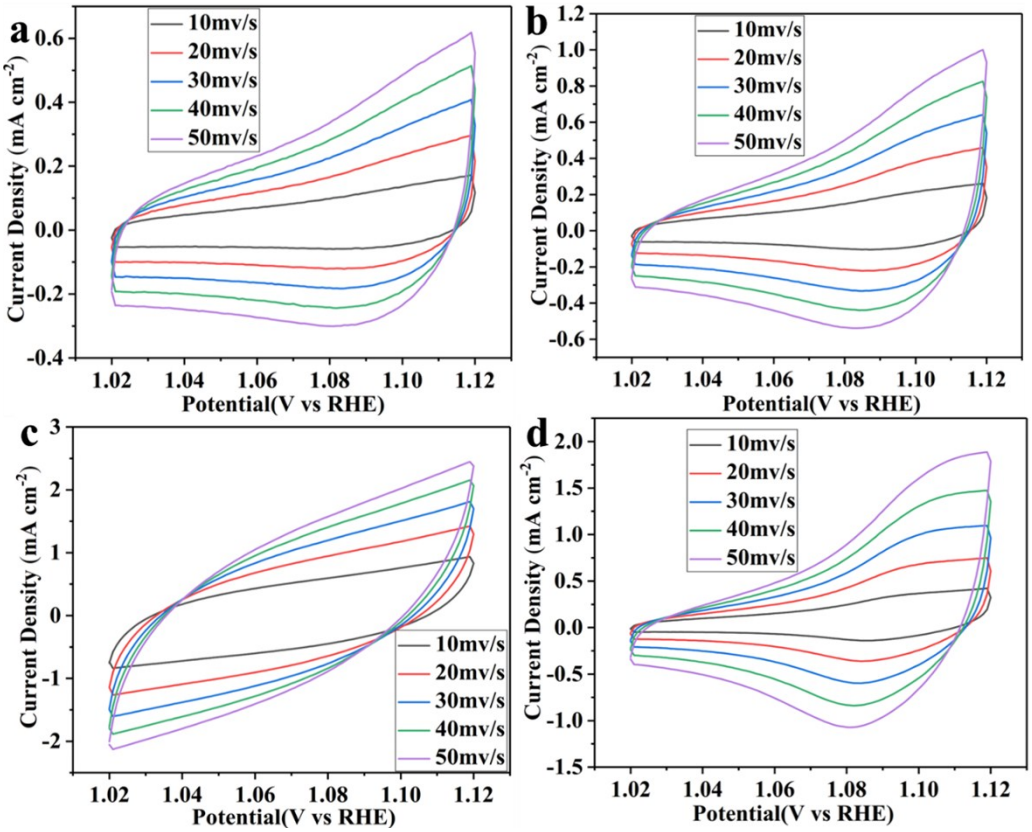

Fig. S5 CV_S of $MnCo_2(OH)_6$-15mmol (a), $MnCo_2O_4$@$Ni(OH)_2$-12h (b), $MnCo_2O_4$@Ni_3S_2 (c) and $MnCo_2O_4$@NiP_2 (d) with different scan rates (10-50 mV s^{-1}) in the region of 1.02-1.12V *vs* RHE.

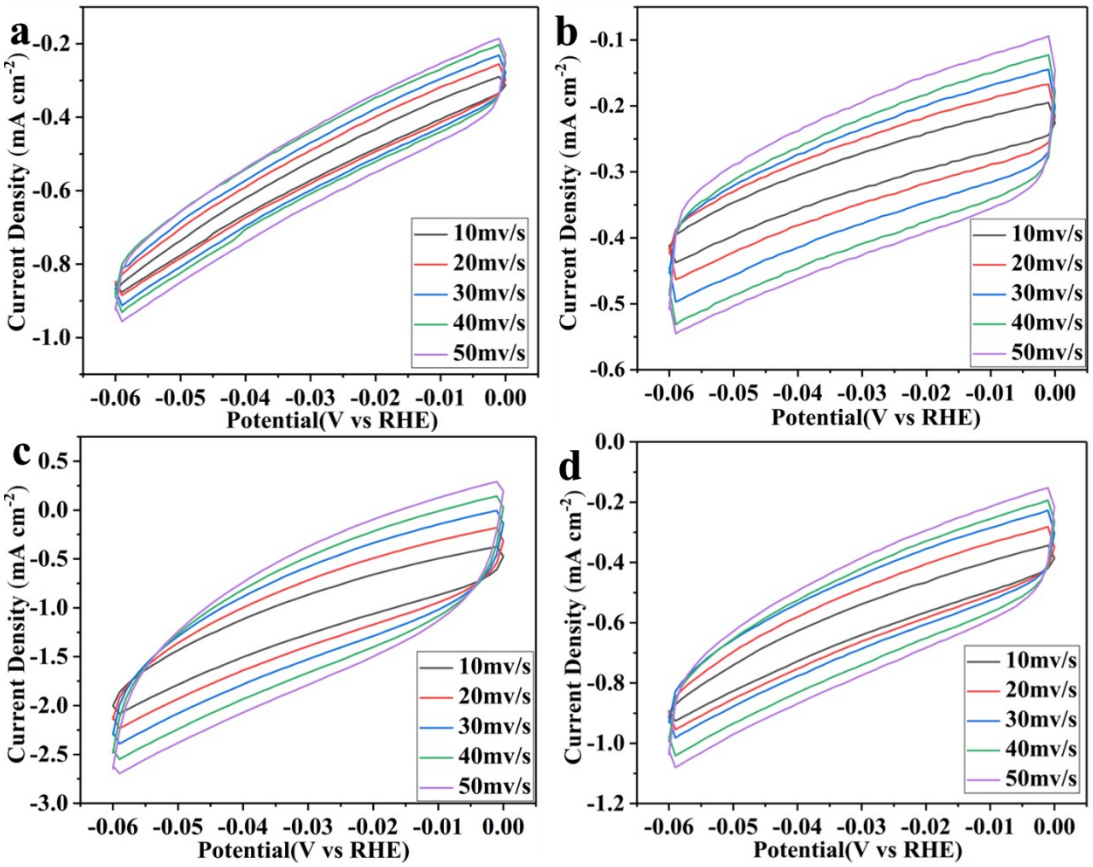

Fig. S6 CV_S of $MnCo_2(OH)_6$-15mmol (a), $MnCo_2O_4$@$Ni(OH)_2$-12h (b), $MnCo_2O_4$@Ni_3S_2 (c) and $MnCo_2O_4$@NiP_2 (d) with different scan rates (10-50 mV s^{-1}) in the region of -0.06 —0V *vs* RHE.

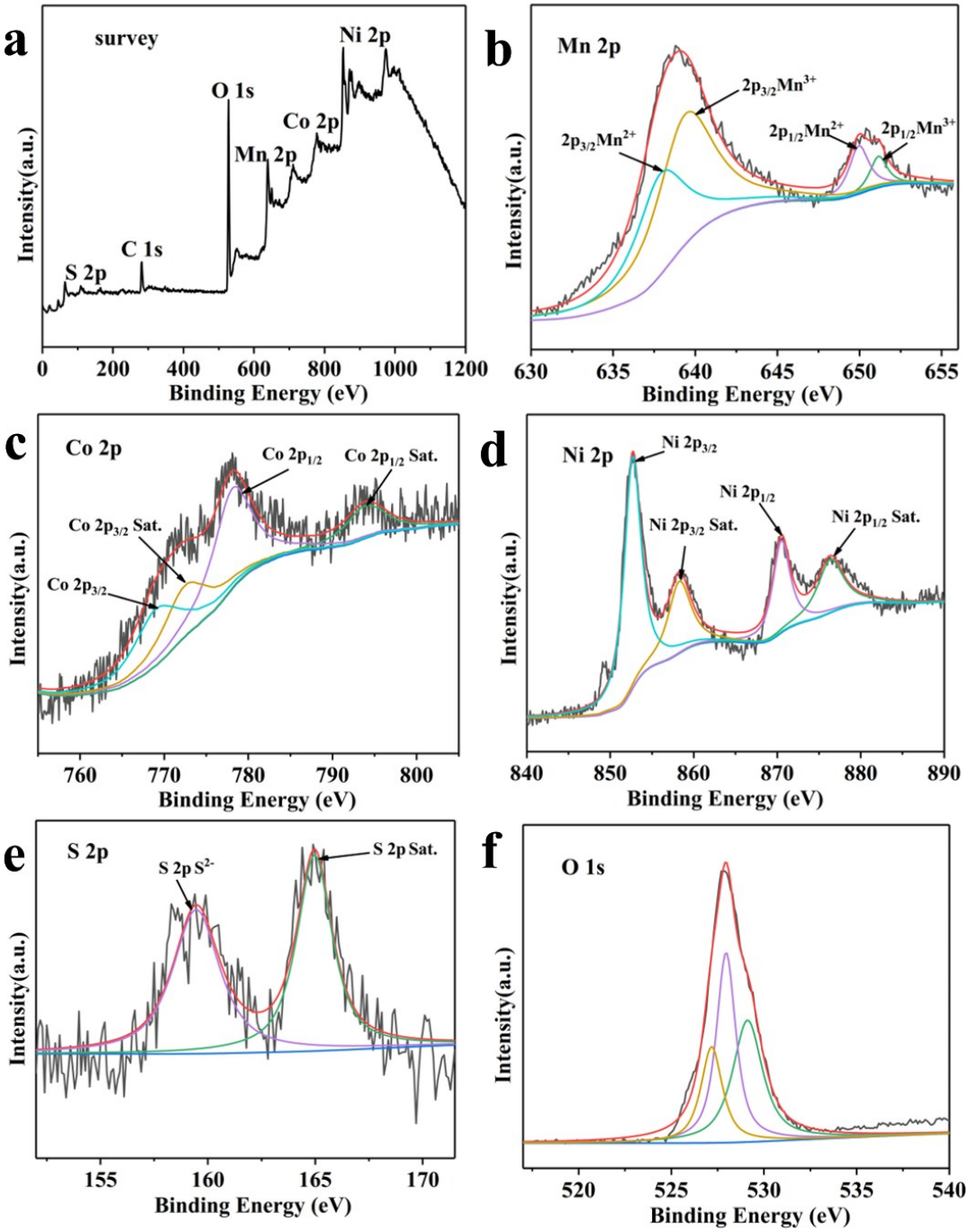

Fig. S7 XPS spectra of $MnCo_2O_4$@Ni_3S_2 after electrochemical testing: (a) survey scan, (b) Mn 2p, (c) Co 2p, (d) Ni 2p, (e) S 2p and (f) O 1s.

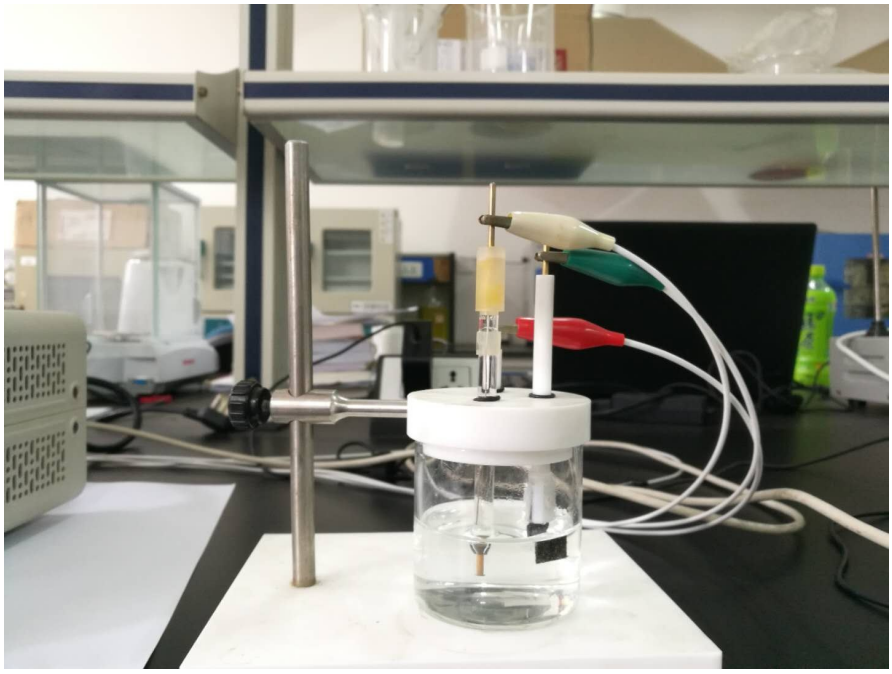

Fig.S8 A photograph showing generation of O_2 bubbles on the $MnCo_2O_4$@Ni_3S_2 electrodes.

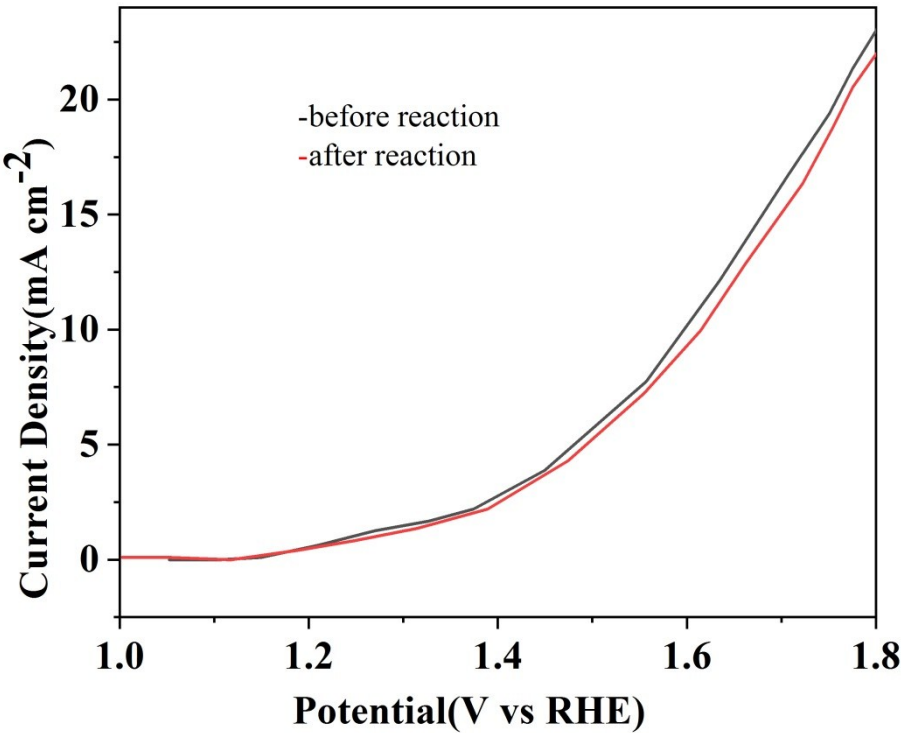

Fig. S9 LSV curve of $MnCo_2O_4$@Ni_3S_2 for water splitting before and after reaction.

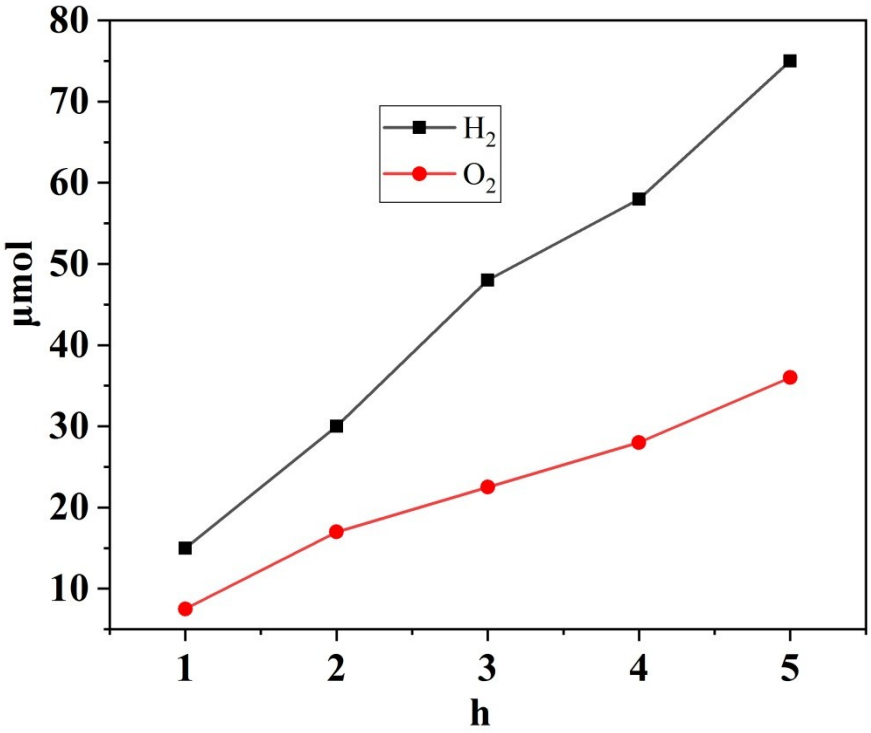

Fig. S10 (a) Kinetics of O_2 and H_2 formation in the electrocatalytic system using $MnCo_2O_4$@Ni_3S_2.