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Cu-Co-M arrays on Ni foam as monolithic structured catalysts for water splitting: effects of co-doped S-P

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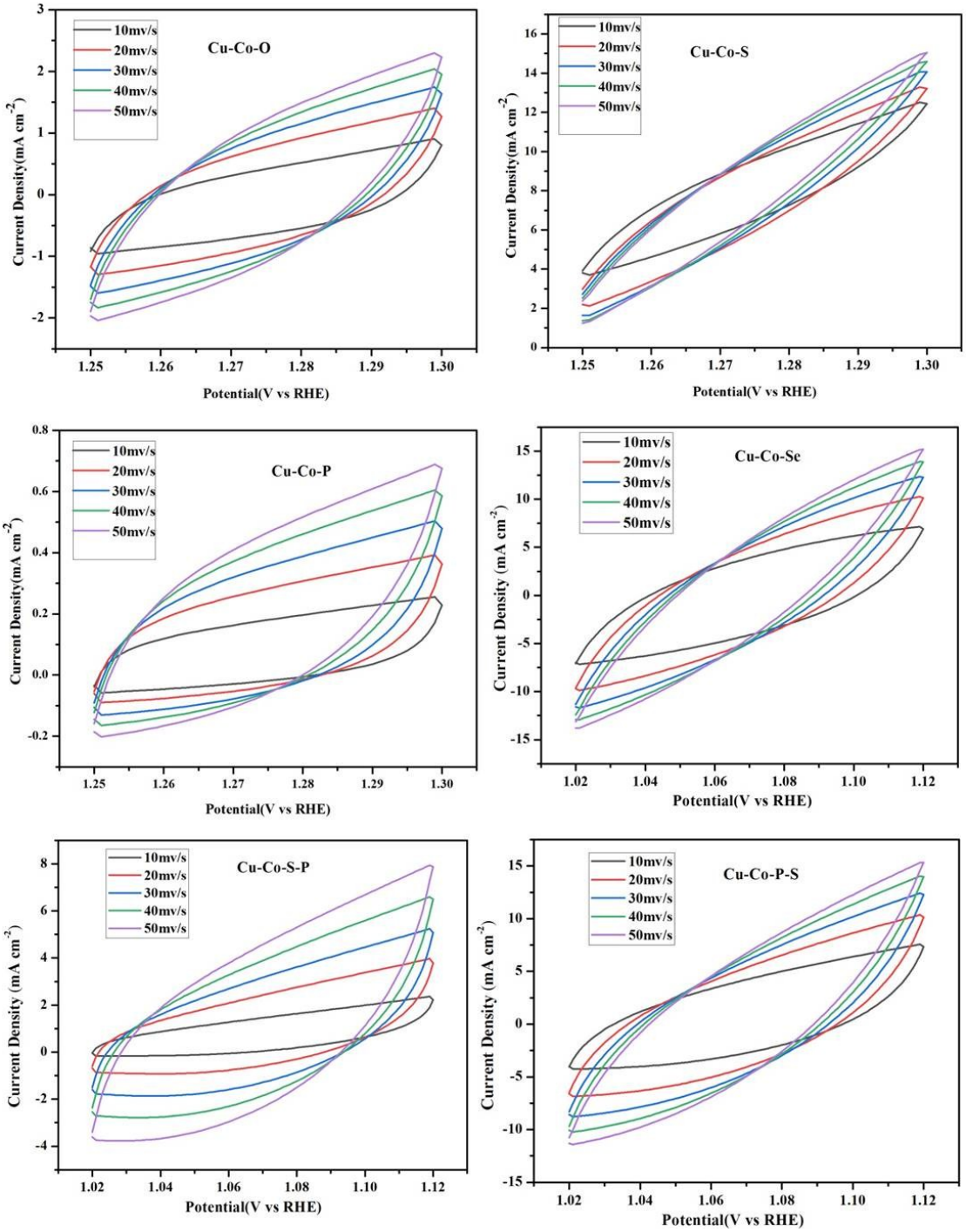

Fig. S1 CV_S of Cu-Co-O, Cu-Co-S, Cu-Co-P, Cu-Co-Se, Cu-Co-S-P and Cu-Co-P-S with different scan rates (10-50 mV s^{-1}) in the region of 1.02-1.12V *vs* RHE.

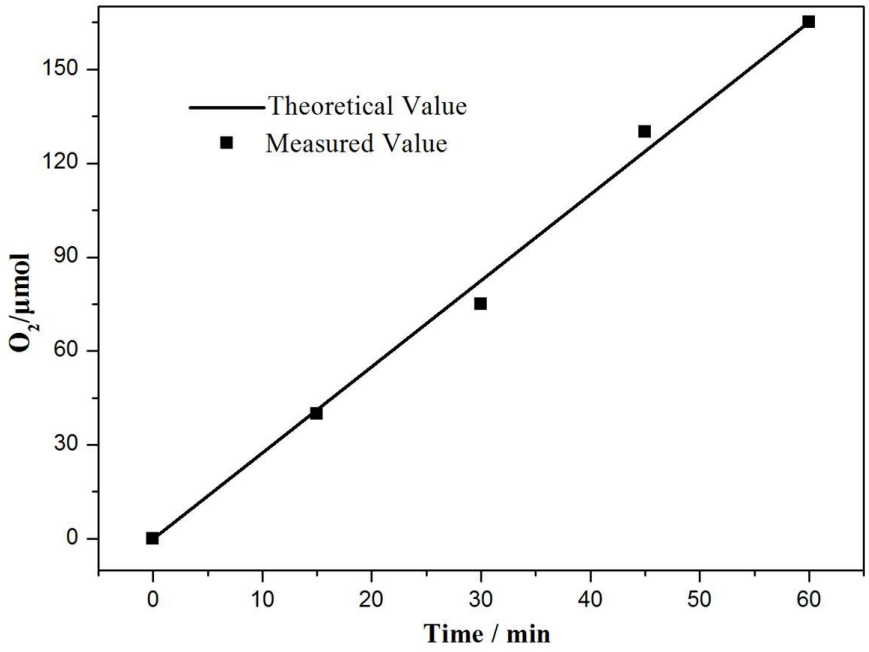

Fig. S2 Electrocatalytic efficiency of O_2 production over Cu-Co-P-S at a potential of ca. 1.50 V, measured for 60 min.

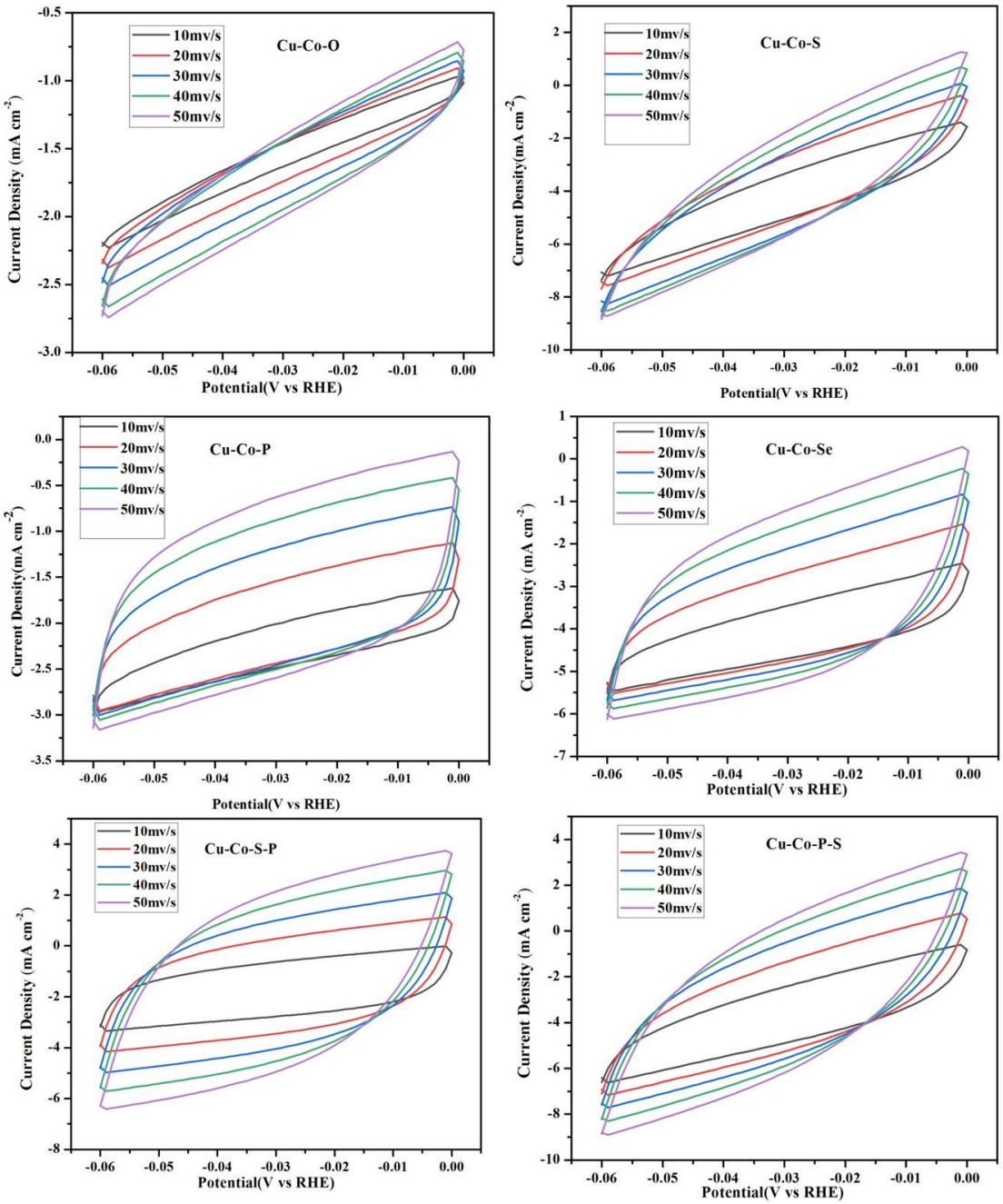

Fig. S3 CV_S of Cu-Co-O, Cu-Co-S, Cu-Co-P, Cu-Co-Se, Cu-Co-S-P and Cu-Co-P-S with different scan rates (10-50 mV s^{-1}) in the region of -0.06-0 V *vs* RHE.

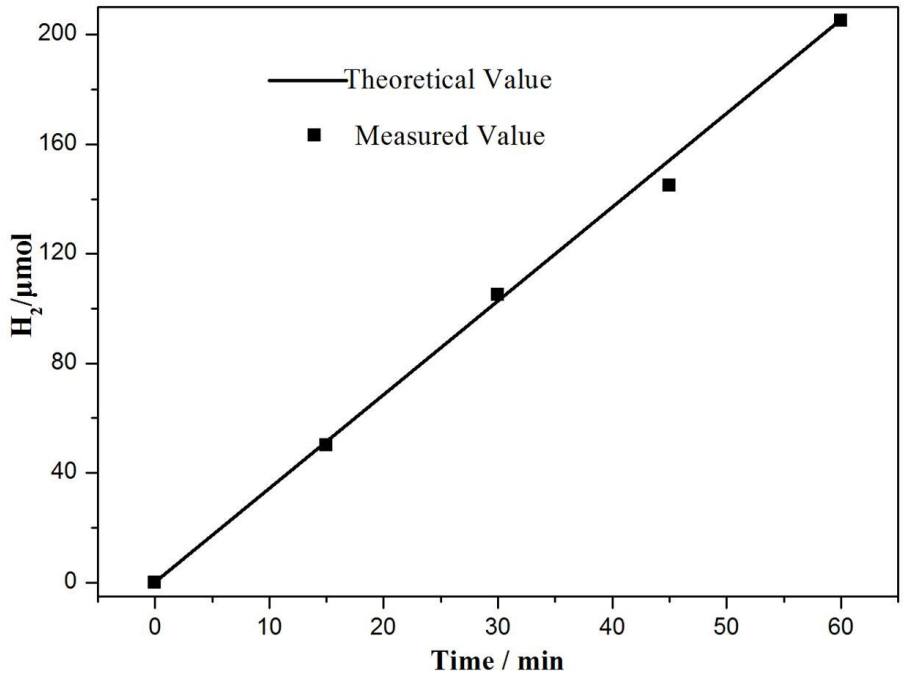

Fig. S4 Electrocatalytic efficiency of H_2 production over Cu-Co-P-S at a potential of ca. -0.2V, measured for 60 min.

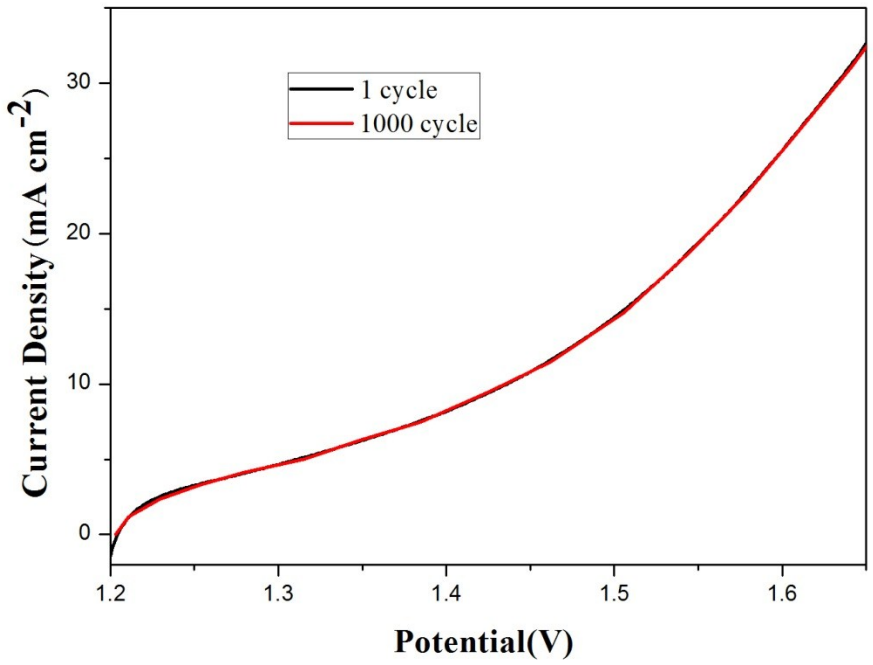

Fig. S5 The polarization curves for the Cu-Co-P-S before and after 1000 cycles of the accelerated stability test.

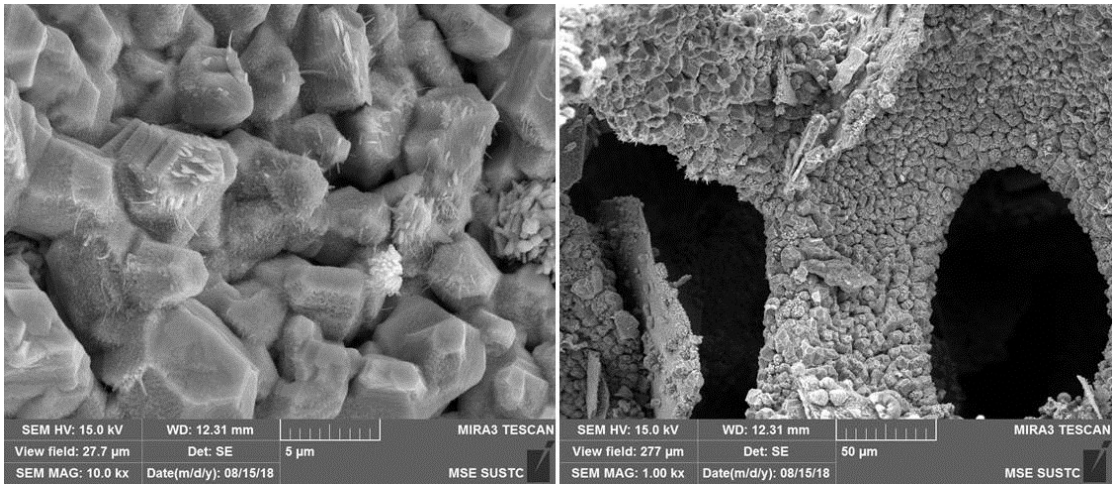

Fig. S6 SEM of the Cu-Co-S.

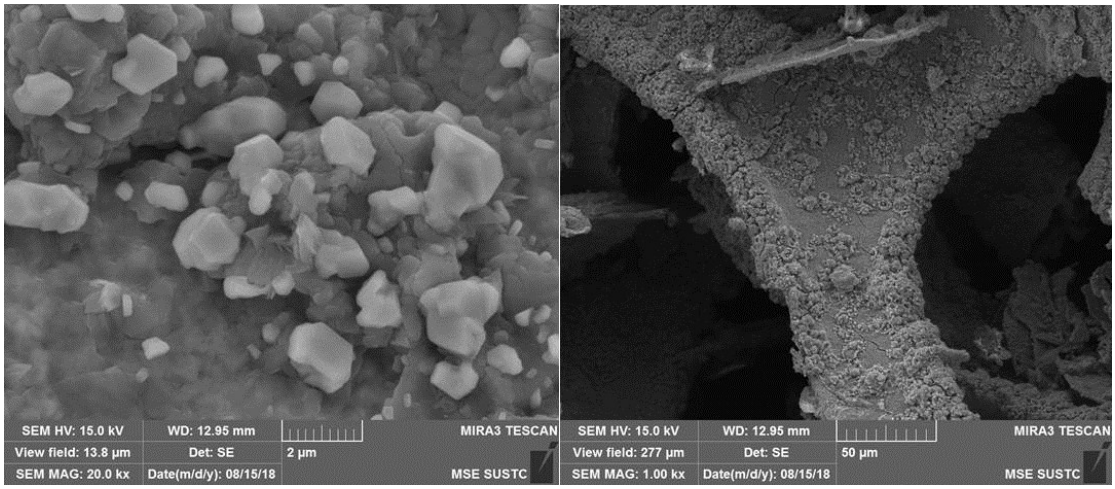

Fig. S7 SEM of the Cu-Co-P.

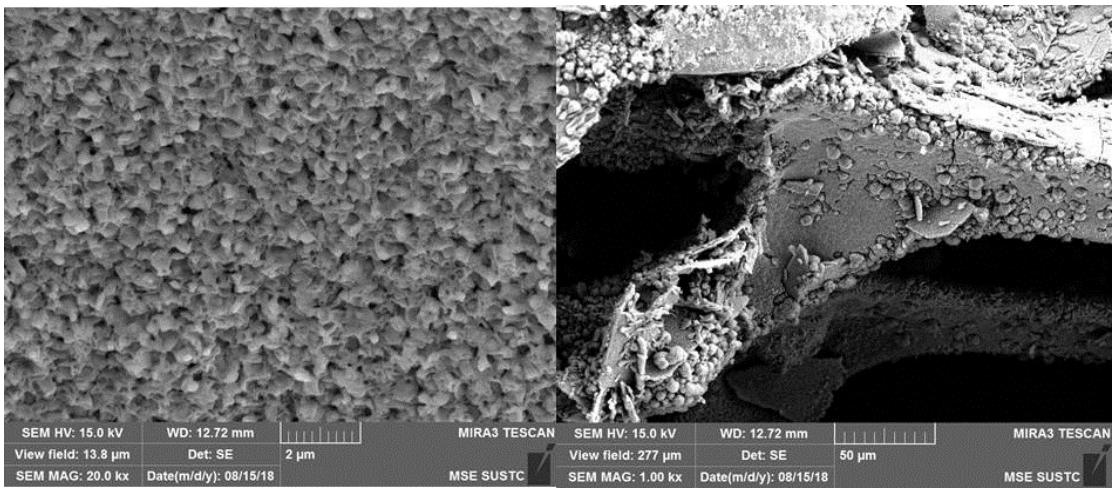

Fig. S8 SEM of the Cu-Co-Se.

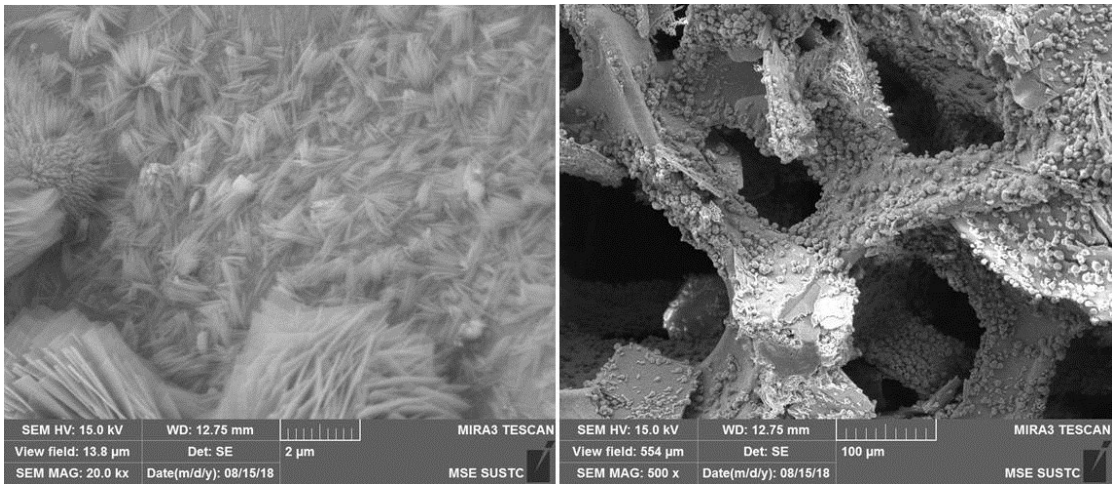

Fig. S9SEM of the Cu-Co-O.

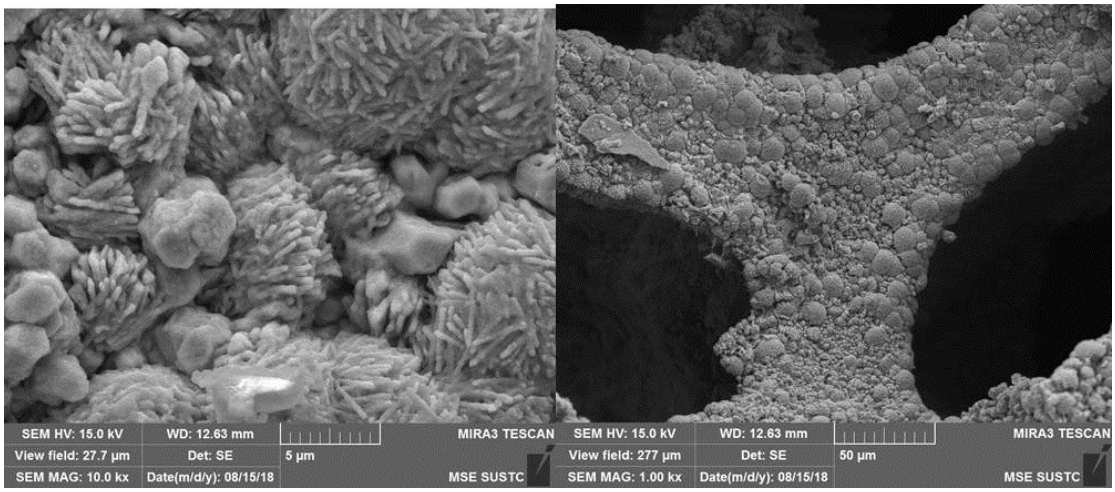

Fig. S10SEM of the Cu-Co-S-P.

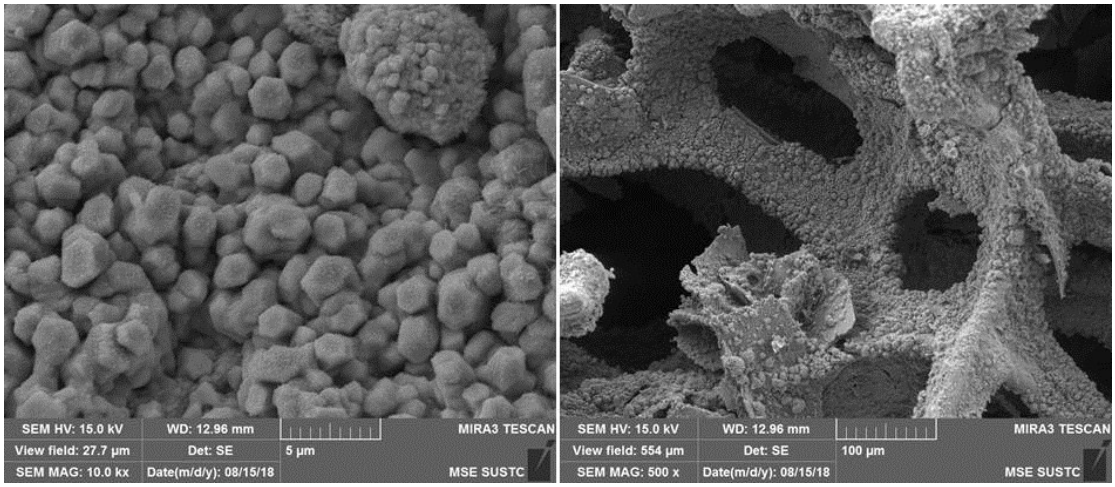

Fig. S11SEM of the Cu-Co-P-S.

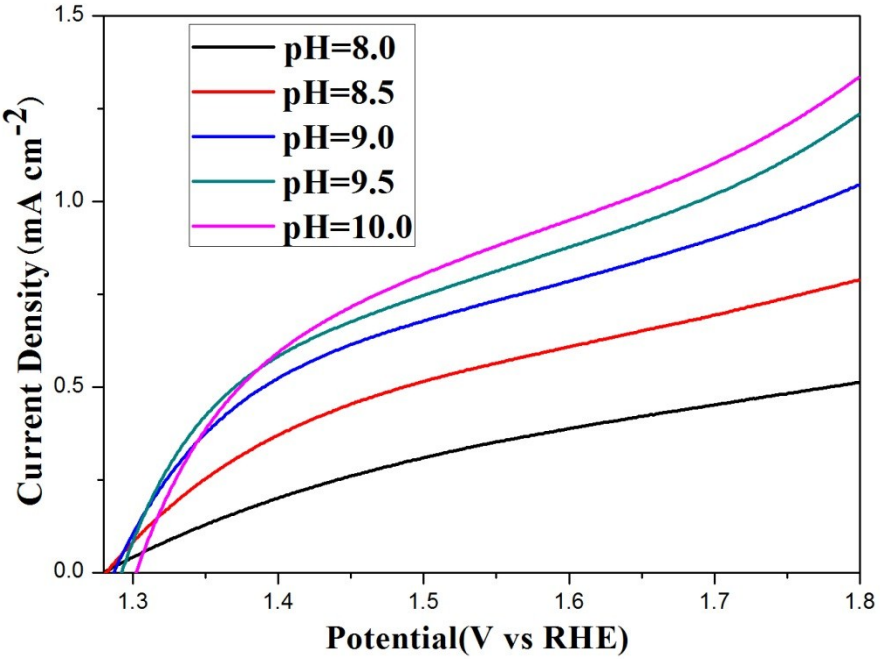

Fig. S12 LSV of Cu-Co-P-S in 80 mM sodium borate buffer solution at a potential sweep rate of 100 mV s^{-1}(1.30-1.80 V vs RHE).

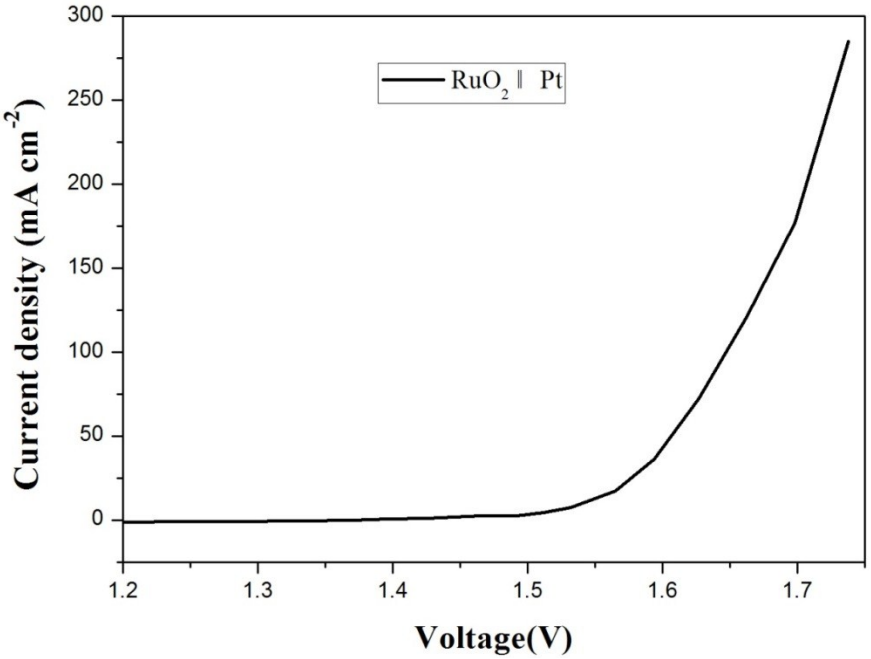

Fig. S13 Polarization curve of the RuO_2 and Pt for water splitting with a scan rate of 5 mV s^{-1} in 1 M KOH.

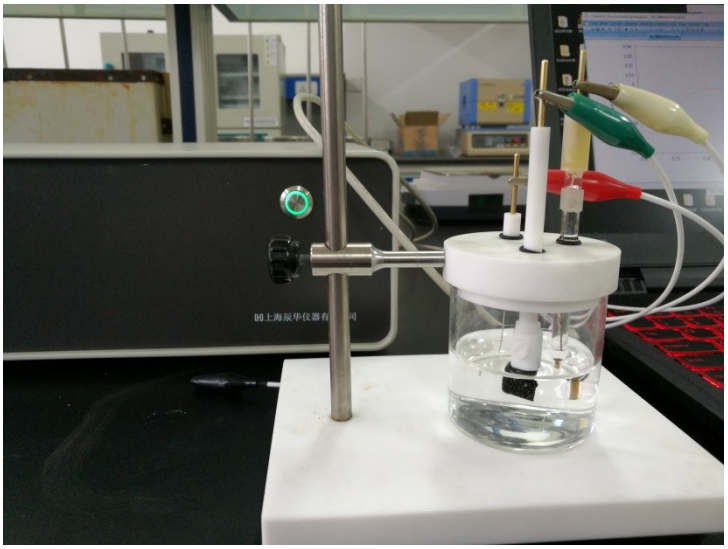

Fig. S14 A photograph showing generation of O_2 bubbles on the Cu-Co-P-S electrodes.

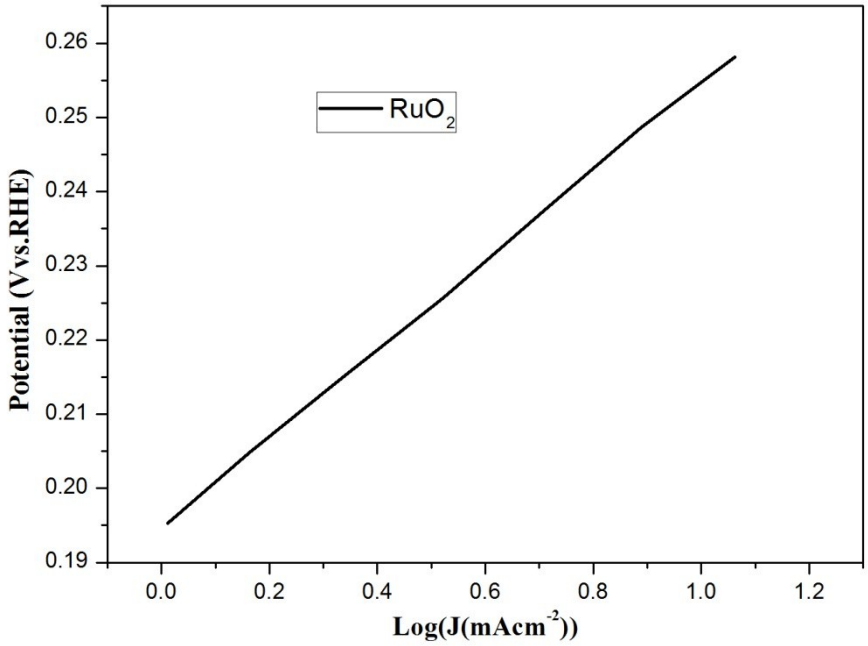

Fig. S15 Tafel plots of RuO_2 derived from the OER voltammograms.

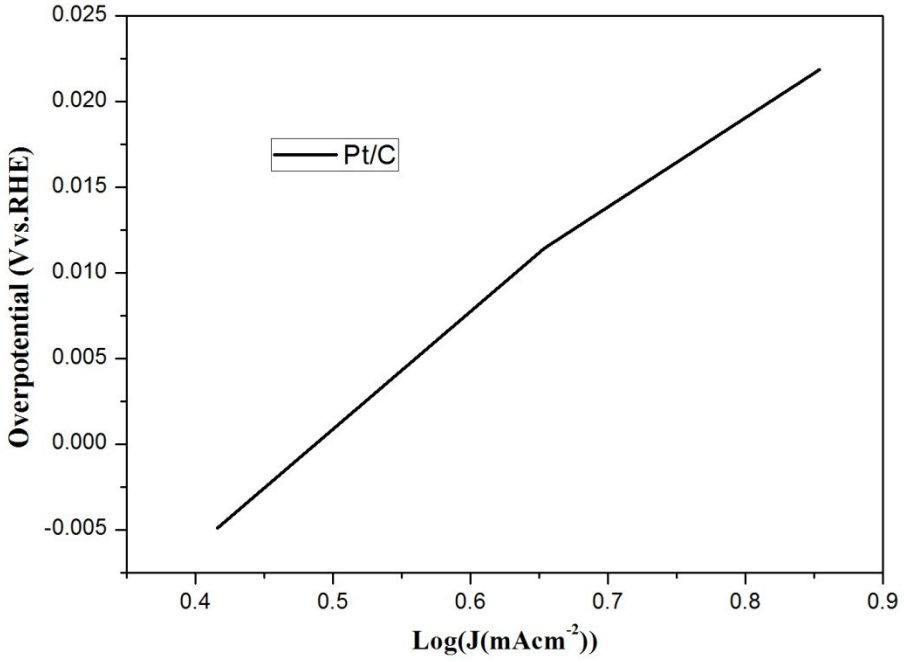

Fig. S16 Tafel plots of Pt/C derived from the HER voltammograms.

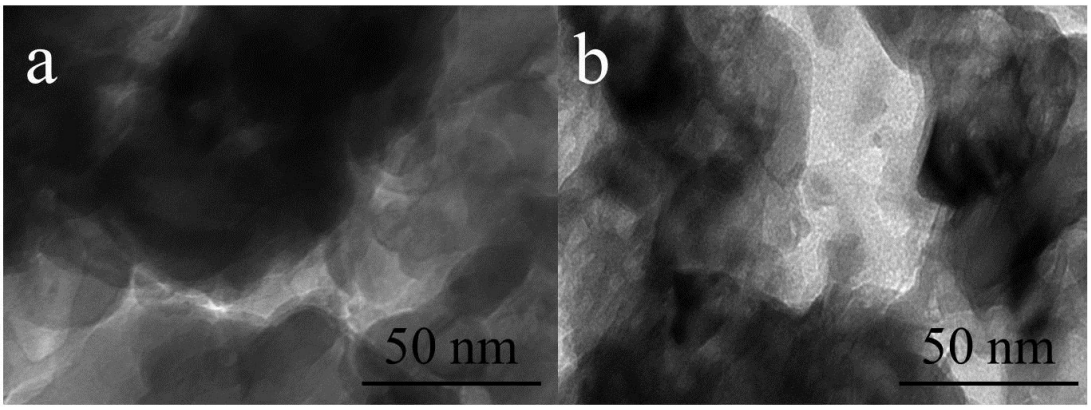

Fig. S17 TEM of fresh catalyst (a)and recovered catalyst(b).

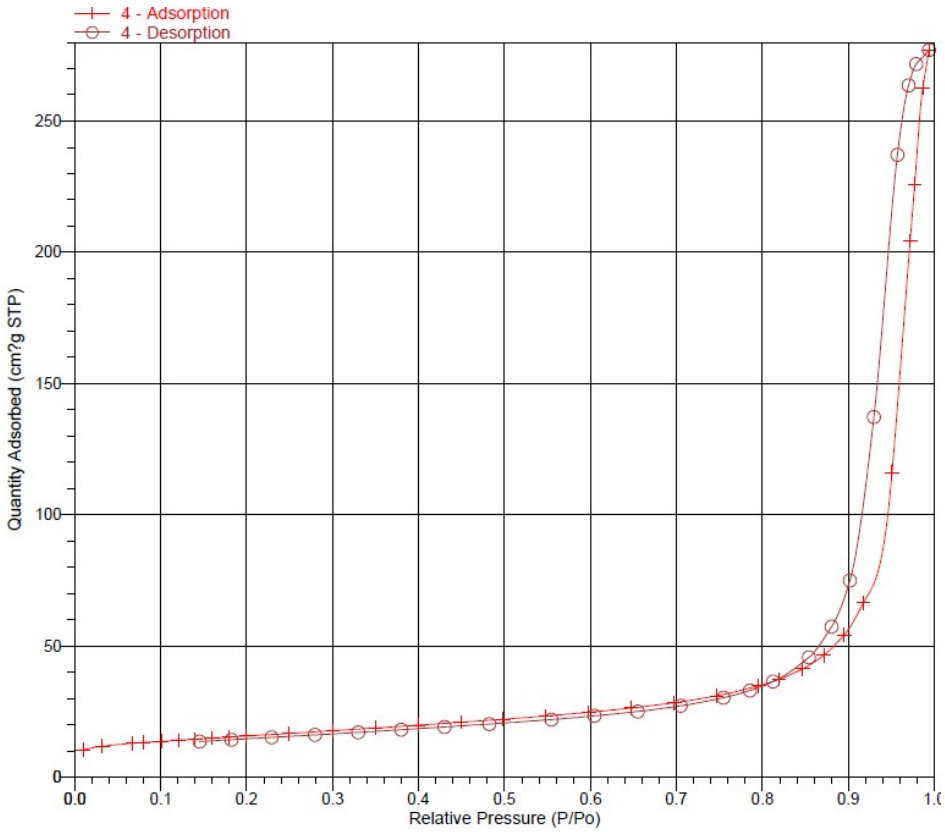

Fig. S18 Nitrogen adsorption isotherms of the porous Cu-Co-P.

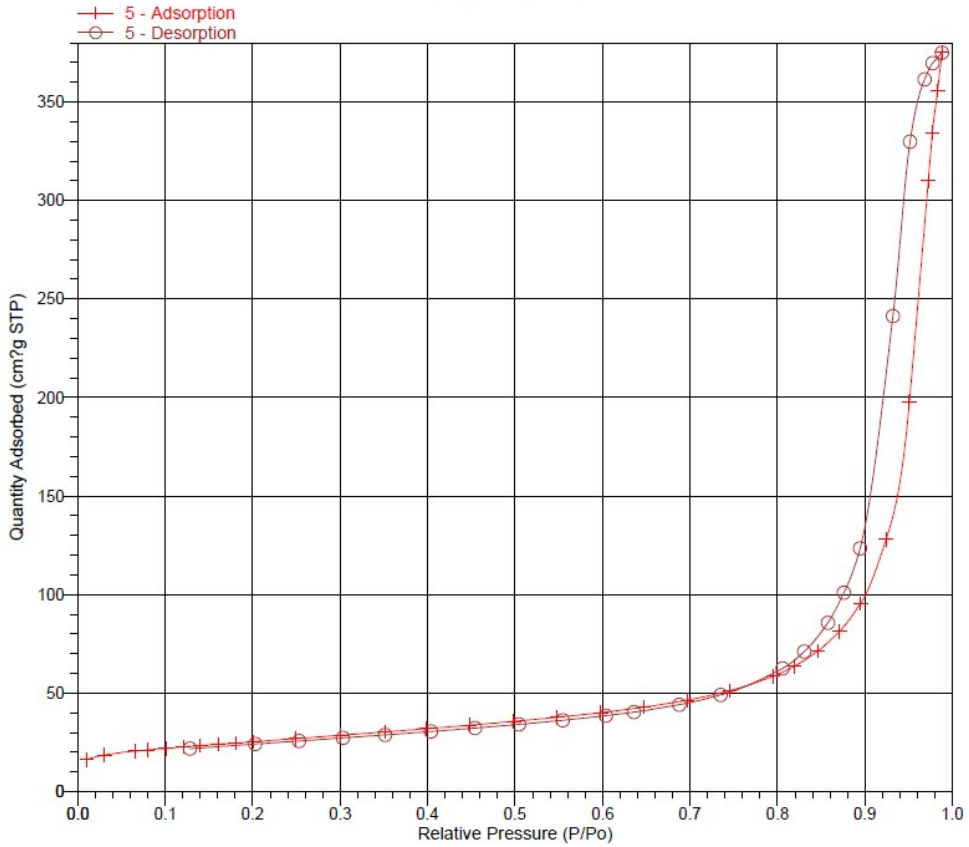

Fig. S19 Nitrogen adsorption isotherms of the porous Cu-Co-S-P.

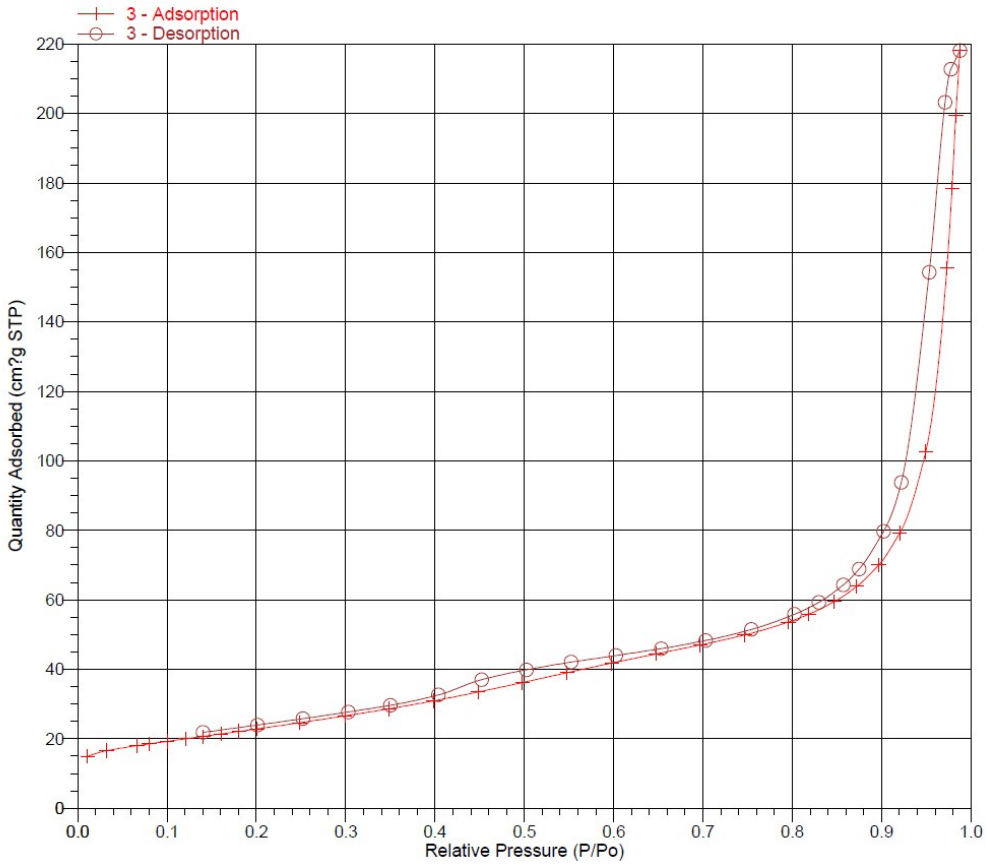

Fig. S20 Nitrogen adsorption isotherms of the porous Cu-Co-P-S.

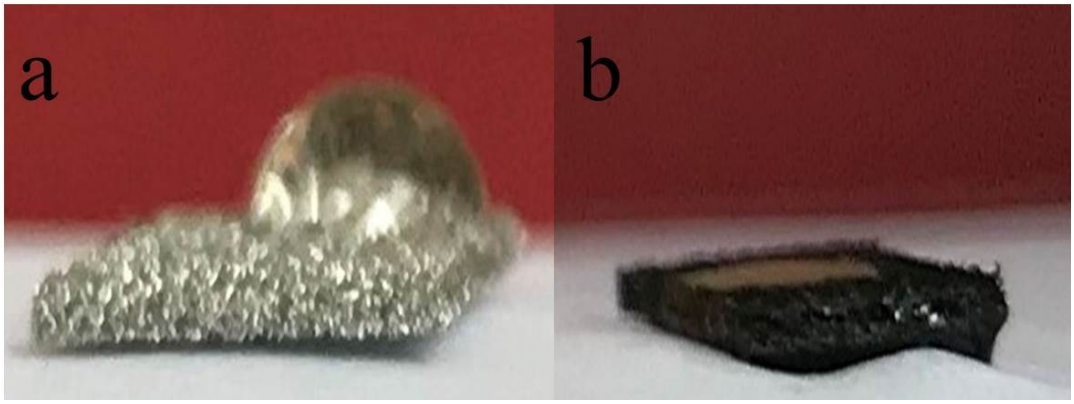

Fig. S21 Processed digital photos of the hydrophilic property test for pure NF (a) and Cu-Co-P-S (b).

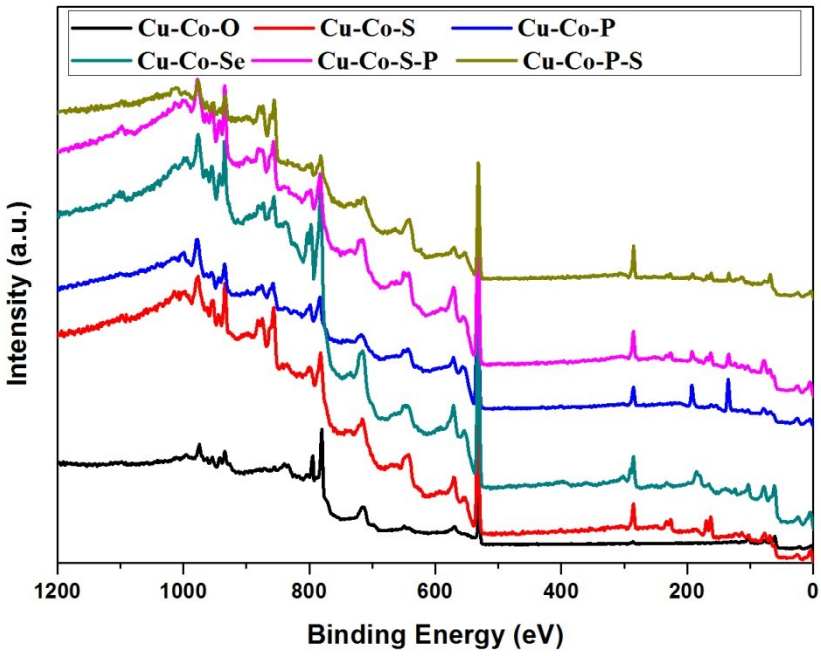

Fig. S22 XPS survey of Cu-Co-O, Cu-Co-S, Cu-Co-P, Cu-Co-Se, Cu-Co-S-P and Cu-Co-P-S.