Supplementary Information

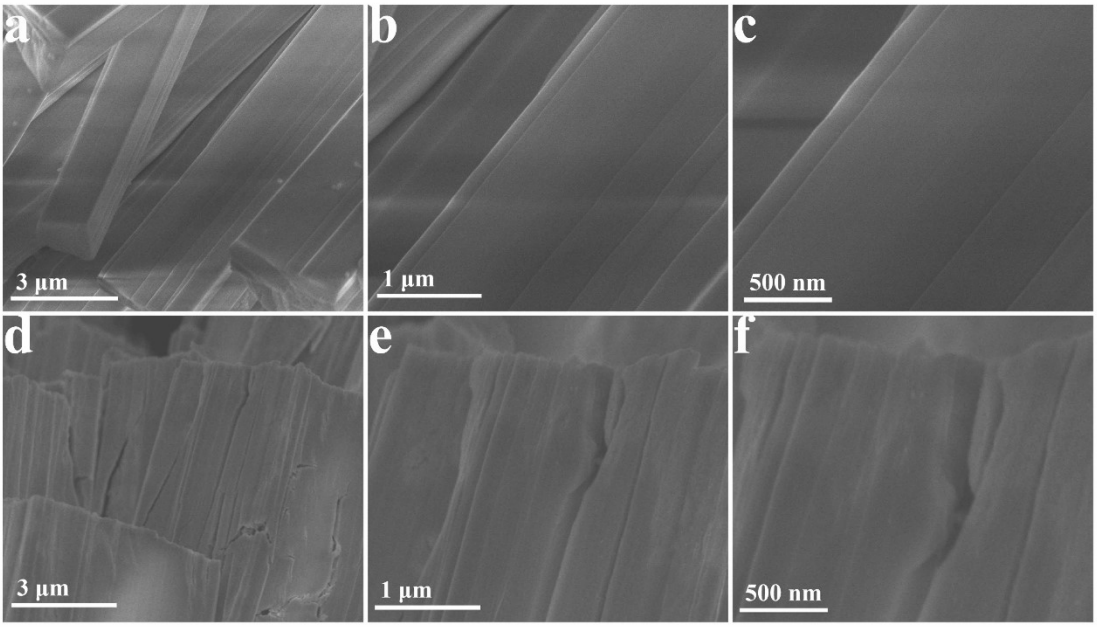

Fig. S1. SEM of (a~c) $CoMoO_4 \cdot 0.75H_2O$; (d~f) $CoMoO_4$.

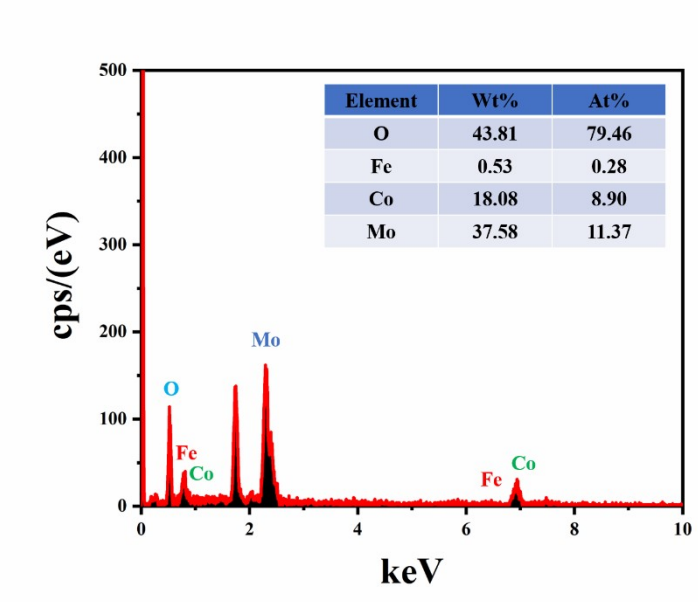

Fig. S2. EDX spectrum of Fe-$CoMoO_4$.

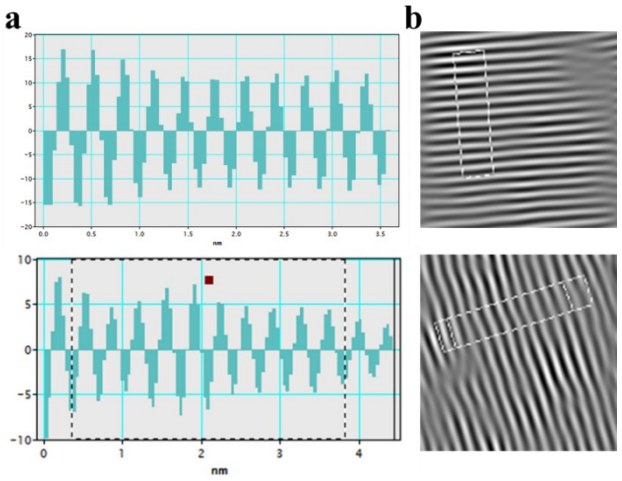

Fig. S3. HRTEM real-time profiles (a) IFFT image (b) of Fe-$CoMoO_4$ crystal.

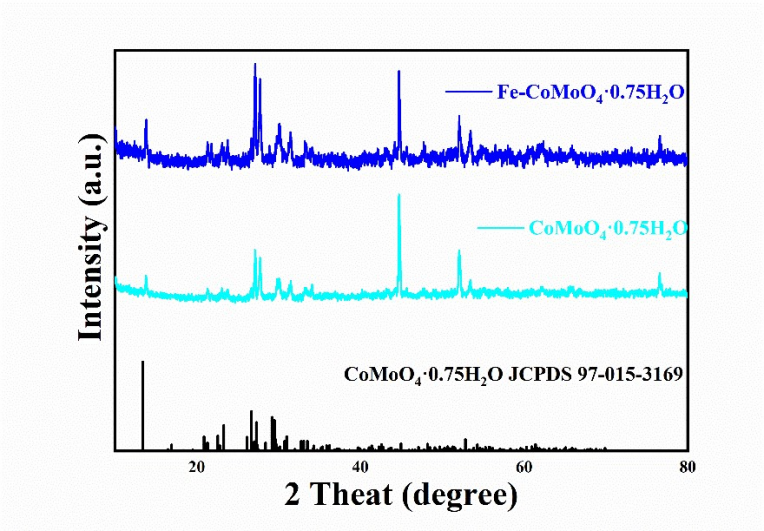

Fig. S4**.** XRD of Fe-$CoMoO_4 \cdot 0.75H_2O$ and $CoMoO_4 \cdot 0.75H_2O$.

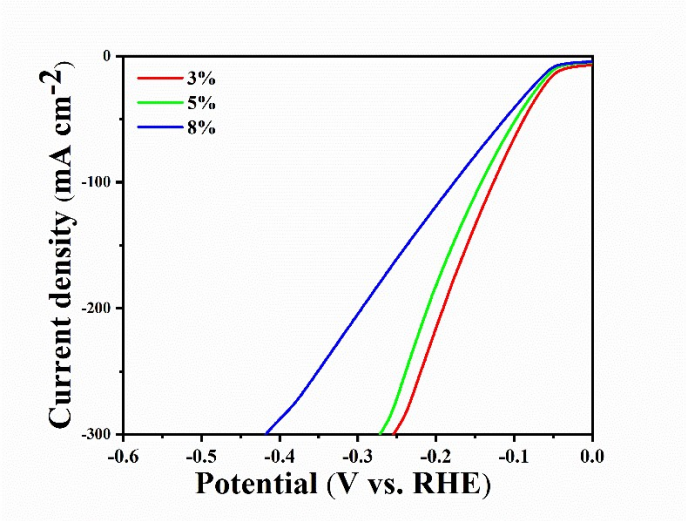

Fig. S5. The HER iR-corrected polarization curves of cobalt molybdate with different Fe doping (3, 5, 8% Fe) amounts 1 M KOH.

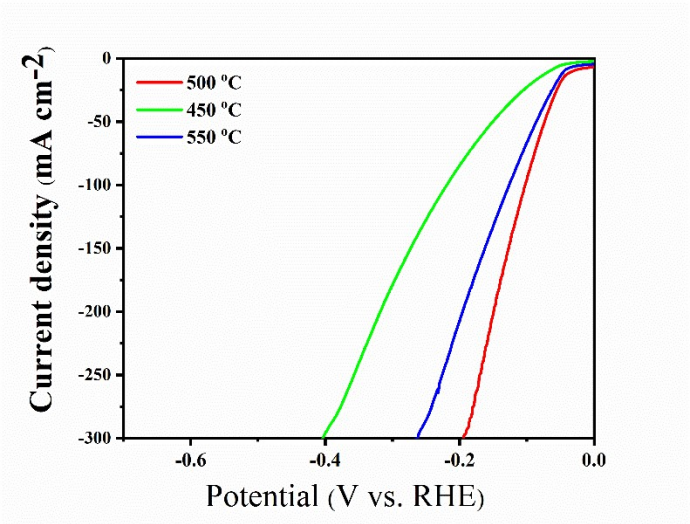

Fig. S6. The HER iR-corrected polarization curves of Fe-doped (3%) cobalt molybdate with different annealing temperatures (450, 500, or 550 °C) in 1 M KOH.

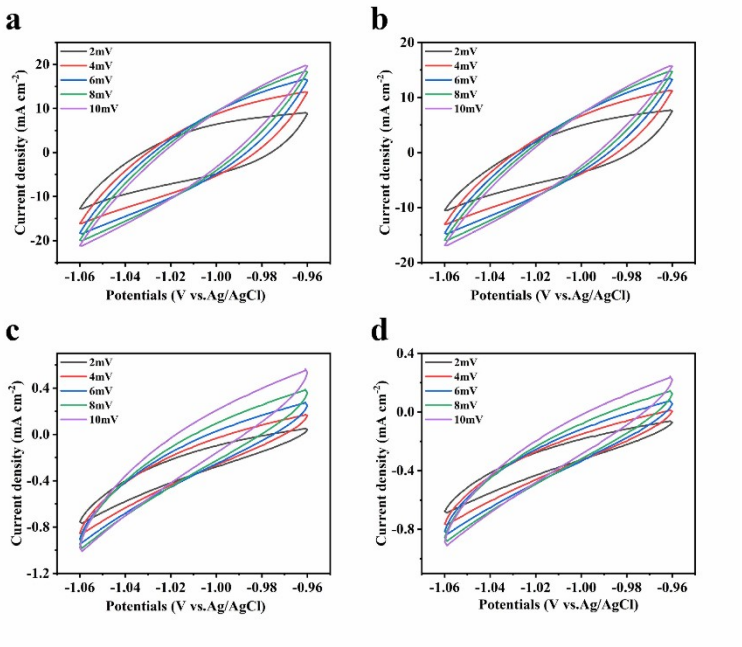

Fig. S7. Cyclic voltammograms curves of (a) Fe-$CoMoO_4$, (b) $CoMoO_4$, (c) Fe-$CoMoO_4 \cdot 0.75H_2O$, and (d) $CoMoO_4 \cdot 0.75H_2O$ in region of -0.106~-0.96 V vs. Ag/AgCl at various scan rate.

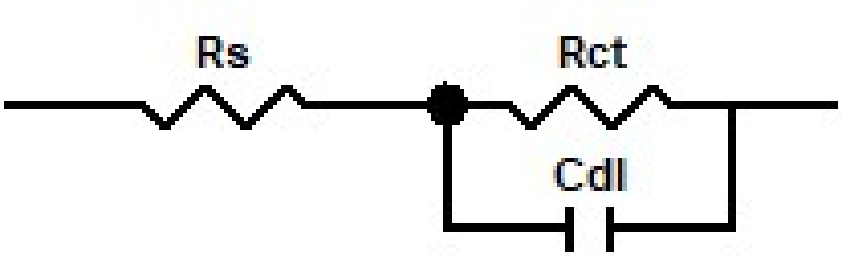

Fig. S8. Equivalent electrical circuit used to model the HER kinetics process, Rs is the solution resistance, Rct is the charge transfer resistance at catalyst/electrolyte interface and Cdl is the double layer capacitance of the working electrode.

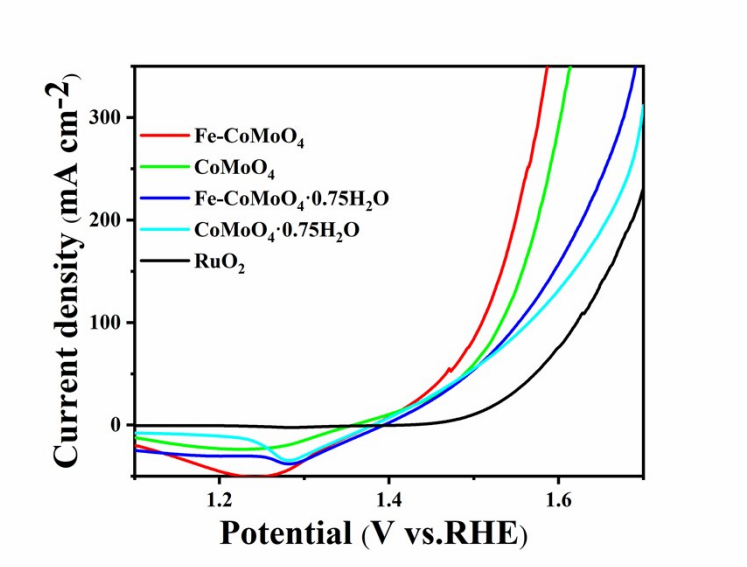

Fig. S9. OER LSV curves of Fe-$CoMoO_4$, $CoMoO_4$, Fe-$CoMoO_4$·0.75H_2O, $CoMoO_4$·0.75H_2O.

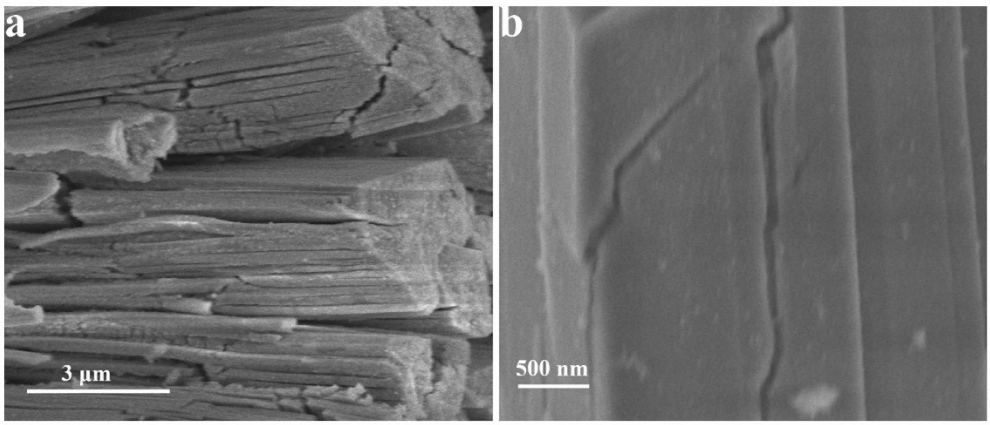

Fig. S10. SEM images of Fe-$CoMoO_4$ sample after stability test.

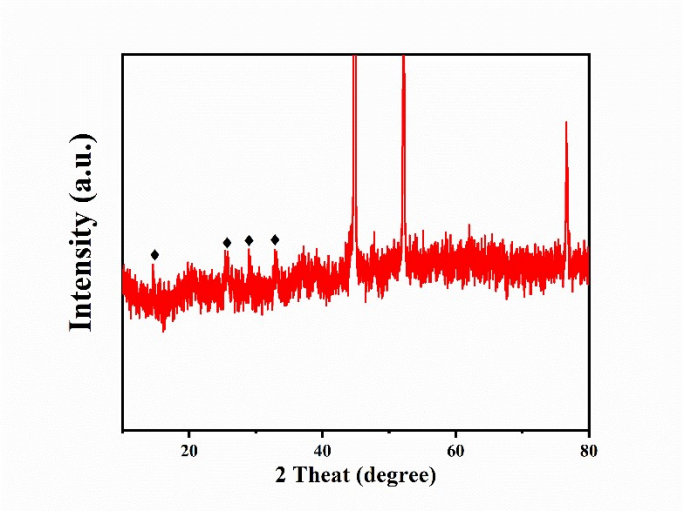

Fig. S11. XRD of Fe-$CoMoO_4$ sample after stability test.

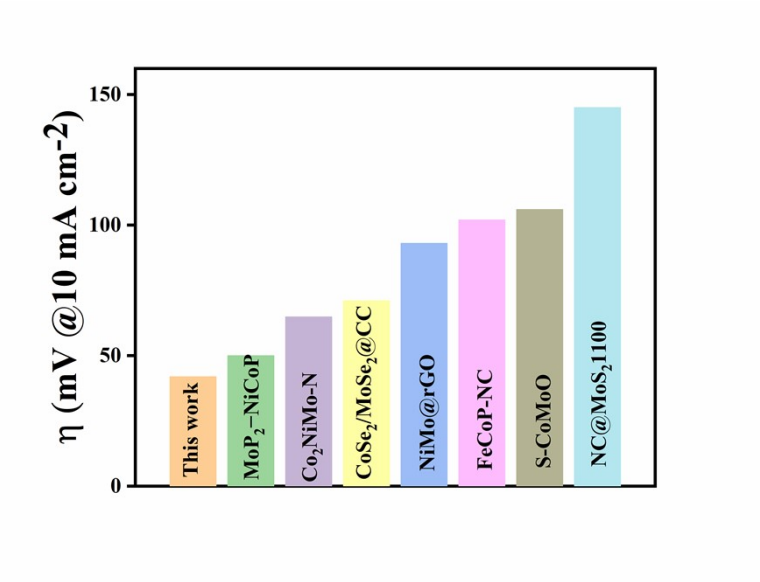

Fig. S12. Comparison of catalytic performance comparison of Fe-$CoMoO_4$ materials with other highly efficient transition metal-based catalysts in 1 M KOH for HER.