

**Template-directed assembly of urchin-like  $\text{CoS}_x/\text{Co-MOF}$  as efficient  
bifunctional electrocatalyst for overall water and urea electrolysis**

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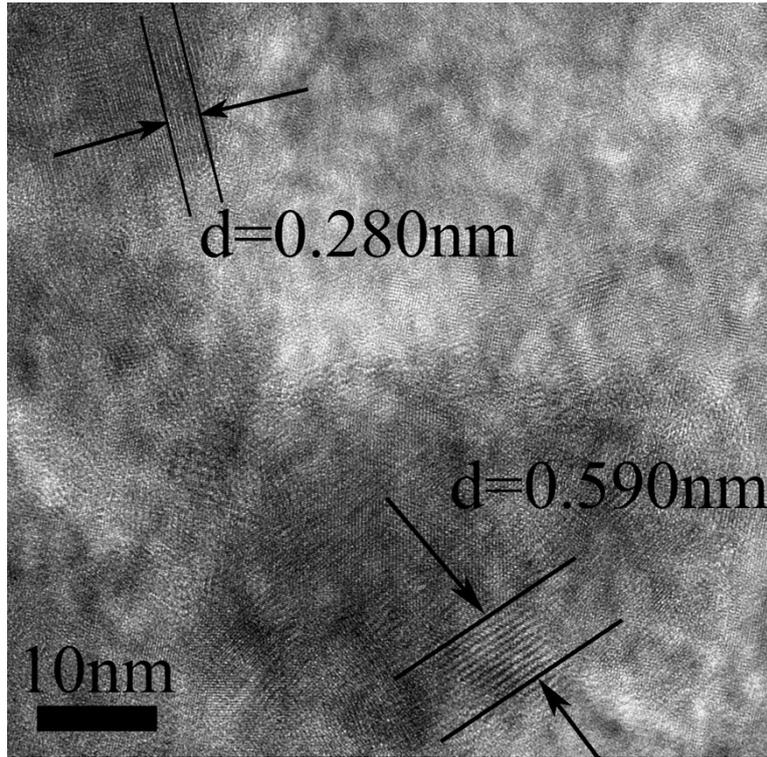
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**Table S1.** The area obtained from the fitting of Co 2p XPS spectra.

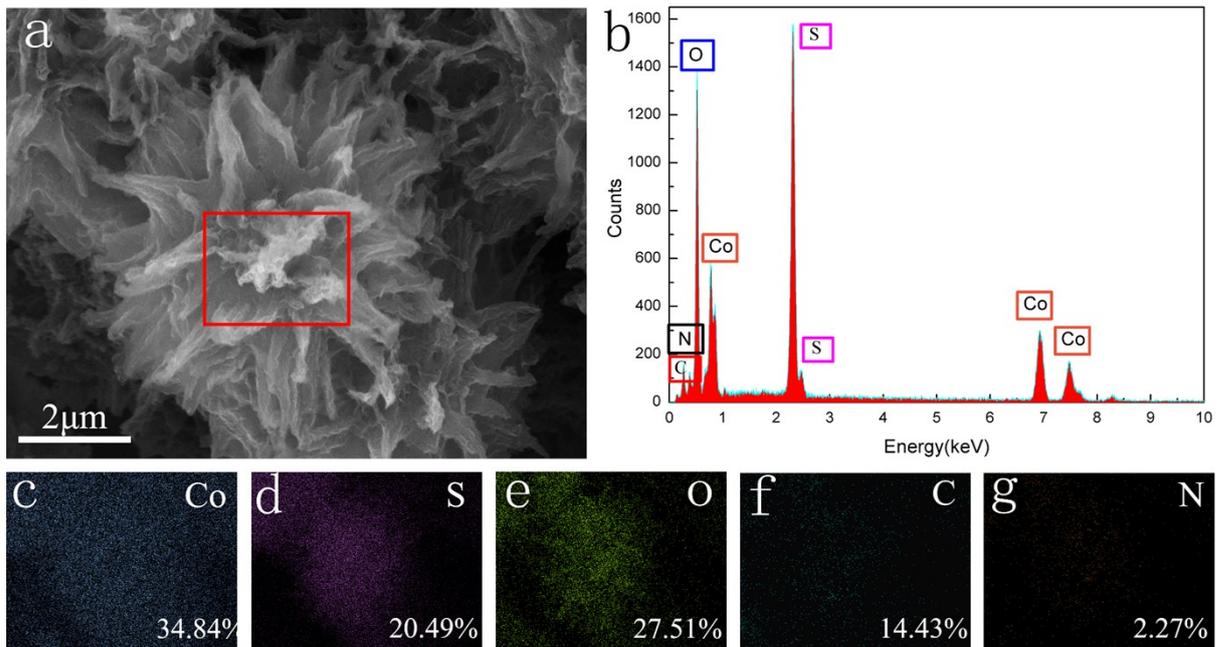
Area	Co 2p <sup>3/2</sup>			Co 2p <sup>1/2</sup>	
	Co <sup>3+</sup>	Co <sup>2+</sup>	Co <sup>0</sup>	Co <sup>3+</sup>	Co <sup>2+</sup>
CoS <sub>x</sub> /Co-MOF	50084.52	32085.02	6718.03	16578.76	8939.04
Co-MOF	/	27527.24	/	/	9858.55
Co(OH) <sub>2</sub> -S	44477.14	37902.42	/	16280.81	14001.43
ZIF-67-S	4976.23	8432.73	/	960.31	1715.75

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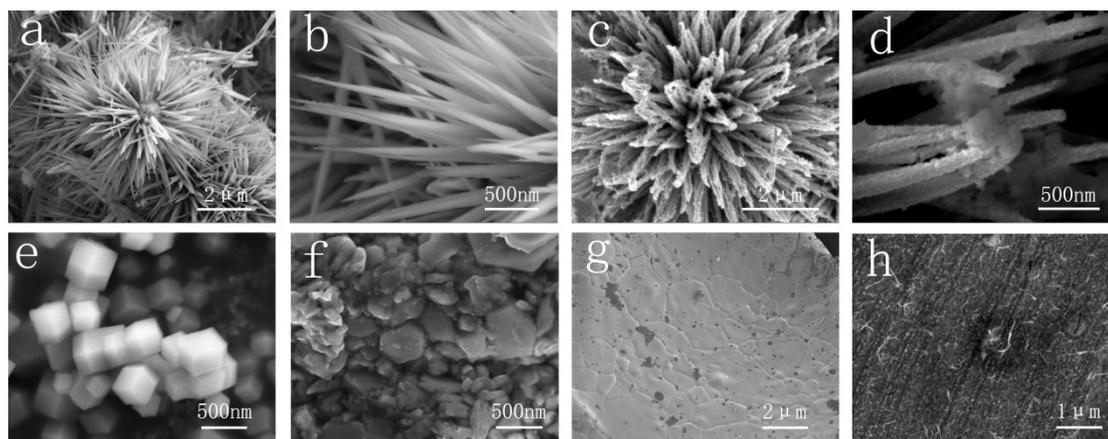
E-mail addresses: yeke@hrbeu.edu.cn (K. Ye); caodianxue@hrbeu.edu.cn (D. Cao)



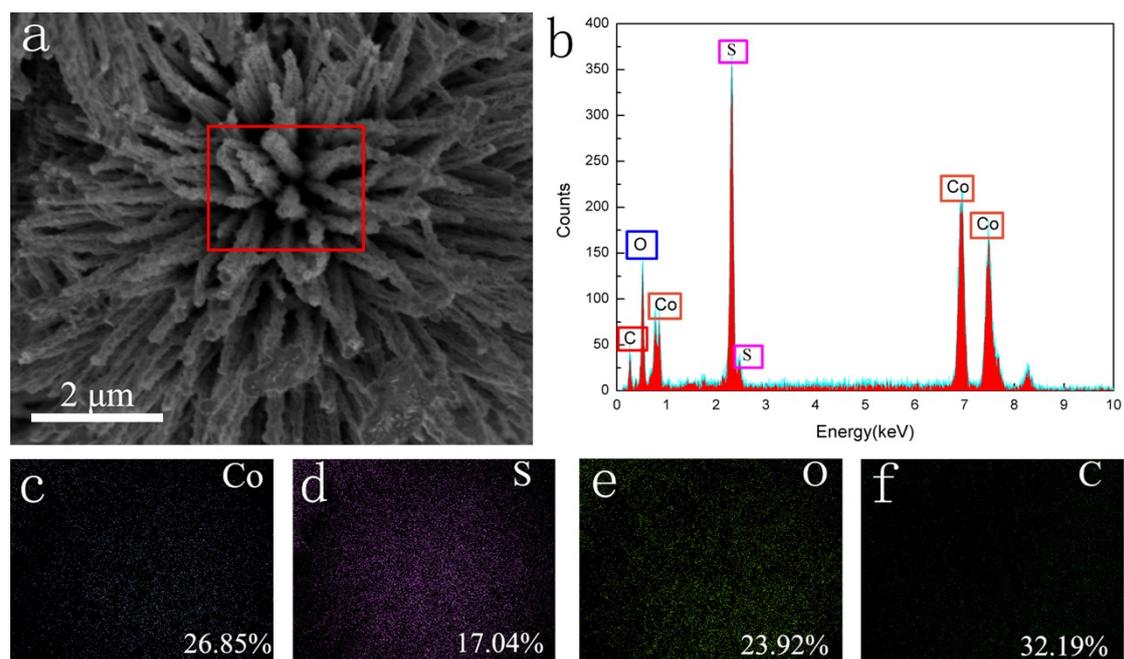
**Figure S1.** HRTEM image of CoS<sub>x</sub>/Co-MOF.



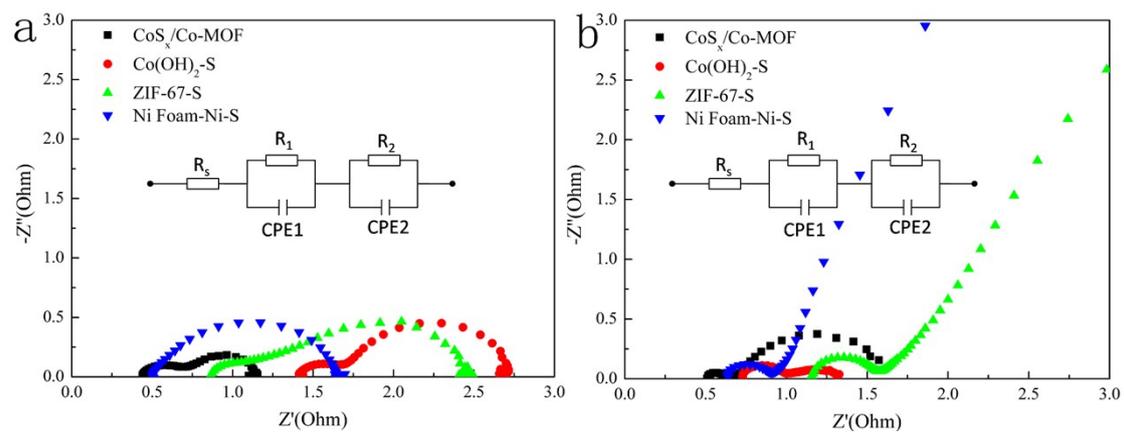
**Figure S2.** EDS spectrum of CoS<sub>x</sub>/Co-MOF.



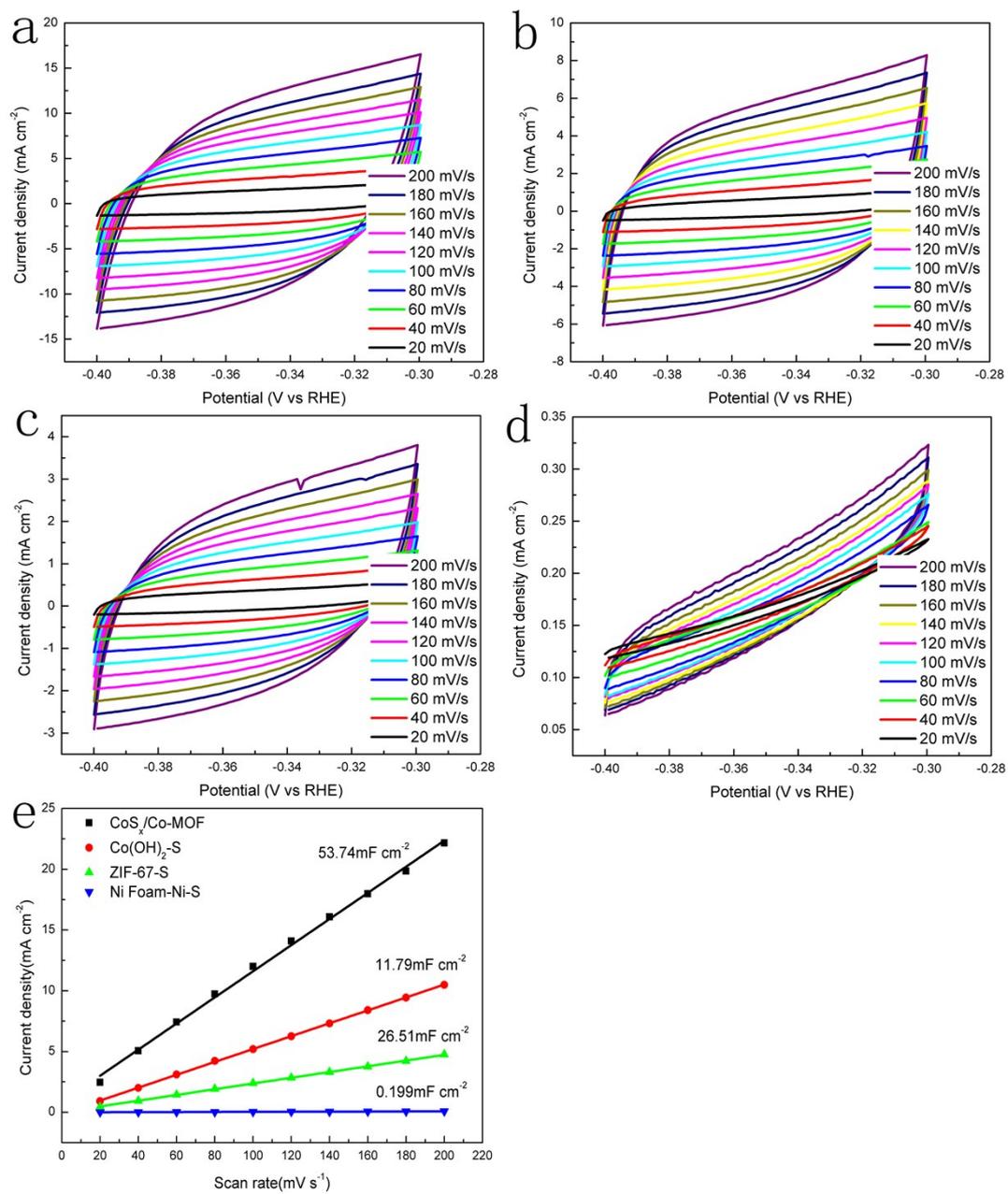
**Figure S3.** SEM images of (a and b)  $\text{Co(OH)}_2$ ; (c and d)  $\text{Co(OH)}_2\text{-S}$ ; (e) ZIF-67; (f) ZIF-67-S; (g) Ni foam; (h) Ni foam-Ni-S.



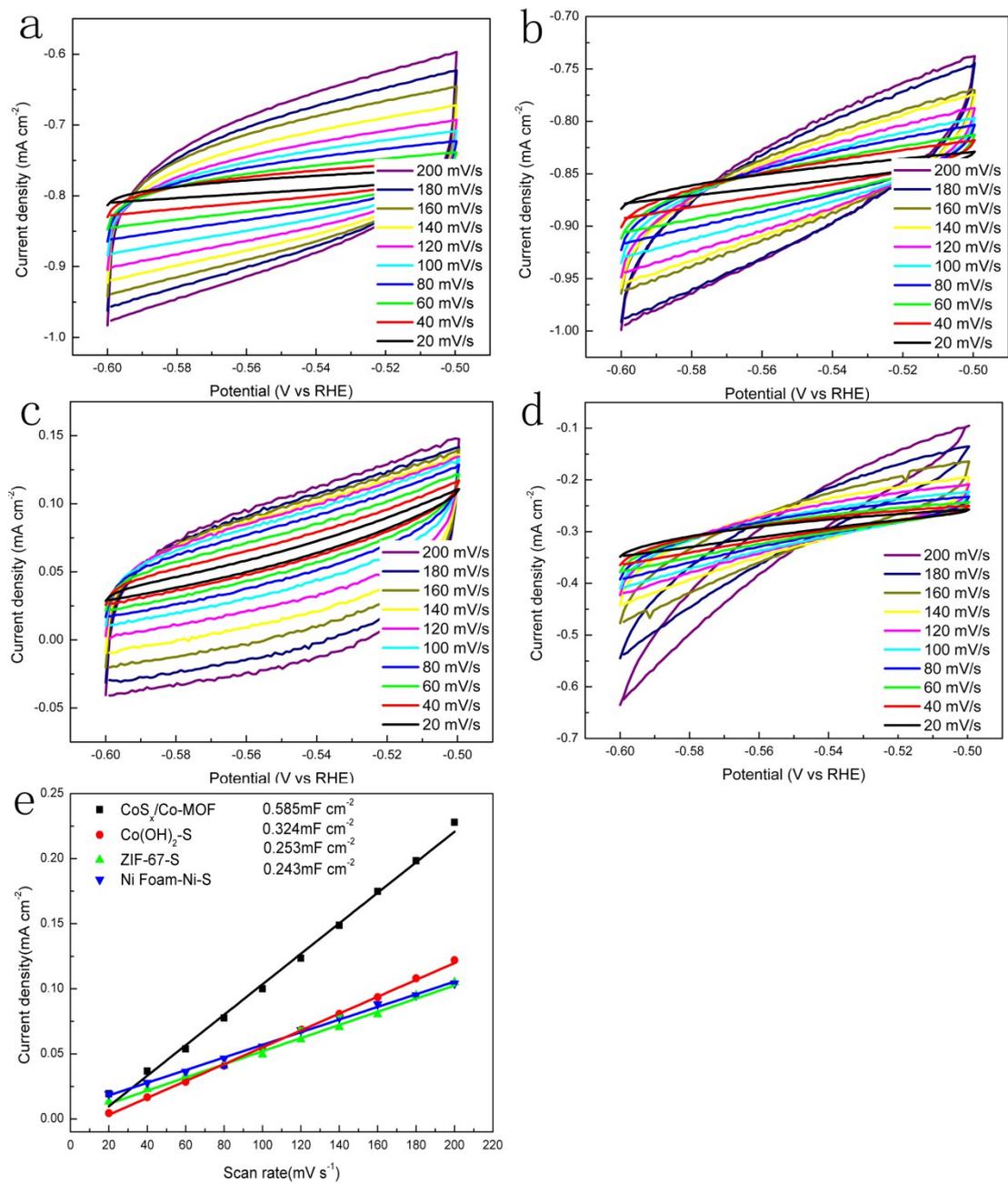
**Figure S4.** EDS spectrum of  $\text{Co(OH)}_2\text{-S}$ .



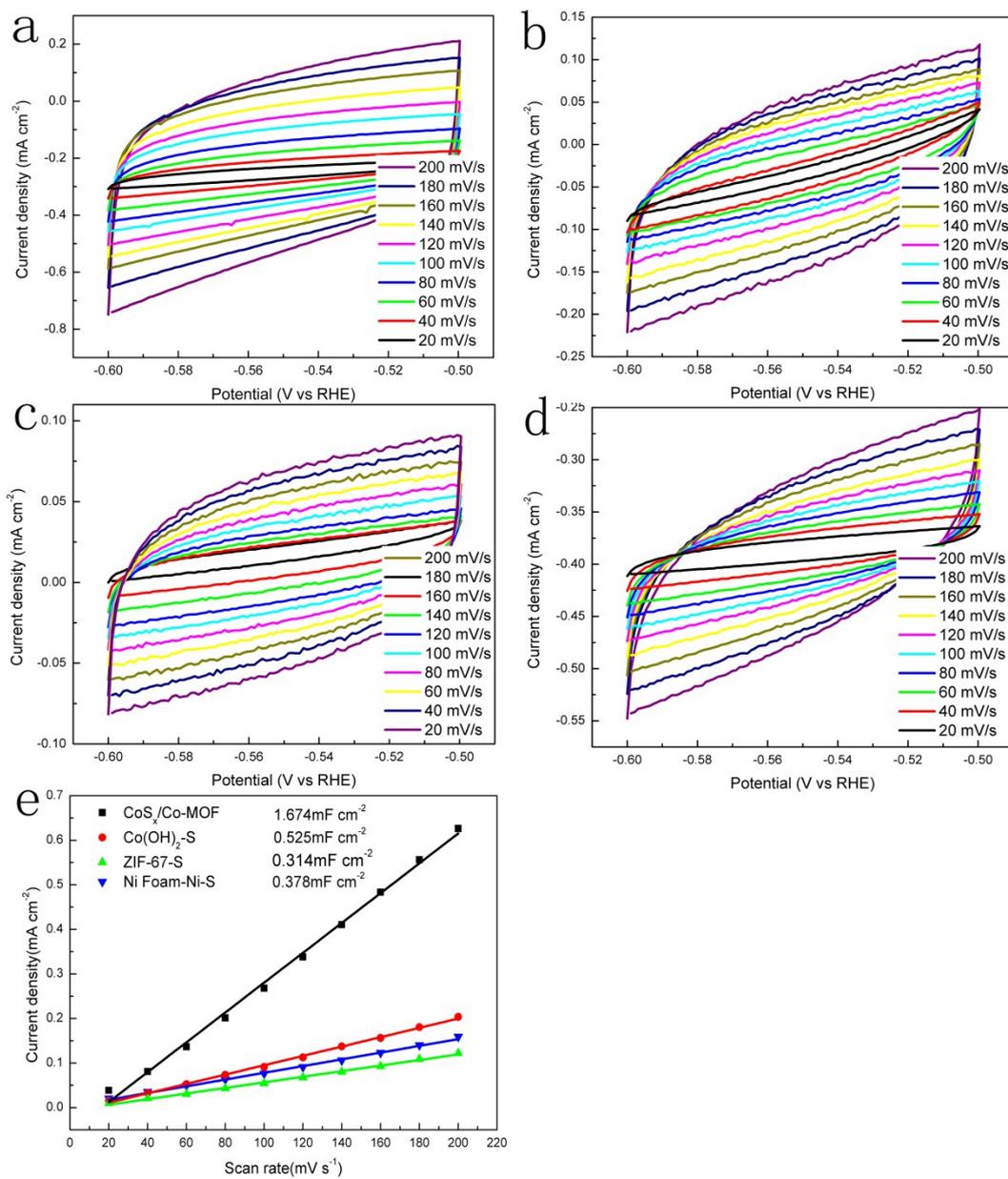
**Figure S5.** (a) EIS results at an overpotential of 300 mV toward HER; (b) EIS results at an overpotential of 300 mV toward OER.



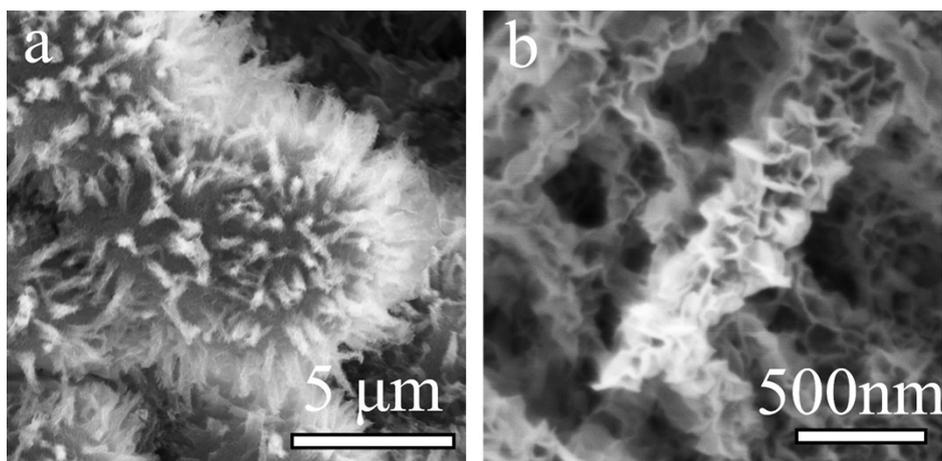
**Figure S6.** CV curves of (a) CoS<sub>x</sub>/Co-MOF; (b) Co(OH)<sub>2</sub>-S; (c) ZIF-67-S; (d) Ni foam-Ni-S; (e) ECSA evaluation toward HER.



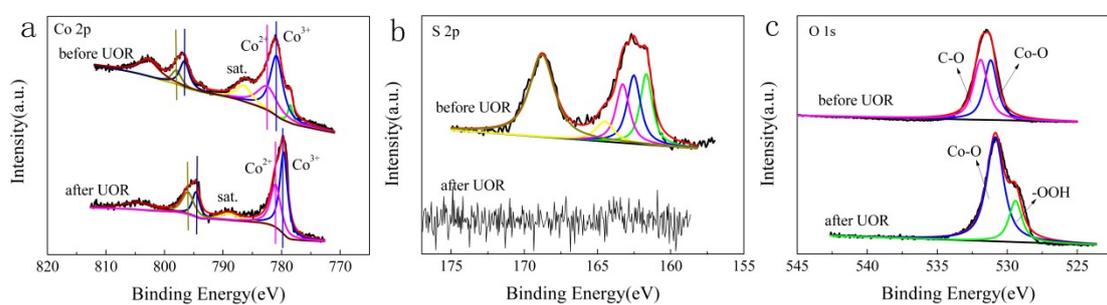
**Figure S7.** CV curves of (a) CoS<sub>x</sub>/Co-MOF; (b) Co(OH)<sub>2</sub>-S; (c) ZIF-67-S; (d) Ni foam-Ni-S; (e) ECSA evaluation toward OER.



**Figure S8.** CV curves of (a) CoS<sub>x</sub>/Co-MOF; (b) Co(OH)<sub>2</sub>-S; (c) ZIF-67-S; (d) Ni foam-Ni-S; (e) ECSA evaluation toward UOR.



**Figure S9.** SEM images of CoS<sub>x</sub>/Co-MOF after UOR.



**Figure S10.** (a) Co 2p (b) S 2p and (c) O 1s XPS spectra of CoS<sub>x</sub>/Co-MOF before and after UOR.