Supporting information

MOF-Derived RuO_2/Co_3O_4 heterojunctions as highly efficient bifunctional electrocatalysts for HER and OER in alkaline solutions

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Electrochemically active surface area (ECSA) measurement details

The electrochemically active surface area (ECSA) of sample is usually estimated using a simple cyclic voltammetry method. The ECSA of a catalyst sample is calculated from the double layer capacitance according to following formula:

$ECSA=C_{dl} / C_s$

However, the exact surface area of our material is difficult to obtain due to the unknown capacitive behavior (Cs) of the electrode of Co_3O_4/RuO_2. However, we can estimate the relative surface areas of three samples, since the double layer capacitance (C_{dl}) is expected to be linearly proportional to effective active surface area for samples with similar composition and this method was employed in our previous study. The double layer capacitance is estimated by plotting the ΔJ at 0.15 V vs RHE against the scan rate, where the slope is twice of C_{dl}.[1, 2] The C_{dl} of S-6, Co_3O_4 and RuO_2 are 3.1, 1.1 and 0.6mF/cm^2, respectively, showing that the product owns more active sites than single Co_3O_4 and RuO_2.

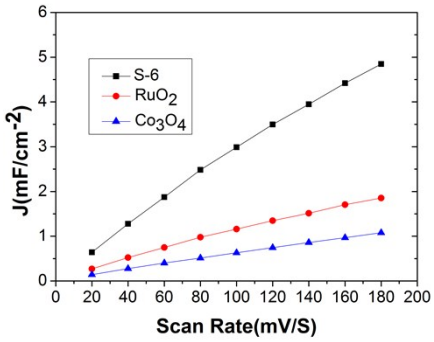

Figure S1. Variations of double-layer charging currents at 0.15V vs RHE with potential scan rate.

References

1. J. Chen, G. Xia, P. Jiang, Y. Yang, R. Li, R. Shi, J. Su and Q. Chen, *ACS Appl. Mater. Interfaces*, 2016, **8**, 13378-13383.
2. Y. Yang, Z. Lun, G. Xia, F. Zheng, M. He and Q. Chen, *Energy Environ. Sci.*, 2015, **8**, 3563-3571.