Electronic Supplementary Materials

**Enhanced Hydrogen Evolution Reaction on Hybrids of Cobalt Phosphide and Molybdenum Phosphide**

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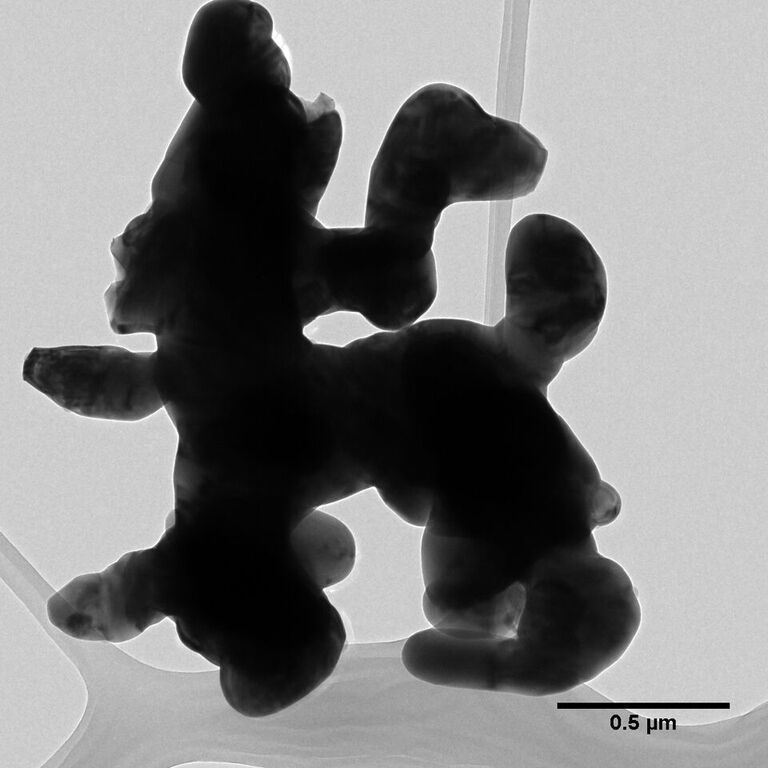
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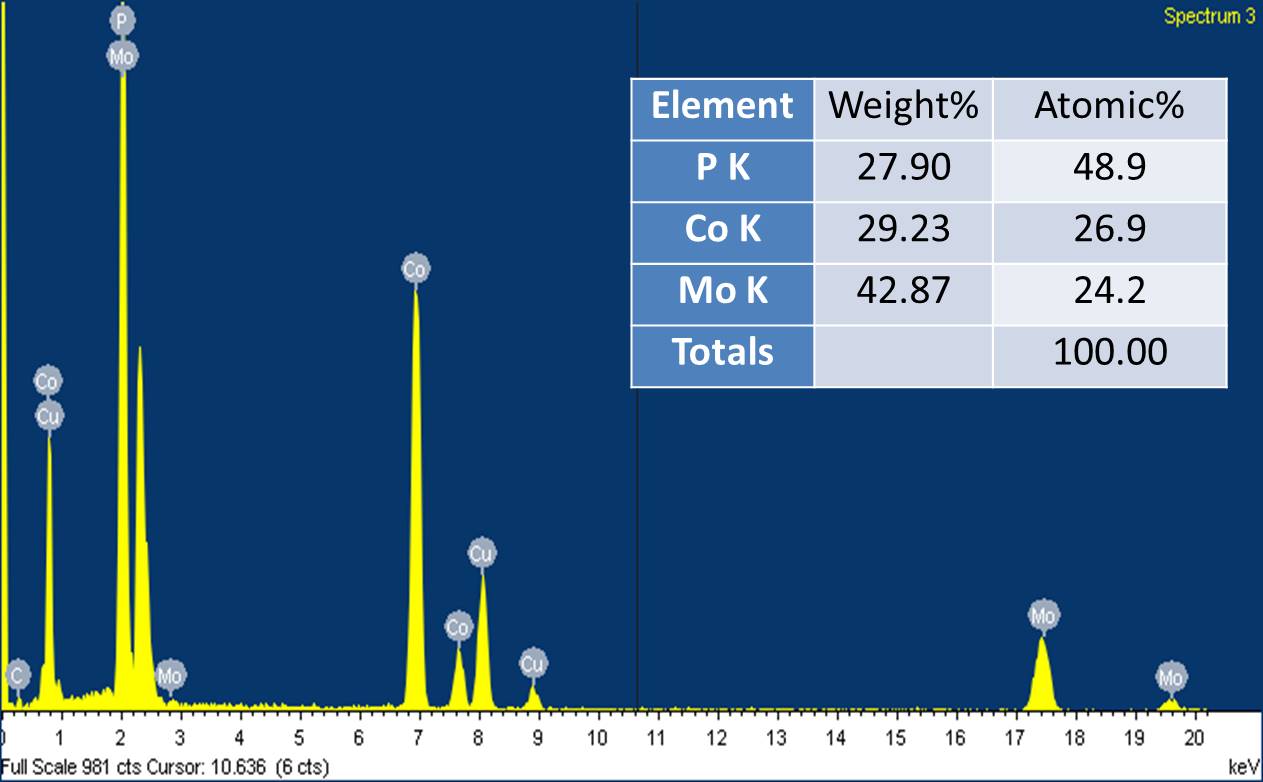
**Figure S1** Comparison of XRD patterns between the Co0.5Mo0.5P hybrid and the ICSD *h*-CoMoP2 database (ICSD No. 624219).

**Figure S2** XPS spectra of the Co0.5Mo0.5P hybrid in the (a) Co 2P, (b) Mo 3d and (c) P 2P regions.



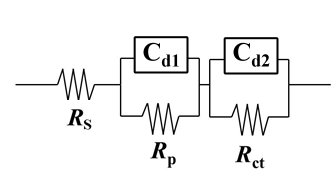
**Figure S3.** A TEM image of the Co0.5Mo0.5P hybrid.



**Figure S4** EDX spectrum of the Co0.5Mo0.5P hybrid collected by a HRTEM, and the elementary compositions are shown in the inset.



**Figure S5** Comparison of polarization curves of the CoP, MoP and three physical mixtures with CoP:MoP = 1:1 (weight ratio) in hydrogen–purged 0.1 M HClO4.



**Figure S6** The equivalent circuit model with two–time constant for fitting the electrochemical impedance spectroscopy under electrocatalytic condition in the hydrogen evolution reaction. *R*s, the series resistance; *R*ct, the charge transfer resistance; *R*p, resistance related to the surface roughness or porosity of the catalytic layer; *C*d1 and *C*d2, the double layer capacitances.







**Figure S7** Nyquist plots of experimental and simulated data for the (a) Co0.5Mo0.5P, (b) MoP (b) and (c) CoP annealed at 800oC simulated by the two-time constant model.



**Figure S8** Cathodic current density of the Co0.5Mo0.5P hybrid catalyst versus time at an overpotential of 165 mV for 6 hours.