

Kirkendall effect induced bifunctional water splitting electrocatalyst consisting of Co_9S_8 and MoS_2 hybrid

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Here, we present a bifunctional hybrid electrocatalyst consisting of Co_9S_8 and MoS_2 each performing as OER and HER active material with structural merits of hierarchical morphology, huge electrocatalytic active sites and enhanced charge transfer ability. The structural features were derived from metal organic framework precursor and elaborately controlled by the calcination temperature dependent-Kirkendall diffusion effect. Specifically, the imbalance in diffusion rates between Co and S confined in the carbon frame triggered outward growth of Co_9S_8 species while suppressing bulk growth of MoS_2 at outer surface, which facilitates effective accessibility of the electrolyte. As a result, the as-prepared hybrid electrocatalyst exhibits low overpotential of 126 mV for HER and 233 mV for OER to generate current density of 10 mA cm^{-2} , respectively.