

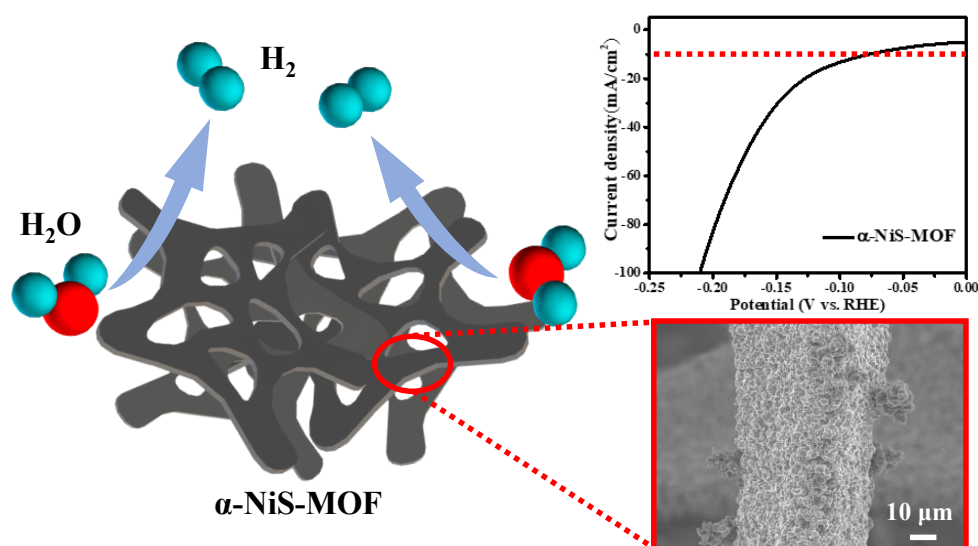
Nickel Sulfide on Organic Framework for Efficient Hydrogen Evolution Reaction

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Abstract: Hydrogen is eco-friendly and high-efficient energy. Choosing the electrocatalysts for hydrogen evolution reaction (HER) is an essential challenge to water splitting. And then transition metal chalcogenides (TMCs) are easy to prepare and cheap, so this works chemical vapor deposition (CVD) to sulfurize nickel-based metal-organic framework (MOF). The Scanning Electron Microscope (SEM) results of α -NiS-MOF indicate that the extensions on the branch can increase surface area. Experimentally, the electrochemical measurement results reveal that MOF after sulfidation has enhanced HER electrocatalytic performance in 1 M KOH (overpotential is 76.7 mV and 210 mV at the current density of -10 mA/cm^2 and -100 mA/cm^2), and widely improve electrochemical surface area (electrical double-layer capacitance is 0.8336 F/cm^2) compared to nickel foam after sulfidation. At the same time, X-ray photoelectron spectroscopy (XPS) was used to observe the chemical state changes of the surface elements of the electrocatalyst before and after the hydrogen evolution reaction. As a result, this work demonstrates a facile synthesis to optimize nickel sulfide electrocatalysts to improve their electrocatalytic performance for practical applications in future energy devices.



Keywords: transition metal chalcogenides, nickel sulfide, metal-organic framework, hydrogen evolution reaction