

Direct growth of hierarchically Ni₃S₂ nanostructures on nickel foam for enhanced hydrogen evolution reaction

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Hydrogen is not only a promising energy, but also widely used in inflammation treatment and sports training. The key to these applications is to obtain pure hydrogen conveniently. Water electrolysis provides a green and sustainable method for hydrogen production, but the urgent problem is to develop low-cost and efficient electrocatalysts. In this work, hierarchically porous Ni₃S₂ nanostructures, which the flocculent two-dimensional Ni₃S₂ is coated on the surface of Ni₃S₂ nanosheets, have been successfully grown on nickel foam through a facile two-step hydrothermal reaction. The hierarchically porous Ni₃S₂ nanostructures has a large specific surface area can expose more active sites and facilitates desorption of bubbles. Moreover, the theoretical calculation has indicated that the dimensional confinement effect of metallic Ni₃S₂ improves the carrier concentration and conductivity. Therefore, the hierarchically porous Ni₃S₂ nanostructures on nickel foam have exhibited enhanced hydrogen evolution reaction and good catalytic stability. This work sheds some light on improving the catalytic performance of metallic compounds.

Keywords: Metallic compounds, Hierarchically, Dimensional confinement, Hydrogen evolution reaction