

Electrochemical hydrogen evolution from MoS₂ directly grown on carbon paper by atomic layer deposition

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Recently hydrogen has been considered as an energy carrier for sustainable energy harvesting via water splitting. The electrochemical hydrogen evolution reaction is one of the most important pathways to efficiently produce hydrogen. Recently, MoS₂ has attracted great attention as one of the most promising HER catalysts to replace expensive Pt catalyst. Here we report MoS₂ catalyst which was directly grown on carbon fiber paper (CFP) at 100 °C by atomic layer deposition (ALD). The ALD of MoS₂ catalyst has a great advantage of conformal coating on porous substrates and precise control of the film thickness. The MoS₂/CFP catalyst shows excellent HER activity (Tafel slope: 55~60 mV/decade; exchange current density: ~ 10⁻⁷ A/cm²; TOF: 1.1 H₂/s at 0.200 V) and negligible loss of cathodic current after repeated hydrogen production of 1000 cycles.