

Process Optimization of Electrochemical Deposition of MoS₂ catalyst for Electrochemical Hydrogen Evolution Reaction

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Recently, amorphous molybdenum sulfide (MoS_x) has appeared to be an emerging material for electrochemical hydrogen evolution reaction (HER). Although there are several electrochemical deposition methods for MoS₂, process parameters for the electrochemical deposition of MoS₂ were not optimized for hydrogen evolution reactions. Here, we prepare MoS_x catalyst on carbon fiber paper (CFP) by electrochemical deposition method using a freshly-prepared sodium tetrathiomolybdate (Na₂MoS₄) solution. The process parameters such as precursor concentrations, deposition time, and applied voltage are optimized to improve the HER performance on MoS_x catalyst. It is demonstrated that the exchange current density, Tafel slope, and overpotential to reach a cathodic current of 10 mA/cm² are significantly enhanced by adjusting the deposition time, precursor concentrations, and applied voltage.