

Nickel-Molybdenum Nitride ( $\text{Ni}_2\text{Mo}_3\text{N}$ ) Catalyst for Outstanding Hydrogen Evolution: Facile One-Pot Synthesis and Active Site Investigation

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In electrochemical hydrogen production, Pt-based electrocatalysts show the best performance. However, considering the high cost and scarcity of the Pt, the development of low cost and abundant non-precious metal catalysts is highly required for hydrogen evolution reaction (HER). Transition metal nitrides (TMNs) have unique physical properties (hardness and superconductivity) and similar electronic structures to noble metals. TMNs have been recently as potential HER catalysts, and further HER activity enhancement has been achieved by employing bimetallic TMNs. Nickel Molybdenum nitride (Ni-Mo-N) are representative bimetallic TMNs with high HER activity. Herein, we easily synthesized bimetallic nickel - molybdenum nitride on Ni foam by a simple annealing of Mo precursor and Ni foam in one-pot. In synthesis, Ni foam acted as Ni precursor because Ni atoms are released from the Ni foam during annealing, and toxic  $\text{NH}_3$  gas was not used. This bimetallic nitride electrocatalyst displayed outstanding HER activity with a low overpotential (21.3 mV at 10  $\text{mAcm}^{-2}$  and 123.8 mV at 100  $\text{mAcm}^{-2}$ ) and great durability for 24 h in alkaline media.