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Epitaxial Growth of Hexagonal Boron Nitride/Nickel Boride Crystal on Ni(111) as Electrocatalyst for Hydrogen Evolution Reaction

The development of efficient and stable electrocatalysts to water splitting is important for hydrogen production in future energy systems. Transition metal boride (TMB) have shown great potential for catalytic applications as alternatives to platinum. In this presentation, I will demonstrate the growth of crystalline nickel boride (Ni₂B₆) covered by a hexagonal boron nitride (h-BN) on single crystal Ni(111) foil by chemical vapor deposition (CVD) method with a borazine precursor at high temperature and low pressure. The h-BN/Ni₂B₆ shows electrocatalytic activity and stability for hydrogen evolution reaction (HER) in acidic solution: overpotential of 54 mV at a current density of 10 mA cm⁻² and Tafel slope of 46 mV dec⁻¹. I also show that h-BN/Ni₂B₆ is more stable than pristine Ni₂B₆ during HER in aqueous acidic media.