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Synergistic Nickel phosphide/MXene: An Efficient Hydrogen Evolution Electrocatalyst In Acidic Media

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Abstract. Electrocatalysis plays a crucial role in the development of sustainable approaches for generating hydrogen as a clean energy source. Hydrogen is considered a promising and clean fuel for various applications, including energy storage and transportation. Developing effective and affordable electrocatalysts is crucial to make water splitting economically viable and environmentally sustainable. Herein, we have taken a commendable step towards understanding the synergistic correlation of metal phosphide (Ni_2P) and MXene ($Ti_3C_2T_x$) hybrid structures for efficient catalyst for hydrogen evolution. The $Ni_2P/Ti_3C_2T_x$ hybrid structure outperformed from its bare phosphide counter part with an overpotential (@ 10 mA/cm^2) of 351 mV, tafel slope of 95 mV/dec with excellent stability profile sustaining up to 11000 secs. This work further provides new pathways to dig up on other phosphide and MXene structures towards sustainable and low cost electrocatalyst.

Keywords: Hydrogen evolution, electrocatalyst, MXene, Tafel slope