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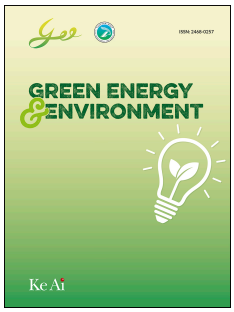

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Three-dimensional Hierarchical MoS_2/CoS_2 Heterostructure Arrays for Highly Efficient Electrocatalytic Hydrogen Evolution

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Abstract

Developing non-expensive, highly active and highly stable electrocatalysts for hydrogen evolution has aroused extensive attention, owing to the necessity of novel clean and sustainable energy carriers. In this paper, we repost a synthesis of free-standing three-dimensional hierarchical MoS_2/CoS_2 heterostructure arrays through a convenient process. The investigation of electrocatalytic HER performance suggests that the MoS_2/CoS_2 hybrid catalyst exhibits significant enhancement in HER (onsetpotential and potential at a current density of 100 mA cm^{-2} are 20 mV and 125 mV, respectively) and superior durability (no shift of current density is observed after a continuous scanning of 3000 times) compared with individual CoS_2 and MoS_2.The superior HER performance was attributed to the formation of the interface between CoS_2 and MoS_2 through the electrochemical characterization, Raman, XPS analysis, and the control experiment. The lower onsetpotential, higher current density, excellent durability, and the free-standing structure of the three-dimensional hierarchical MoS_2/CoS_2 hetero-structure array make it a promising cathode catalyst suitable for widespread application.

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Keywords: MoS_2/CoS_2; Heterostructure array; Free-standing; Hydrogen evolution reaction;