COBALT SULFIDE ELECTRODEPOSITED ON NICKEL FOAM AS HIGHLY EFFICIENT ELECTROCATALYSTS FOR OXYGEN EVOLUTION REACTION IN ALKALINE WATER ELECTROLYSIS

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ABSTRACT

Oxygen Evolution Reaction (OER) is crucial for the overpotential and applied energy during water splitting. Non-noble metals, especially cobalt sulfide composites, have recently gained interest due to their high OER efficiency. In this study, the impact of Co/S molar ratio on the structural, morphological, and electrochemical characteristics of Ni-based electrodes was investigated through field emission scanning electron microscopy (FE-SEM), X-ray diffraction (XRD), X-ray fluorescence (XRF) and electrochemical experiments. The as-prepared electrodes were fabricated via a one-step electrodeposition process over a nickel foam (NF) substrate. The NF electrode with equimolar Co:S ratio (1:1) exhibited the optimum electrochemical performance, offering overpotential value $|\eta_{10}|$ = 0.28 V, Tafel slope of 95 mV dec^{-1}, and double layer capacitance (C_{DL}) of 10.7 mF cm^{-2}. Its superior performance can be attributed to the formation of flower-like nanosheets, offering high electrochemically active surface area and improved oxygen kinetics.

Keywords: Oxygen Evolution Reaction (OER), Cobalt sulfide nanostructures, water electrolysis