Abstract

In the pursuit of sustainable energy resources, hydrogen production is more desirable due to its regular and sustainable nature, as well as its zero carbon dioxide emissions. We fabricated and characterized metal-organic framework (MOF) related electrocatalysts for HER and OER. Cobalt (Co) worked as the main metal, with Cerium (Ce), Nickel (Ni), Copper (Cu), and Cadmium (Cd) as co-metals, with 2-aminoterephthalic acid as the organic ligand. Solvothermal methods was used to prepare these MOFs and in-situ deposited on nickel foam (NF) substrates. General Characterization by SEM, EDX, and XRD confirmed the successful formation of Co-Ni MOF-based electrocatalysts. Electrochemical analyses shown that Co-Ni MOF/NF beat other catalysts by demonstrating remarkable HER and OER current densities of 530 $mAcm^{-2}$ and 514 $mAcm^{-2}$, respectively. Particularly, Co-Ni MOF/NF displayed low contact resistance and charge transfer resistance in EIS, indicating efficient charge transference kinetics. This study confirms the potential of Co-Ni-MOF/NF for sustainable hydrogen production, based on higher performance as proved by XRD and SEM data. Furthermore, the catalyst's catalytic activity was expressively enhanced by the synergistic effects causing from the cobalt and nickel metals' combination, indicating it's prospective as efficient catalyst in the field of renewable energy.