22nd Iranian Inorganic Chemistry Conference,
23-25 August, 2023
University of Kurdistan

NiFe Oxide-Based Electrodes Loaded on Indium Tin Oxide as Effective Electrocatalysts for Oxygen-Evolution Reaction

Mohammad Khateri and Mohammad Mahdi Najafpour*

Department of Chemistry, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, 45137-66731, Iran

**E-mail: mmnajafpour@iasbs.ac.ir*

The oxygen-evolution reaction (OER) is a vital process in energy storage applications such as metal-air batteries and water splitting.[1,2] NiFe oxide-based electrodes have gained significant attention for OER due to their promising features.[3,4] In this study, we investigated the effectiveness of NiFe oxide loaded on indium tin oxide as an electrocatalyst for OER in the presence of $NaHCO_3$.

The electrocatalyst was characterized using various techniques, including Raman spectroscopy, diffuse reflectance spectroscopy (DRS), X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy-dispersive X-ray spectrometry (EDX). Our findings revealed that NiFe oxide loaded on indium tin oxide serves as an effective and durable electrocatalyst for OER in the presence of $NaHCO_3$.

Furthermore, our results suggest that the electrolysis of $NaHCO_3$ solution offers a highly promising alternative for producing oxygen and hydrogen compared to corrosive acidic or alkaline solutions. These findings demonstrate the potential of NiFe oxide-based electrodes for OER and offer insights into developing sustainable and efficient energy storage systems.

Keywords: oxygen-evolution reaction, indium tin oxide, electrocatalyst

References

[1] Tee, S.; Khin, y. w.; Teo, W.; Koh, L.-D.; Liu, S.; Teng, C. P.; Han, M.-Y. Recent Progress in Energy-Driven Water Splitting. *Advanced Science* **2017**, *4*, 1600337. DOI: 10.1002/advs.201600337.

[2] Al-Fetlawi, H.; Shah, A.; Walsh, F. Modelling the effects of oxygen evolution in the all-vanadium redox flow battery. *Electrochimica Acta* **2010**, *55*, 3192-3205. DOI: 10.1016/j.electacta.2009.12.085.

[3] Sun, Y.; Liu, C.; Zhang, L.; Wan, P.; Zhuang, S.; Tang, Y.; Chen, Y.; Pan, J. Ultrafast Electrodeposition of Ni–Fe Hydroxide Nanosheets on Nickel Foam as Oxygen Evolution Anode for Energy-Saving Electrolysis of Na2CO3/NaHCO3. *ChemElectroChem* **2017**, *4* (5), 1044-1050.

[4] *ACS Appl. Energy Mater* **5, 22, 2023**, *6* (10), 5536-5547.