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

Synthesis, Characterization, and Electrochemical Properties Study of a Novel Polyoxotungstate/Metal-Organic Framework/MWCNTs-COOH Nano-hybrid Material

Zahra sadeghi, Somayeh Dianat*

Department of Chemistry, Faculty of Sciences, University of Hormozgan, Bandar Abbas 79161-93145, Iran

E-mail:s.dianat@hormozgan.ac.ir

Polyoxometalates (POMs) are a large group of metal-oxygen cluster anions that have unique structural and electronic characteristics [1,2]. Therefore they have many applications in various fields [1]. One of the essential applications of POMs, specially Keggin-type POMs, is in the electrochemistry field [2]. The stability of these compounds in aqueous environment and with increasing pH decreases [3]. These characteristics limit the analytical application of these compounds. Therefore, in this research, in order to overcome this limitation, a hybrid composition based on polyoxometalate stabilized on the surface of multi-walled carbon nanotubes ($SiW_{11}Co$@Cu-BTC/MWCNTs-COOH) was designed and prepared. Then $SiW_{11}Co$@Cu-BTC/MWCNTs-COOH nano-hybrid material was characterized by various methods such as Fourier transform infrared spectroscopy (FTIR), X-ray Diffraction (XRD), and transmission electron microscopy (TEM). Then the surface of the glassy carbon electrode was modified by this nano-hybrid compound during two stages of drop-casting and then electrochemical reduction method. The surface morphology, and electrochemical properties of the $SiW_{11}Co$@Cu-BTC/MWCNTs-COOH/GCE were evaluated by field emission scanning electron microscope/EDS (FE-SEM/EDS), and voltammetry techniques.

Keywords: Polyoxometalate (POM), Metal-Organic Framework (MOF), MWCNTs-COOH, Nano-hybrid materials, Electrochemical Properties.

References

[1] D. Wang, L. Liu, J. Jiang, L. Chen, J. Zhao, *Nanoscale* **2020**, 12, 5705.
[2] F. M. Gusmão, D. Mladenović, K. Radinović, D. M. Santos, B. Šljukić, *Energies* **2022**, 15, 9021.
[3] S. Dianat, S. Tangestaninejad, B. Yadollahi, A.-K. Bordbar, M. Moghadam, V. Mirkhani, I. Mohammadpoor-Baltork, *J. Mol. Liq.* **2012**, 174, 76.