

عنوان مقاله:

Synthesis, Characterization, and Electrocatalytic Activity of a New Polypyridyl Osmium (II) Complex

محل انتشار:

بیست و یکمین سمینار شیمی معدنی انجمن شیمی ایران (سال: 1398)

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خلاصه مقاله:

The evidence that increased levels of atmospheric CO₂ are responsible for the rise in global temperature is overwhelming. The atmospheric CO₂ was measured to be 407 ppm in 2017, whereas it was 315 ppm in 1955 [1]. The utilization of CO₂ as a feedstock to produce the chemicals not only contributes to alleviating global climate changes caused by increasing CO₂ emissions, but also results in a great challenge in discovering new opportunities for the catalytic and industrial development. Several technologies have been studied to convert CO₂ to the value added chemicals and fuel such as methanol or CO as a renewable source [2, 3]. Among the most widely studied methods to CO₂ transformation, the efficient and selective electrochemical reduction is very important. A number of group VIII transition metal complexes (Fe, Ru, and Os) have been reported as the electrocatalysts for the CO₂ reduction [4, 5]. The detailed mechanistic insight required to design new electrocatalysts which run at low overvoltages with high selectivity of the desired product. Here in, we report the synthesis and characterization of a new polypyridyl osmium (II) complex, [Os (DMF) 2(tmp)2](BF₄)₂, by elemental analysis, spectroscopic techniques, and cyclic voltammetry. Moreover, the electrocatalytic activity of this complex was examined towards the CO₂ reduction to CO using cyclic voltammetry. The effect of the different parameters such as concentration of the electrocatalyst, temperature, and scan rate was investigated on the catalytic activity of the Os (II) complex. Further, DFT calculations were used to confirm the suggested electrocatalytic cycle for the conversion of CO₂ to CO.

کلمات کلیدی:

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