

Chemical Engineering Thesis Defense

Electroreduction of Carbon Dioxide to Formate on Carbon Supported Bismuth

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Abstract

To address the issue of excessive carbon dioxide (CO₂) emissions, many scientists have developed an approach called Electroreduction of CO₂ (CO₂ER), which can convert CO₂ into useful compounds, such as formic acid, methane, ethylene, and more. This study synthesized carbon-supported Bi nanoparticles as a electrocatalyst for the electroreduction of CO₂ to formate. The aim of this research was to develop a Bi-based electrocatalyst that can be easily produced on a large scale, as existing Bi-based catalysts are challenging to manufacture in bulk.

This M.S. thesis presents the process of synthesizing the catalysts and conducting further electroreduction experiments. Additionally, it reports the surface measurement results of the synthesized carbon-supported Bi particles. The Faradaic Efficiency (FE%) of the carbon-supported Bi particles was 70%, which is a 50% increase compared to the empty experiment. The comparison between carbon-supported Bi particles and a massive Bi rod is also discussed. Moreover, the effect of different catholytes, including KHCO₃, KCl, and K₂SO₄ solutions, is further examined.



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Zoom Link: <https://asu.zoom.us/j/7383588853>