Single-Step Electrodeposition and Electroreduction of Bimetallic Bi-Cu Electrocatalyst for CO2 Reduction to Formic Acid

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Project objectives and goals

- Prepare Bi and Bi-Cu electrodes via constant current electrodeposition in the presence of CO_2 gas.
- Compare the electrocatalytic performance of Bi and Bi-Cu electrodes for CO_2 reduction to formic acid.
- Investigate how CO_2 presence during electrodeposition influences surface composition and catalytic behavior.
- Benchmark the CuBi electrode against CuBi catalysts from previous studies prepared by different synthesis methods.

Methodology

Constant current electrodeposition in the presence of CO_2

Challenges and obstacles encountered

Limited time did not allow me to conduct experiments on advanced electrochemical cells and repeating some analysis, I just did the initial tests of the catalyst.

Results

The single step electrodeposition and electroreduction of CuBi catalyst, demonstrated enhanced efficiency and cost-effectiveness. This optimized method improved the catalytic performance, resulting in higher formic acid yield, high PCD of 130mA/cm^2, high stability, making it a promising approach for eCO_2 conversion.

Future Goals

Electrolyzer scale-up and high yield pure formic acid production.

Resources and tools

- Potentiostat
- XPS
- XRD
- SEM
- NMR