Abstract

Electrolyzers For CO_2 Conversion from BioSources

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Dioxide Materials' anion exchange membrane CO_2 electrolyzers have demonstrated the highest Faradaic efficiency and stability reported in the literature for reduction to CO. To interface with an industrial scale biorefinery the surface area must be increased to at least $1m^2$ and scaled to the tens of MW scale. It has also been observed that the conversion performance is also reduced due to components in fermentation flue gas.

In the proposed work, we will

- create electrolyzer designs that are scalable to the MW scale;
- develop improved catalyst/ionomer layers that are robust to changes in flue gas composition;
- integrate the improved electrolyzer with a CO fermenting microbe.

If successful, this project develop membrane and cell housing designs that are scalable to match industrial biorefinery CO_2 emissions to produce fuels and chemicals. Thereby achieving BETO goals of producing a transportation fuel at a modeled minimum fuel selling price of $2.5 gallon of gasoline equivalent by FY 2030, while increasing the carbon efficiency of an EtOH biorefinery. This technology will help U.S. industry meet sustainability goals by producing value added products from CO_2.