

SEAI National Energy Research, Development & Demonstration Funding Programme

Authors

Stephen Dooley, Trinity college of Dublin
Kim McKelvey, Victoria University of Wellington, New Zealand

Project Partners

Mohammad Reza Ghaani, Weiming (Alex) Liu, Harry Dunne, Trinity College of Dublin

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Contact details

e: stephen.dooley@tcd.ie
[Stephen Dooley | LinkedIn](#)

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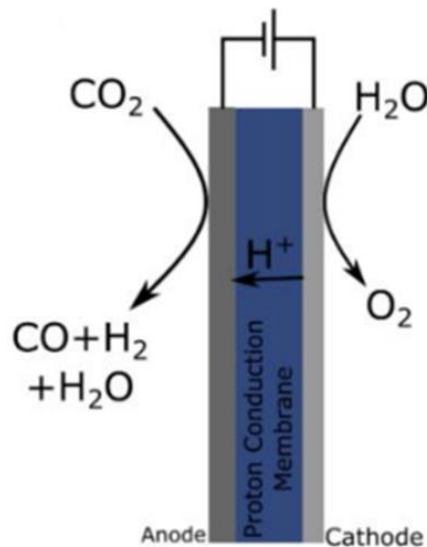
An Electricity-to-Fuels Research and Deployment Platform for Ireland

Abstract

The purpose of this project is to gather essential engineering data about the performance of electrocatalytic cells for carbon dioxide reduction to drop-in transportation fuels.

This data will be used to design and optimise a device of superior performance to state-of-art. A key innovation in the proposal is to create a computational modelling platform that will describe the

dioxide reduction to CO, methane and methanol will be created and its performance determined. A multi-physics model will then be written to describe the chemical reaction kinetics and fluid mechanics which the device manipulates. The model will subsequently be exercised to define the optimum conditions at which the cell device could function. Finally, the optimized cell will be constructed, and its performance verified.



essential physics and chemistry occurring in such devices. This will allow engineers not knowledgeable in the area to design and prototype such devices numerically at low time and materials costs. To achieve these goals, a prototype electrochemical cell for carbon

Research Outcomes

Two articles have been published by our research group in 2024, in the American Chemical Society journals *The Journal of Physical Chemistry*, and *Applied Energy Materials*.

Recommendations

Investment in renewable electricity generation is advised as electrochemical CO₂ reduction relies on cheap renewable electricity. Carbon capture technologies should be invested in as CO₂ reduction relies on a feedstock of captured CO₂. Infrastructure for CO₂ electrolysis plants should be constructed just as green H₂ plants are constructed currently

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