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Technical University of
Denmark



Technical University
Berlin



Delft University
of Technology



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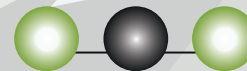
Pretexo



SLAC National
Accelerator Laboratory



SELECTIVE ELECTROCHEMICAL
REDUCTION OF CO₂ TO HIGH
VALUE CHEMICALS



SELECTCO2 aims to contribute to the electrification of the chemicals industry through the development of highly selective and efficient devices for the conversion of CO₂ to high value products at low temperatures and pressures.

Electrochemical CO₂ reduction uniquely allows to start with a single reactant, CO₂, and uses catalysis to build up selectively to a given molecule. With electricity as the driving force, we can take advantage of low-cost wind and solar energy to provide an economically competitive approach towards a sustainable chemicals industry. The direct conversion to a specific product allows for the mitigation or even elimination of separation costs and can greatly reduce the costs of producing a given chemical.

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www.selectco2.eu

Objective 1

Development of selective catalysis for CO, ethanol and ethylene.

Objective 2

Develop gas diffusion layers for improved CO₂ conversion to a given product.

Objective 3

Develop anion-exchange membranes and ionomers specific to CO₂ reduction applications.

Objective 4

Develop mass transfer models to improve selectivity.

Objective 5

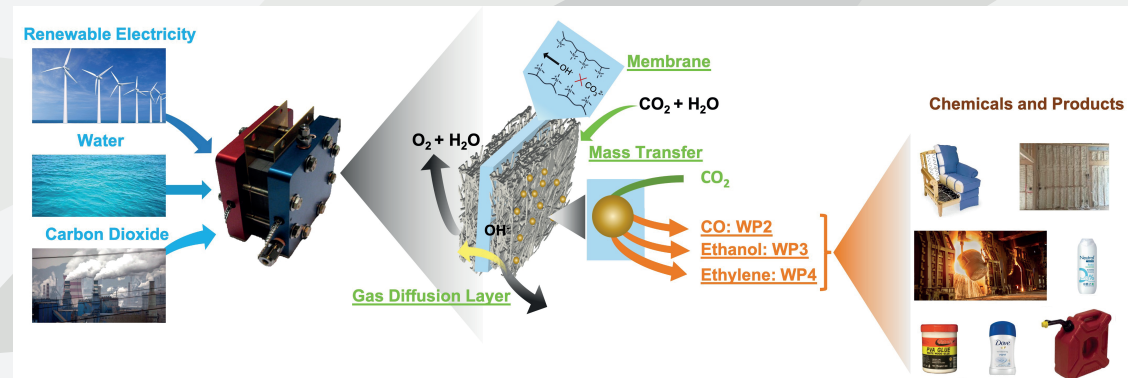
Analyse the benefits of SELECTCO₂ technologies to specific products.

Objectives and Overview

The drastic price drop in renewable electricity from sources such as solar and wind along with the global mandate to significantly reduce CO₂ emissions has now led to a new energy conversion opportunity: **Sustainable chemical production through electrochemical CO₂ reduction (ECO2R)**. This process combines CO₂ with water to produce organics, effectively the reverse of a combustion reaction

ECO2R process is a net consumer of CO₂, which will balance out the natural production of CO₂ from oxidative decay or combustion of used chemicals, thus allowing for a **CO₂ neutral chemical industry**. While the ECO2R is uphill in energy, cheap electrical energy along with an appropriate catalyst can allow us to accomplish this goal at an economically competitive price.

This approach will take advantage of Europe's high renewable electricity penetration and high-tech work force to create high value base chemicals (CO, ethanol, and ethylene) for the chemical industry.



SELECTCO₂ will develop enhanced electrolysis devices enabling CO₂ to be converted into high value chemicals. Specifically, it will improve selectivity, efficiency and durability of electrochemical CO₂ conversion into either carbon monoxide, ethanol or ethylene.

The immediate focus will be on the highly economically attractive **chemical industry**, with the long-term goal of using this as a steppingstone towards the **fuel industry**.